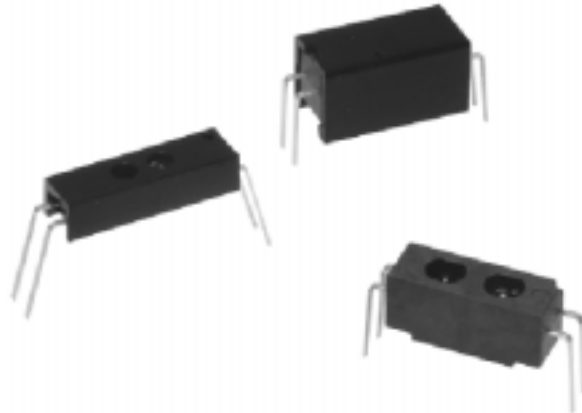





## EE-SY110/113/171

### Compact Reflective Phototransistor Output

- Low-profiled model with an overall height of only 3 mm (EE-SY171)
- Models with a circuit integrated into molded housing provide special cost advantages (EE-SY110/113)
- Model with a filter reduces effects of external visible light (EE-SY113)



### Ordering Information

Appearance	Sensing method	Sensing distance	Sensing object	Output configuration	Weight	Part number
	Reflective	3.5 mm	White paper with reflection factor of 90%	Phototransistor	0.3 g	<b>EE-SY171</b>
		4.4 mm			Approx. 0.5 g	<b>EE-SY113</b>
		5 mm			Approx. 0.4 g	<b>EE-SY110</b>

### Specifications

#### ■ ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Item		Symbol	Rated value
Input	Forward current	$I_F$	50 mA*
	Pulse forward current	$I_{FP}$	1 A**
	Reverse voltage	$V_R$	4 V
Output	Collector-emitter voltage	$V_{CEO}$	30 V
	Collector current	$I_C$	20 mA
	Collector dissipation	$P_C$	100 mW*
Ambient temperature	Operating	$T_{opr}$	-40°C to 85°C (-40°F to 185°F)
	Storage	$T_{stg}$	-40°C to 85°C (-40°F to 185°F)

\*Refer to Engineering Data if the ambient temperature is not within the normal room temperature range.

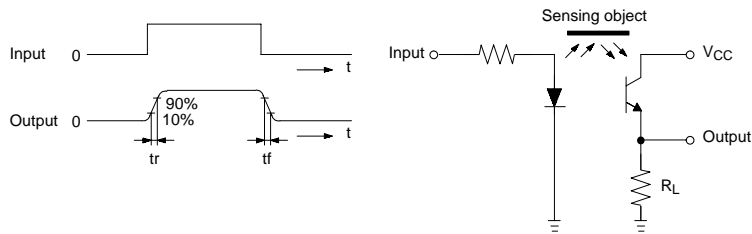
\*\*This value was measured with a pulse width of 10  $\mu\text{s}$  and a repeating frequency of 100 Hz.

■ CHARACTERISTICS (T<sub>A</sub> = 25°C)

Item	Symbol	EE-SY110		EE-SY171		EE-SY113		
		Value	Condition	Value	Condition	Value	Condition	
Emitter	Forward voltage	V <sub>F</sub>	1.5 V max.	I <sub>F</sub> = 30 mA	1.5 V max.	I <sub>F</sub> = 30 mA	1.5 V max.	I <sub>F</sub> = 30 mA
	Reverse current	I <sub>R</sub>	10 μA max.	V <sub>R</sub> = 4 V	10 μA max.	V <sub>R</sub> = 4 V	10 μA max.	V <sub>R</sub> = 4 V
	Peak emission wavelength	λ <sub>p</sub> (L)	940 nm typ.	I <sub>F</sub> = 20 mA	940 nm typ.	I <sub>F</sub> = 20 mA	940 nm typ.	I <sub>F</sub> = 20 mA
Receiver	Dark current	I <sub>D</sub>	200 nA max.	V <sub>CE</sub> = 10 V 0/k	200 nA max.	V <sub>CE</sub> = 10 V 0/k	200 nA max.	V <sub>CE</sub> = 10 V 0/k
	Peak spectral sensitivity wavelength	λ <sub>p</sub> (P)	850 nm typ.	V <sub>CE</sub> = 10 V	850 nm typ.	V <sub>CE</sub> = 10 V	850 nm typ.	V <sub>CE</sub> = 10 V
Combination	Light current	I <sub>L</sub>	200 to 2,000 μA	I <sub>F</sub> = 20 mA V <sub>CE</sub> = 10 V White paper with a reflection factor of 90% at a distance of 5 mm	50 to 500 μA	I <sub>F</sub> = 20 mA V <sub>CE</sub> = 10 V White paper with a reflection factor of 90% at a distance of 3.5 mm	160 to 1,600 μA	I <sub>F</sub> = 20 mA V <sub>CE</sub> = 10 V White paper with a reflection factor of 90% at a distance of 4.4 mm
	Leakage current	I <sub>LEAK</sub>	2 μA max.	I <sub>F</sub> = 20 mA V <sub>CE</sub> = 10 V*	200 nA max.	I <sub>F</sub> = 20 mA V <sub>CE</sub> = 10 V*	2 μA max.	I <sub>F</sub> = 20 mA V <sub>CE</sub> = 10 V*
	Rising time**	t <sub>r</sub>	30 μs typ.	V <sub>CC</sub> = 5 V R <sub>L</sub> = 1 kΩ I <sub>L</sub> = 1 mA	30 μs typ.	V <sub>CC</sub> = 5 V R <sub>L</sub> = 1 kΩ I <sub>L</sub> = 1 mA	30 μs typ.	V <sub>CC</sub> = 5 V R <sub>L</sub> = 1 kΩ I <sub>L</sub> = 1 mA
	Falling time**	t <sub>f</sub>	30 μs typ.		30 μs typ.		30 μs typ.	

\*The sensing object reflects no light.

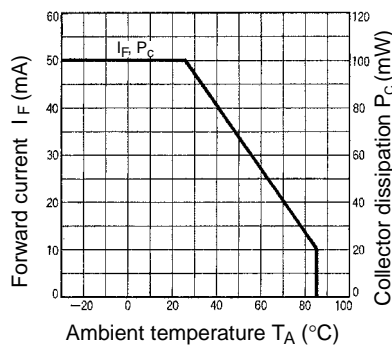
\*\*The following illustrations show the rising time, t<sub>r</sub>, and the falling time, t<sub>f</sub>.



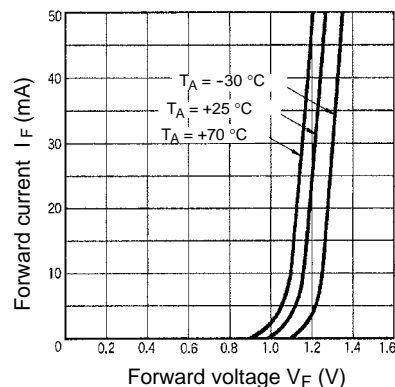
Engineering Data

Note: The operating conditions of the photomicrosensor must be within the absolute maximum rating ranges.

■ TEMPERATURE CHARACTERISTICS

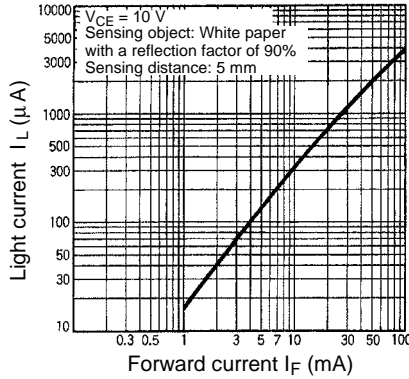


■ INPUT CHARACTERISTICS (TYPICAL)

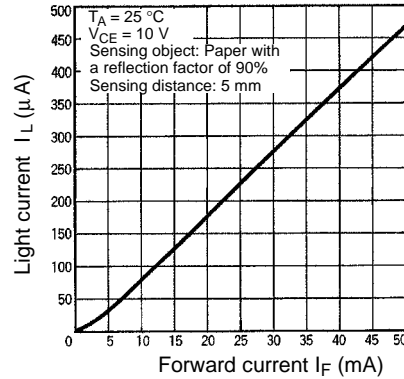


**INPUT/OUTPUT CHARACTERISTICS (TYPICAL)**

EE-SY110

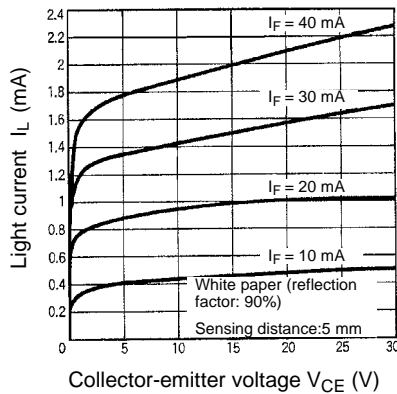


EE-SY171

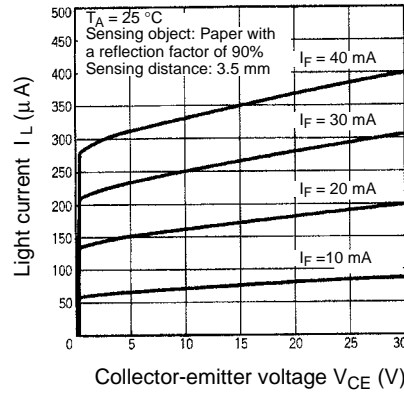


**OUTPUT CHARACTERISTICS (TYPICAL)**

EE-SY110

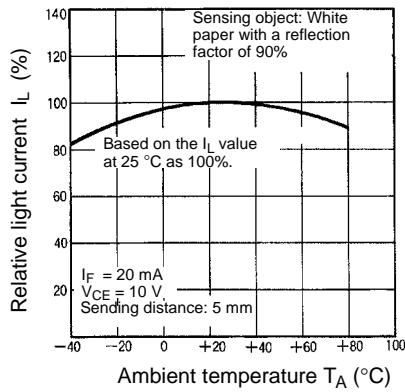


EE-SY171

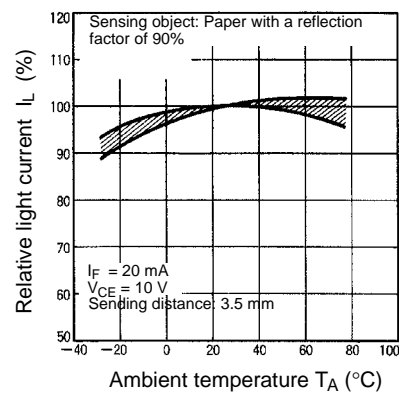


**LIGHT CURRENT TEMPERATURE DEPENDENCY (TYPICAL)**

EE-SY110/113

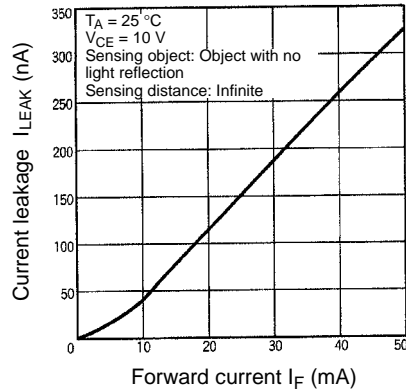


EE-SY171



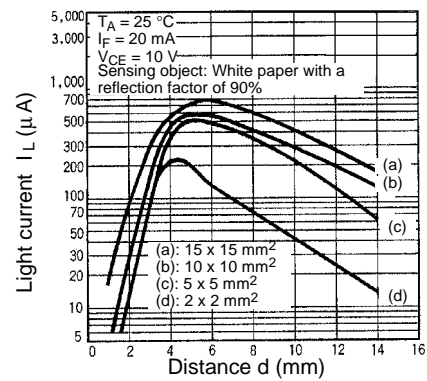
**LEAKAGE CURRENT CHARACTERISTICS (TYPICAL)**

EE-SY171



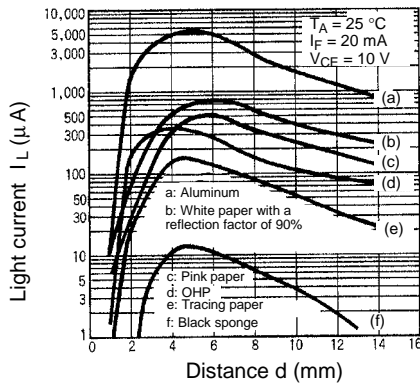
**SENSING DISTANCE CHARACTERISTICS 1 (TYPICAL)**

EE-SY110



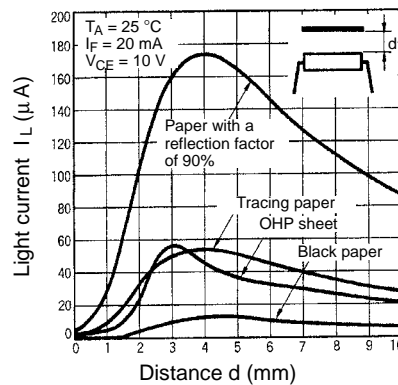
**SENSING DISTANCE CHARACTERISTICS 2 (TYPICAL)**

EE-SY171

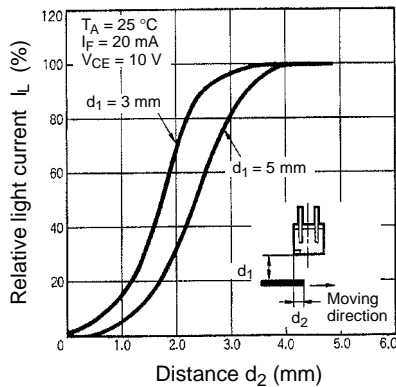


**SENSING DISTANCE CHARACTERISTICS (TYPICAL)**

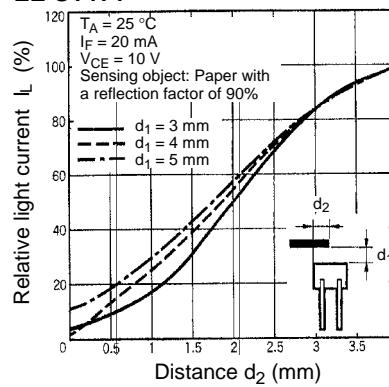
EE-SY171



EE-SY110

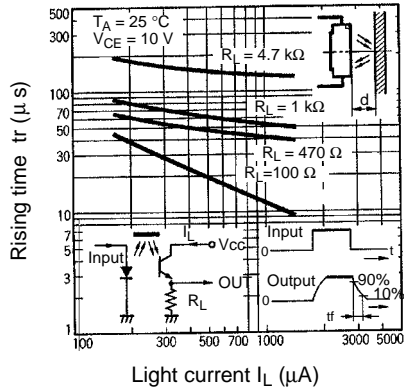


EE-SY171

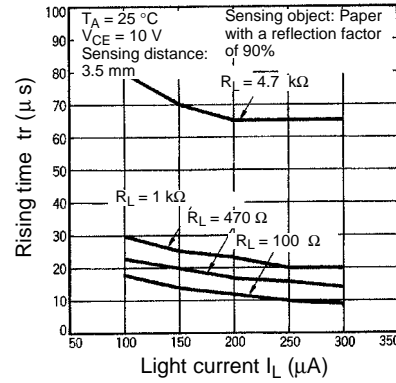


**SWITCHING CHARACTERISTICS (RISE TIME, TYPICAL)**

EE-SY110/113

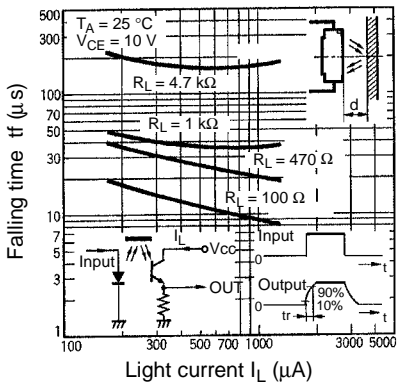


EE-SY171

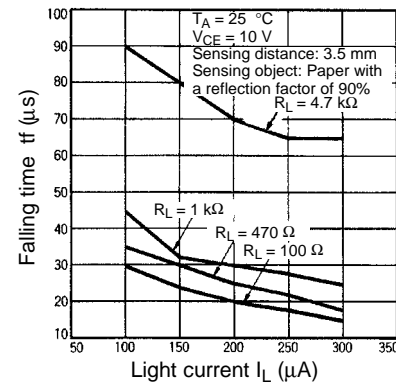


**SWITCHING CHARACTERISTICS (FALL TIME, TYPICAL)**

EE-SY110/113

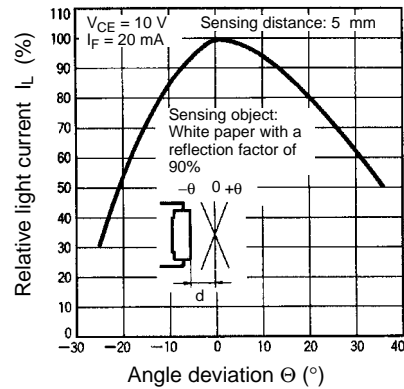


EE-SY171

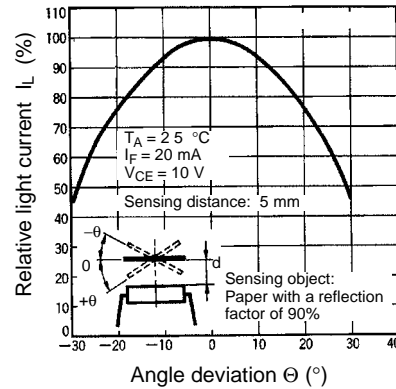


**SENSING ANGLE CHARACTERISTICS (TYPICAL)**

EE-SY110



EE-SY171





## Precautions

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Refer to the Technical Information Section for general precautions.

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

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