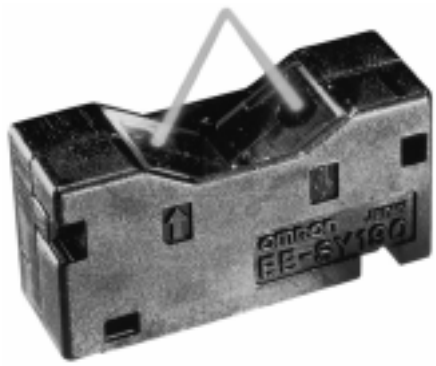
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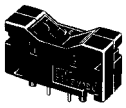
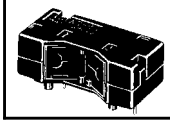
# EE-SY190/191

## Reflective Photomicrosensor uses Fresnel Lenses to Enhance Sensing Characteristics




- High-precision optical technology ensures excellent limited sensing range and sensing position characteristics
- Ideal for paper/OHP detection in OA/CP markets
- Available in top-view model (EE-SY190) and side-view model (EE-SY191)
- Compact package (Length 18mm x Width 6mm x Height 9 mm)

## Ordering Information

| Appearance | Sensing method | Sensing distance | Output configuration | Weight | **Part number** |
|---|---|---|---|---|---|
|  | Reflective | 4.0 mm (min)<br>4.5 mm (typ)<br>5.0 mm (max) | Phototransistor | Approx. 0.95 g | **EE-SY190** |
|  | Reflective | 4.0 mm (min)<br>4.5 mm (typ)<br>5.0 mm (max) | Phototransistor | Approx. 0.88 g | **EE-SY191** |

# Specifications

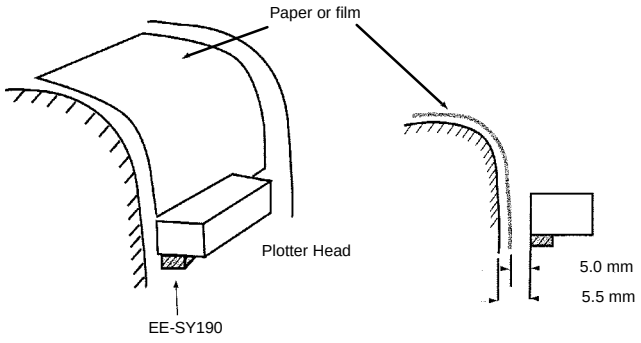
## ■ ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C (77°F))

| Item | | Symbol | Rated value |
|---|---|---|---|
| Emitter | Forward current | $I_F$ | 50 mA (See Note 1.) |
| | Pulse forward current | $I_{FP}$ | 1 A (See Note 2.) |
| | Reverse voltage | $V_R$ | 4 V |
| Receiver | Collector-emitter voltage | $V_{CEO}$ | 30 V |
| | Emitter-collector voltage | $V_{ECO}$ | --- |
| | Collector current | $I_C$ | 20 mA |
| | Collector dissipation | $P_C$ | 100 mW (See Note 1.) |
| Ambient temperature | Operating | Topr | -25°C to 85°C (-13°F to 185°F) (See Note 3.) |
| | Storage | Tstg | -40°C to 100°C (-40°F to 212°F) |
| | Soldering | Tsol | 260°C (500°F) (10 seconds max.) |

Note: 1. Refer to Engineering Data if the ambient temperature is not within the normal room temperature. $I_F$, $P_C$ and $P_{OUT}$ must be derated according to the Temperature Characteristics curves contained within the Engineering Data section.
2. The pulse width is 10 μs maximum with a frequency of 100 Hz.
3. To be used on in applications where no freezing or condensation occurs.

## ■ TYPICAL APPLICATION

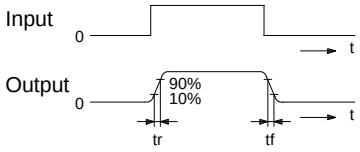
The EE-SY190 microsensor detects the size and edge of overhead transparency film or white paper without detecting the background surface.

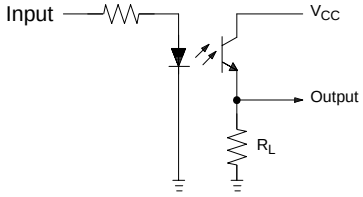


## ■ CHARACTERISTICS ($T_A$ = 25°C (77°F))

| Item | | Symbol | Value | Condition |
|---|---|---|---|---|
| Emitter | Forward voltage | $V_F$ | 1.2 V typ., 1.5 V max. | $I_F$ = 30 mA |
| | Reverse current | $I_R$ | 10 μA max. | $V_R$ = 4 V |
| | Peak emission wavelength | $\lambda_{P(L)}$ | 940 nm typ. | $I_F$ = 30 mA |
| Receiver | Light current (See Note 1.) | $I_L$ | 50 μA min., 180 μA typ., 600 μA max. | $I_F$ = 20 mA, $V_{CE}$ = 5 V White paper with a reflection factor of 90%, d = 4.5 mm (See Note 1.) |
| | Dark current | $I_D$ | 2 nA typ., 100 nA max. | $V_{CE}$ = 5 V, 0 ℓx |
| | Leakage current | $I_{LEAK}$ | 1 μA max. | $I_F$ = 20 mA, $V_{CE}$ = 5 V without object |
| | Peak spectral sensitivity wavelength | $\lambda_{P(P)}$ | 850 nm typ. | $V_{CE}$ =5 V |
| Rising time (See Note 2.) | | tr | 30 μs typ. | $V_{CC}$ = 5 V, $R_L$ = 1 kΩ, $I_L$ = 200 μA |
| Falling time (See Note 2.) | | tf | 30 μs typ. | $V_{CC}$ = 5 V, $R_L$ = 1 kΩ, $I_L$ = 200 μA |

Note: 1. The letter “d” indicates the distance between the top surface of the sensor and the sensing object.
2. The illustration below shows the rising time, tr, and the falling time, tf.



## ■ SENSING CHARACTERISTICS ($T_A$ = 25°C (77°F))

| Item | Symbol | Value | Condition |
|---|---|---|---|
| Light-convergent characteristics | ΔL | $^{+4.0}/_{-3.0}$ mm typ., $^{+5.5}/_{-3.5}$ mm max. | ΔL defined as $I_L$ = 20% assuming $I_L$ = 100% at d = 4.5 mm (see Fig. 1). |
| Sensing position characteristics | Δd | ±0.6 mm typ., ±1.6 mm max. | Δd defined as distance for $I_L$ to change from 20% (80%) to 50% of the peak $I_L$. Center: $I_L$ = 50% in X and Y directions (see Fig. 2). |
| Recommended sensing distance | d | 4.0 mm min., 4.5 mm typ., 5.0 mm max. | Sensing object can be either of the two: Diffuse reflective object (paper). Regular reflective object (mirror). |

**Fig. 1**

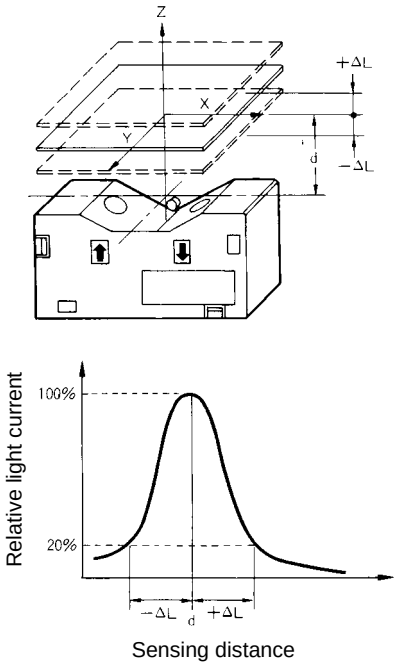
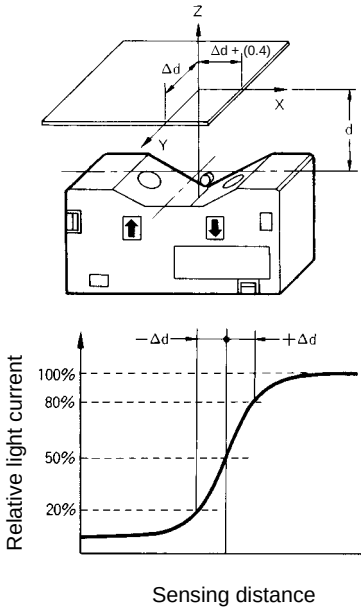
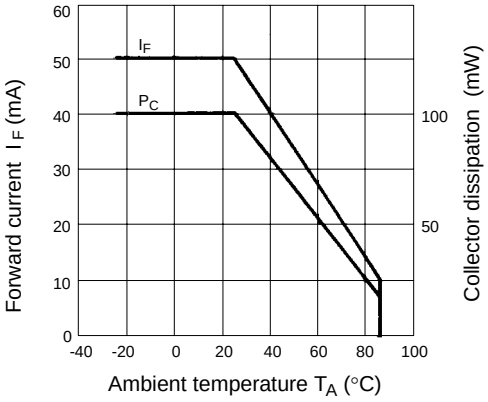



**Fig. 2**

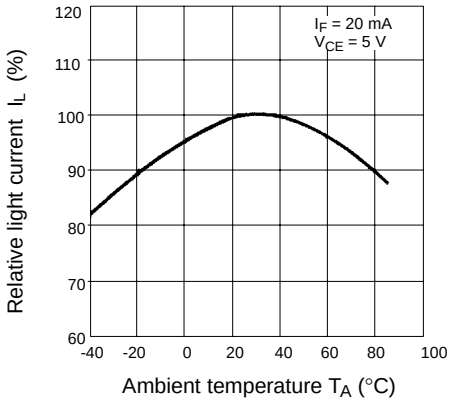


# Engineering Data

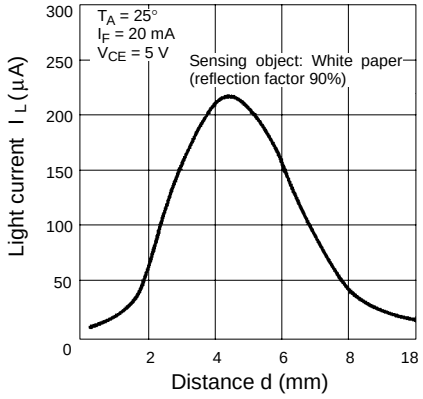
## ■ TEMPERATURE RATING



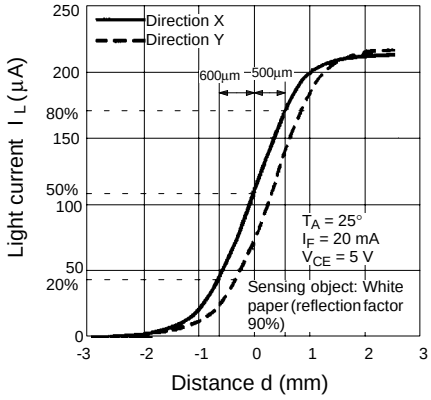

## ■ RELATIVE LIGHT CURRENT VS. AMBIENT TEMPERATURE CHARACTERISTICS (TYPICAL)




## ■ SENSING DISTANCE CHARACTERISTICS (TYPICAL)



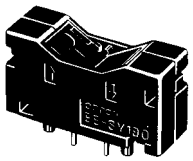

## ■ SENSING POSITION CHARACTERISTICS (TYPICAL)

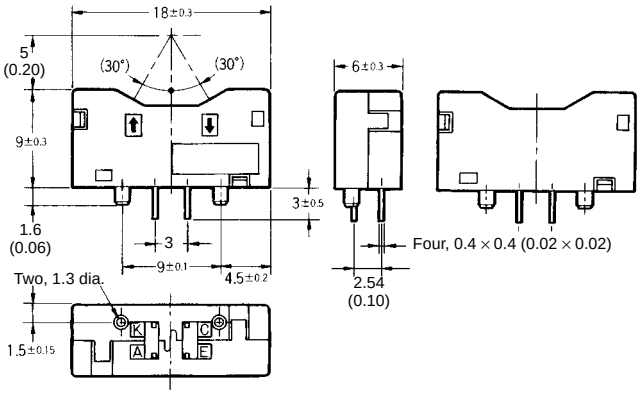


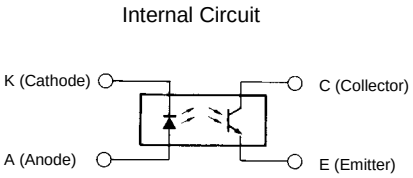
# Dimensions

Unit: mm (inch)

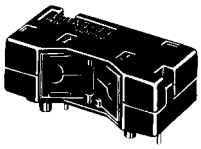
## ■ EE-SY190

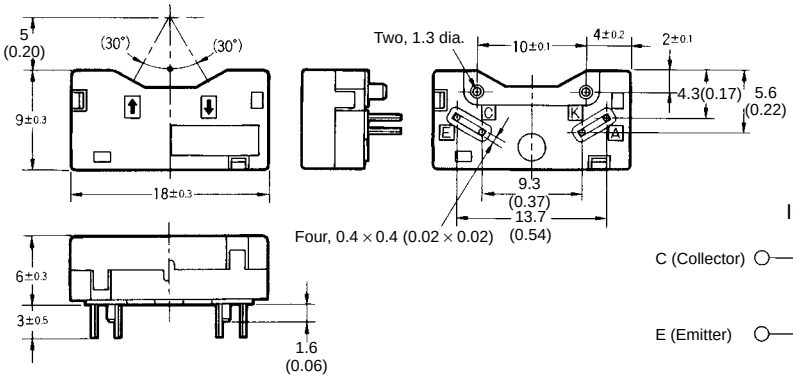


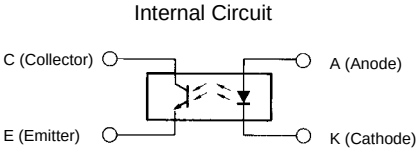



## ■ EE-SY191





# Precautions

## RATINGS

Using the photomicrosensor beyond its absolute maximum ratings can result in diminished life expectancy, reliability, or failure. OMRON does not assume responsibility for any change in the characteristics and/or performance of the device due to use beyond the absolute maximum ratings.

## SURGE

Electrical surges, incorrect wiring or voltage could result in damage to the photomicrosensor.

## INSTALLATION

Photomicrosensors with non-modulated light sources are not protected against incandescent lights or sunlight and should not be located in areas where such external light sources exists. Photomicrosensors equipped with an internal modulated light source are not affected by external light sources.

When installing the photomicrosensor, always mount it on a flat surface. If mounted on a curved or irregular surface, the electrical characteristics of the sensor can be altered due to a change in the sensor's orientation.

For proper connection of the photomicrosensor, refer to the terminal diagram on the data sheet. Incorrect wiring or connections can result in damage to the photomicrosensor.

## RELIABILITY

For maximum reliability and life expectancy, use the photomicrosensor at temperatures within the rated operating temperature range. If the ambient temperature abruptly changes from a low (0°C or lower) to a high temperature, condensation may occur on the surface of the light source and/or receiver, thus causing a malfunction.

Mount the photomicrosensor in a dust-free environment. Check that the light-receiving window is clean. If necessary, clean off the window using a dry cloth.

Keep the photomicrosensor in a dry storage location to prevent the terminals from corroding.

The sensing window and case of most photomicrosensor models are made of a polycarbonate resin which withstands alcohol and chloride solvents, but is soluble in strong alkali, aromatic hydrocarbons, and aliphatic hydrocarbonate chloride solvents.

**NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.**

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