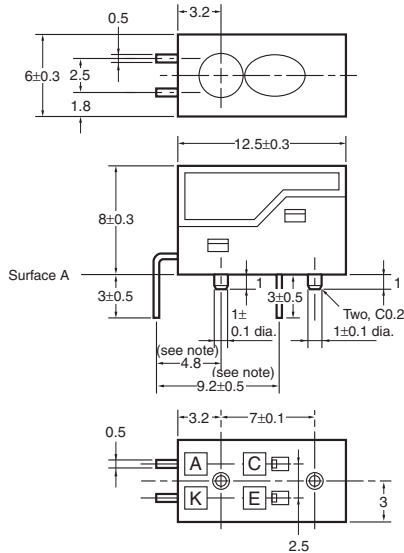


## Photomicrosensor (Reflective) EE-SY169B

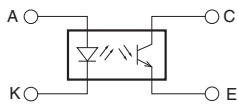
**⚠ Be sure to read *Precautions* on page 24.**

### ■ Dimensions

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



#### Internal Circuit



**Note:** These dimensions are for the surface A. Other lead wire pitch dimensions are for the housing surface.

Unless otherwise specified, the tolerances are as shown below.

| Dimensions   | Tolerance |
|--------------|-----------|
| 3 mm max.    | ±0.3      |
| 3 < mm ≤ 6   | ±0.375    |
| 6 < mm ≤ 10  | ±0.45     |
| 10 < mm ≤ 18 | ±0.55     |
| 18 < mm ≤ 30 | ±0.65     |

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

### ■ Features

- High-quality model with plastic lenses.
- Highly precise sensing range with a tolerance of ±0.6 mm horizontally and vertically.
- With a red LED sensing dyestuff-type links.
- Limited reflective model
- Higher gain than EE-SY169.
- Possible to get the same  $I_L$  as EE-SY169 with  $I_F=10$  mA. (half of EE-SY169 condition)
- Recommended sensing distance = 4.0 mm

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

| Item                  | Symbol                    | Rated value                        |
|-----------------------|---------------------------|------------------------------------|
| Emitter               | Forward current           | $I_F$<br>40 mA<br>(see note 1)     |
|                       | Pulse forward current     | $I_{FP}$<br>300 mA<br>(see note 2) |
|                       | Reverse voltage           | $V_R$<br>3 V                       |
| Detector              | Collector–Emitter voltage | $V_{CEO}$<br>30 V                  |
|                       | Emitter–Collector voltage | $V_{ECO}$<br>---                   |
|                       | Collector current         | $I_C$<br>20 mA                     |
|                       | Collector dissipation     | $P_C$<br>100 mW<br>(see note 1)    |
| Ambient temperature   | Operating                 | $T_{opr}$<br>0°C to 70°C           |
|                       | Storage                   | $T_{stg}$<br>–20°C to 80°C         |
| Soldering temperature | $T_{sol}$                 | 260°C<br>(see note 3)              |

- Note:**
1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.
  2. The pulse width is 10  $\mu$ s maximum with a frequency of 100 Hz.
  3. Complete soldering within 10 seconds.

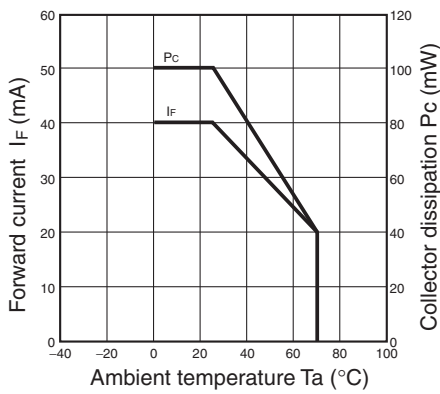
### ■ Electrical and Optical Characteristics (Ta = 25°C)

| Item         | Symbol                               | Value   | Condition  |
|--------------|--------------------------------------|---|--|
| Emitter      | Forward voltage                      | $V_F$<br>1.85 V typ., 2.3 V max.                    | $I_F = 20$ mA  |
|              | Reverse current                      | $I_R$<br>0.01 $\mu$ A typ., 10 $\mu$ A max.         | $V_R = 3$ V  |
|              | Peak emission wavelength             | $\lambda_P$<br>660 nm typ.                          | $I_F = 20$ mA  |
| Detector     | Light current                        | $I_L$<br>160 $\mu$ A min., 2,000 $\mu$ A max.       | $I_F = 10$ mA, $V_{CE} = 5$ V<br>White paper with a reflection ratio of 90%, $d = 4$ mm (see note) |
|              | Dark current                         | $I_D$<br>2 nA typ., 200 nA max.                     | $V_{CE} = 5$ V, 0 lx   |
|              | Leakage current                      | $I_{LEAK}$<br>2 $\mu$ A max.                        | $I_F = 20$ mA, $V_{CE} = 5$ V with no reflection   |
|              | Collector–Emitter saturated voltage  | $V_{CE} (sat)$<br>---                               | ---  |
|              | Peak spectral sensitivity wavelength | $\lambda_P$<br>850 nm typ.                          | $V_{CE} = 5$ V   |
| Rising time  | $t_r$<br>30 $\mu$ s typ.             | $V_{CC} = 5$ V, $R_L = 1$ k $\Omega$ , $I_L = 1$ mA |  |
| Falling time | $t_f$<br>30 $\mu$ s typ.             | $V_{CC} = 5$ V, $R_L = 1$ k $\Omega$ , $I_L = 1$ mA |  |

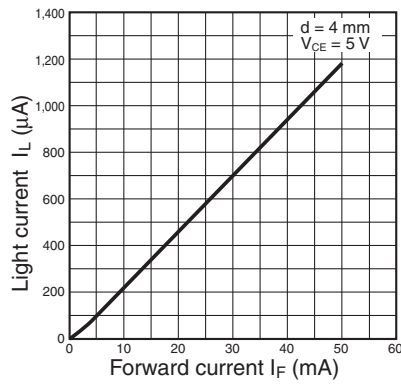
**Note:** The letter “d” indicates the distance between the top surface of the sensor and the sensing object.

■ Engineering Data

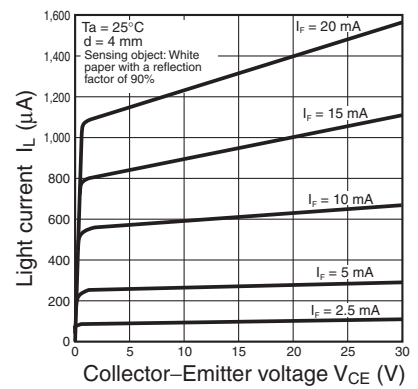
**Forward Current vs. Collector Dissipation Temperature Rating**



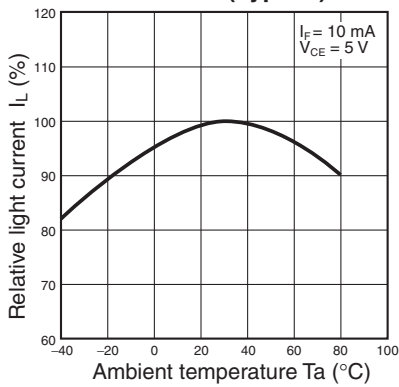
**Light Current vs. Forward Current Characteristics (Typical)**



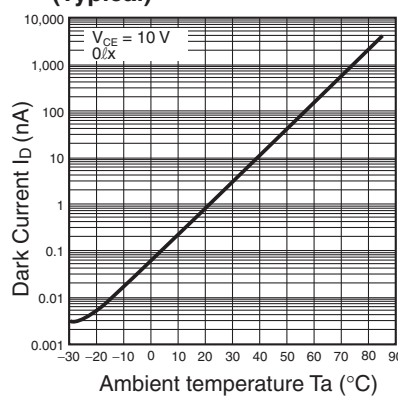
**Light Current vs. Collector–Emitter Voltage Characteristics (Typical)**



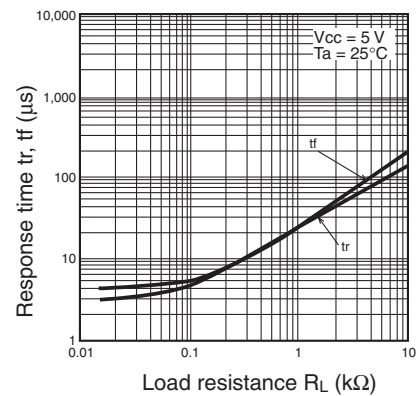
**Relative Light Current vs. Ambient Temperature Characteristics (Typical)**



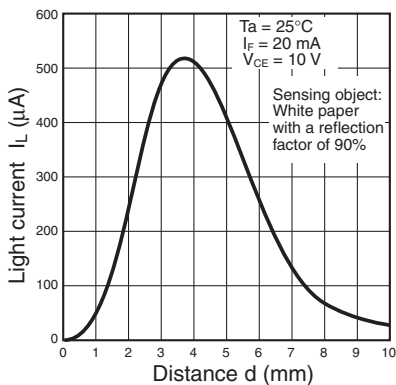
**Dark Current vs. Ambient Temperature Characteristics (Typical)**



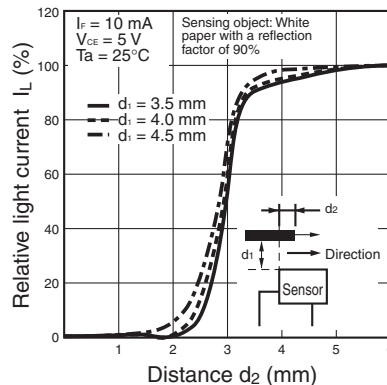
**Response Time vs. Load Resistance Characteristics (Typical)**



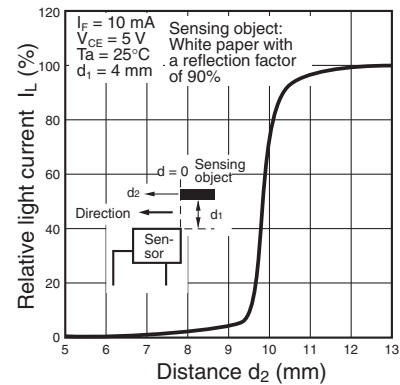
**Sensing Distance Characteristics (Typical)**



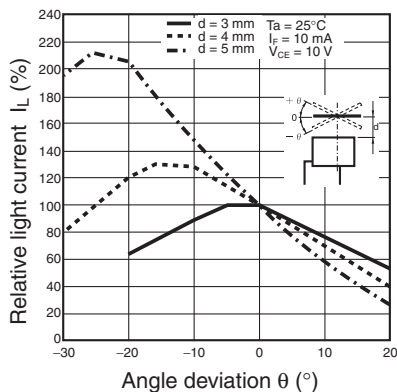
**Sensing Position Characteristics (Typical)**



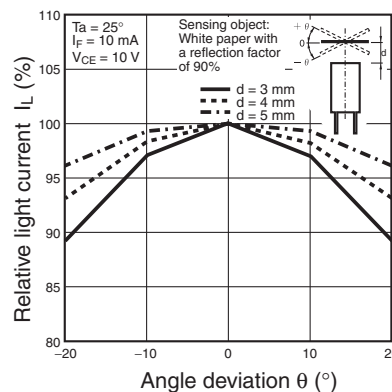
**Sensing Position Characteristics (Typical)**



**Sensing Angle Characteristics (Typical)**



**Sensing Angle Characteristics (Typical)**



**Response Time Measurement Circuit**

