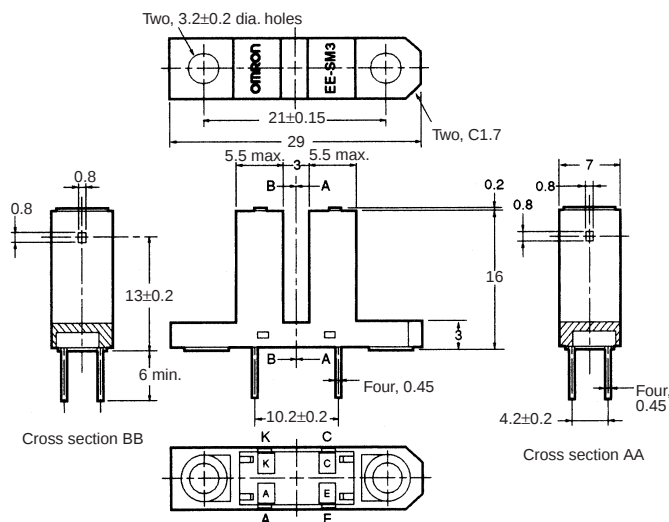


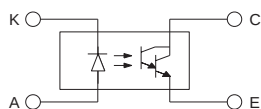
## Photomicrosensor (Transmissive) EE-SM3

### ■ Dimensions

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



Internal Circuit



Unless otherwise specified, the tolerances are as shown below.

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

| 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     |

### ■ Features

- General-purpose model with a 3-mm-wide slot.
- PCB mounting type.
- With a red LED as an emitter element and a Photo-Darlington transistor as a detector element.

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

| Item                | Symbol                    | Rated value                  |
|---------------------|---------------------------|------------------------------|
| Emitter             | Forward current           | $I_F$ 15 mA (see note 1)     |
|                     | Pulse forward current     | $I_{FP}$ ---                 |
|                     | Reverse voltage           | $V_R$ 4 V                    |
| Detector            | Collector–Emitter voltage | $V_{CEO}$ 24 V               |
|                     | Emitter–Collector voltage | $V_{ECO}$ ---                |
|                     | Collector current         | $I_C$ 20 mA                  |
|                     | Collector dissipation     | $P_C$ 75 mW (see note 1)     |
|                     | Operating                 | $T_{opr}$ –20°C to 60°C      |
| Ambient temperature | Storage                   | $T_{stg}$ –20°C to 80°C      |
|                     | Soldering temperature     | $T_{sol}$ 260°C (see note 2) |

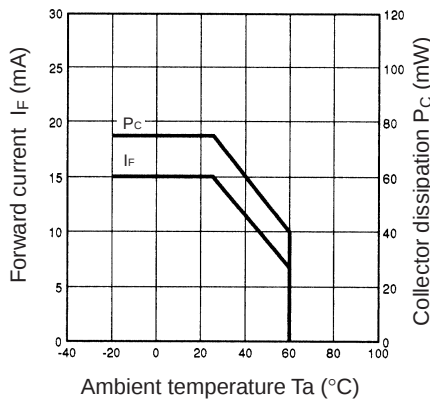
- Note:** 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.  
2. Complete soldering within 10 seconds.

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

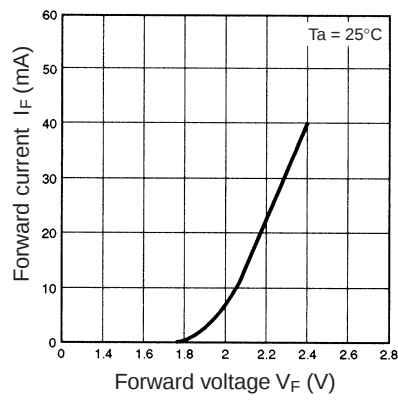
| Item         | Symbol                               | Value                                   | Condition                                          |
|--------------|--------------------------------------|-----------------------------------------|----------------------------------------------------|
| Emitter      | Forward voltage                      | $V_F$ 2.0 V typ., 2.6 V max.            | $I_F = 15$ mA                                      |
|              | Reverse current                      | $I_R$ 0.01 $\mu$ A typ., 5 $\mu$ A max. | $V_R = 4$ V                                        |
|              | Peak emission wavelength             | $\lambda_P$ 700 nm typ.                 | $I_F = 3$ mA                                       |
| Detector     | Light current                        | $I_L$ 1.5 mA min., 120 mA max.          | $I_F = 3$ mA, $V_{CE} = 10$ V                      |
|              | Dark current                         | $I_D$ 2 nA typ., 250 nA max.            | $V_{CE} = 10$ V, 0 lx                              |
|              | Leakage current                      | $I_{LEAK}$ ---                          | ---                                                |
|              | Collector–Emitter saturated voltage  | $V_{CE(sat)}$ 0.9 V typ.                | $I_F = 3$ mA, $I_L = 0.5$ mA                       |
|              | Peak spectral sensitivity wavelength | $\lambda_P$ 750 nm typ.                 | $V_{CE} = 10$ V                                    |
| Rising time  | $t_r$                                | 180 $\mu$ s typ.                        | $V_{CC} = 5$ V, $R_L = 100 \Omega$ , $I_L = 10$ mA |
| Falling time | $t_f$                                | 60 $\mu$ s typ.                         | $V_{CC} = 5$ V, $R_L = 100 \Omega$ , $I_L = 10$ mA |

# Engineering Data

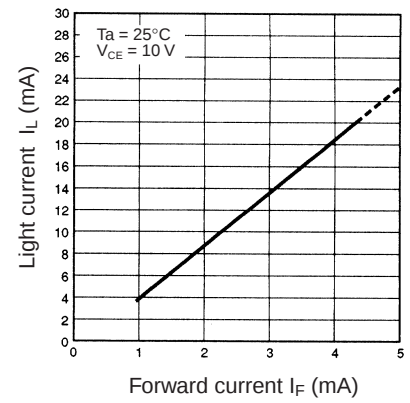
Forward Current vs. Collector Dissipation Temperature Rating



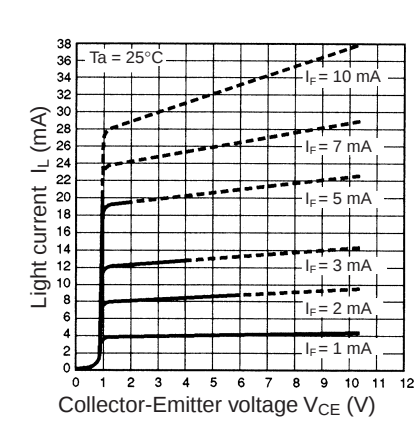
Forward Current vs. Forward Voltage Characteristics (Typical)



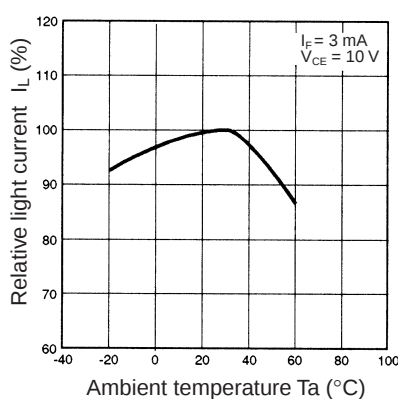
Light Current vs. Forward Current Characteristics (Typical)



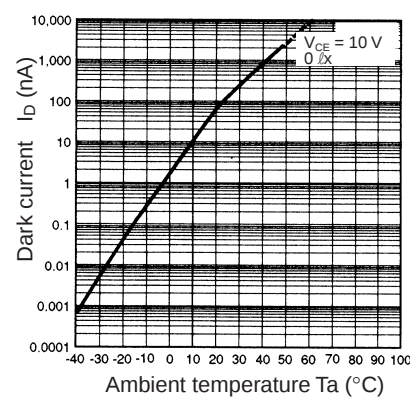
Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



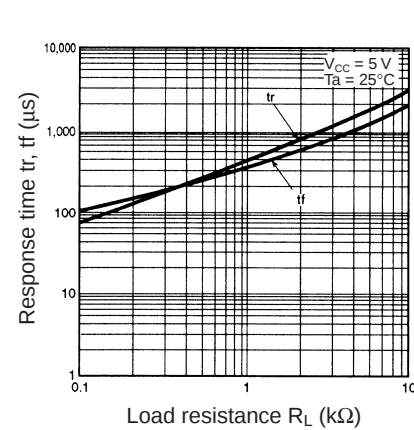
Relative Light Current vs. Ambient Temperature Characteristics (Typical)



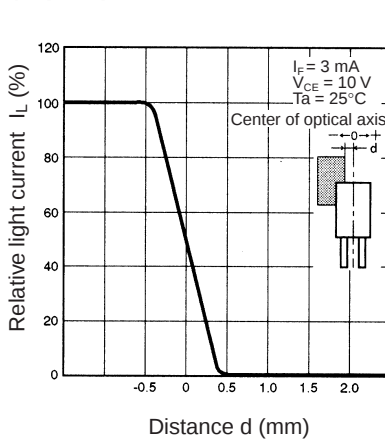
Dark Current vs. Ambient Temperature Characteristics (Typical)



Response Time vs. Load Resistance Characteristics (Typical)



Sensing Position Characteristics (Typical)



Response Time Measurement Circuit

