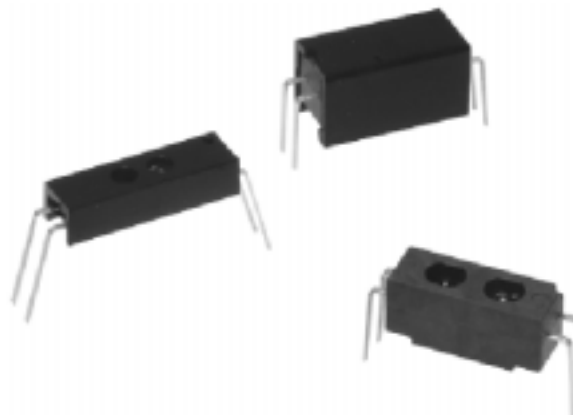


EE-SY110/113/171

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	EE-SY171
		4.4 mm			Approx. 0.5 g	EE-SY113
		5 mm			Approx. 0.4 g	EE-SY110

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.

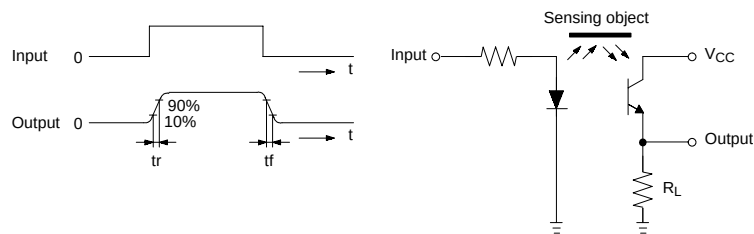
**This value was measured with a pulse width of 10 μs and a repeating frequency of 100 Hz.

■ CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

Item		Symbol	EE-SY110		EE-SY171		EE-SY113	
			Value	Condition	Value	Condition	Value	Condition
Emitter	Forward voltage	V_F	1.5 V max.	$I_F = 30\text{ mA}$	1.5 V max.	$I_F = 30\text{ mA}$	1.5 V max.	$I_F = 30\text{ mA}$
	Reverse current	I_R	10 μA max.	$V_R = 4\text{ V}$	10 μA max.	$V_R = 4\text{ V}$	10 μA max.	$V_R = 4\text{ V}$
	Peak emission wavelength	$\lambda_p(L)$	940 nm typ.	$I_F = 20\text{ mA}$	940 nm typ.	$I_F = 20\text{ mA}$	940 nm typ.	$I_F = 20\text{ mA}$
Receiver	Dark current	I_D	200 nA max.	$V_{CE} = 10\text{ V}$ 0 k	200 nA max.	$V_{CE} = 10\text{ V}$ 0 k	200 nA max.	$V_{CE} = 10\text{ V}$ 0 k
	Peak spectral sensitivity wavelength	$\lambda_p(P)$	850 nm typ.	$V_{CE} = 10\text{ V}$	850 nm typ.	$V_{CE} = 10\text{ V}$	850 nm typ.	$V_{CE} = 10\text{ V}$
Combination	Light current	I_L	200 to 2,000 μA	$I_F = 20\text{ mA}$ $V_{CE} = 10\text{ V}$ White paper with a reflection factor of 90% at a distance of 5 mm	50 to 500 μA	$I_F = 20\text{ mA}$ $V_{CE} = 10\text{ V}$ White paper with a reflection factor of 90% at a distance of 3.5 mm	160 to 1,600 μA	$I_F = 20\text{ mA}$ $V_{CE} = 10\text{ V}$ White paper with a reflection factor of 90% at a distance of 4.4 mm
	Leakage current	I_{LEAK}	2 μA max.	$I_F = 20\text{ mA}$ $V_{CE} = 10\text{ V}^*$	200 nA max.	$I_F = 20\text{ mA}$ $V_{CE} = 10\text{ V}^*$	2 μA max.	$I_F = 20\text{ mA}$ $V_{CE} = 10\text{ V}^*$
	Rising time**	t_r	30 μs typ.	$V_{CC} = 5\text{ V}$ $R_L = 1\text{ k}\Omega$	30 μs typ.	$V_{CC} = 5\text{ V}$ $R_L = 1\text{ k}\Omega$	30 μs typ.	$V_{CC} = 5\text{ V}$ $R_L = 1\text{ k}\Omega$
	Falling time**	t_f	30 μs typ.	$I_L = 1\text{ mA}$	30 μs typ.	$I_L = 1\text{ mA}$	30 μs typ.	$I_L = 1\text{ mA}$

*The sensing object reflects no light.

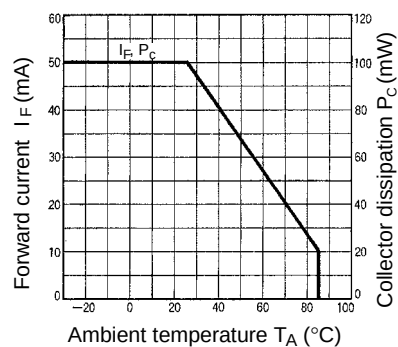
**The following illustrations show the rising time, t_r , and the falling time, t_f .



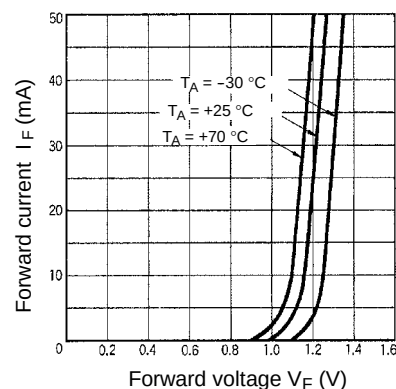
Engineering Data

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

■ TEMPERATURE CHARACTERISTICS

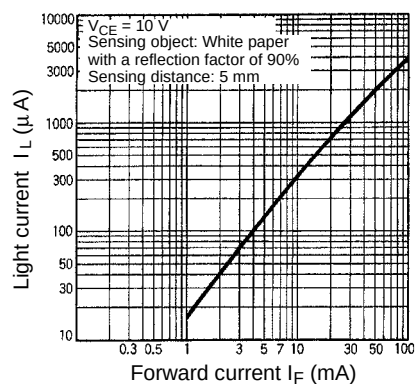


■ INPUT CHARACTERISTICS (TYPICAL)

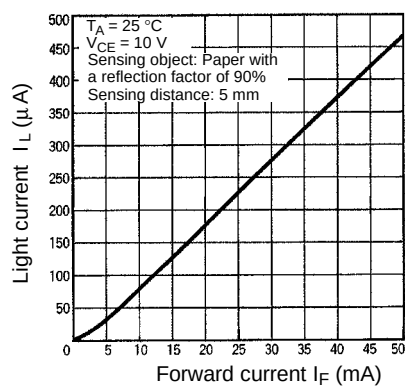


INPUT/OUTPUT CHARACTERISTICS (TYPICAL)

EE-SY110

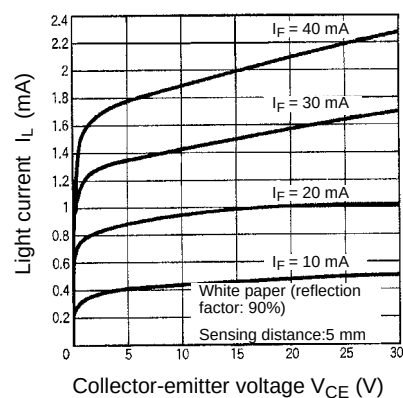


EE-SY171

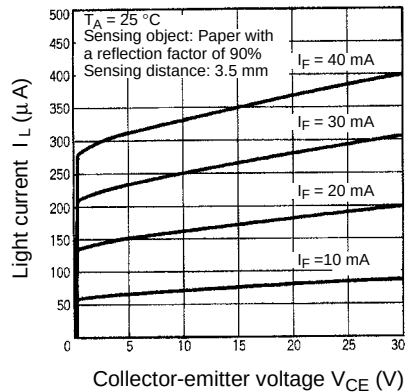


OUTPUT CHARACTERISTICS (TYPICAL)

EE-SY110

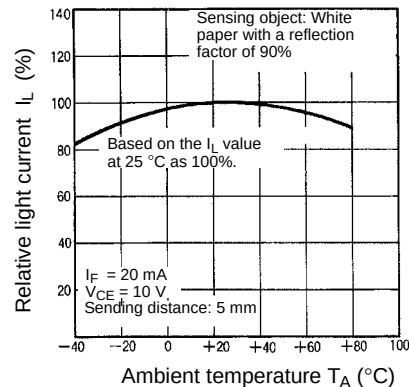


EE-SY171

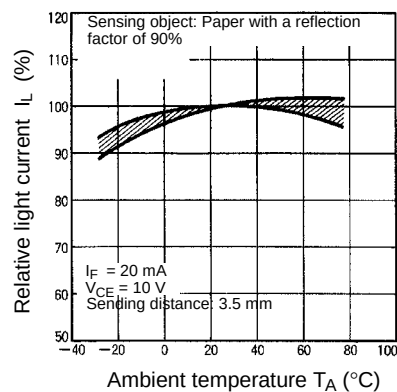


LIGHT CURRENT TEMPERATURE DEPENDENCY (TYPICAL)

EE-SY110/113

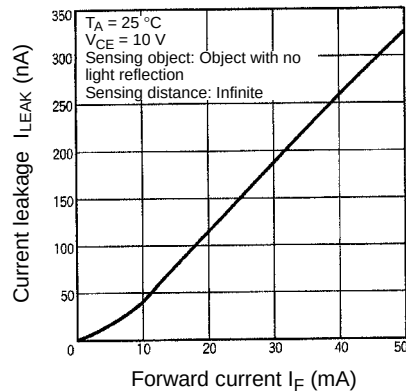


EE-SY171



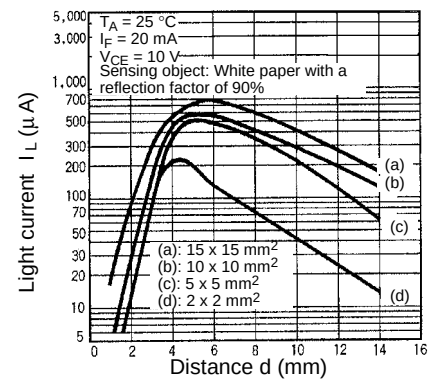
LEAKAGE CURRENT CHARACTERISTICS (TYPICAL)

EE-SY171



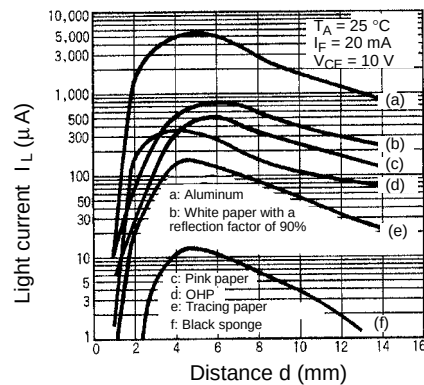
SENSING DISTANCE CHARACTERISTICS 1 (TYPICAL)

EE-SY110



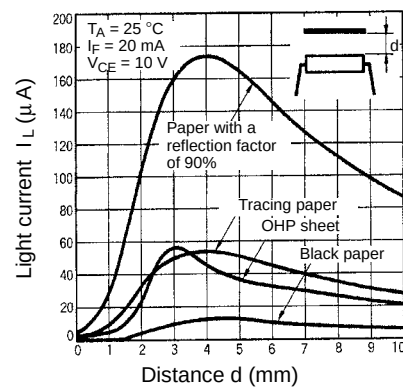
SENSING DISTANCE CHARACTERISTICS 2 (TYPICAL)

EE-SY171

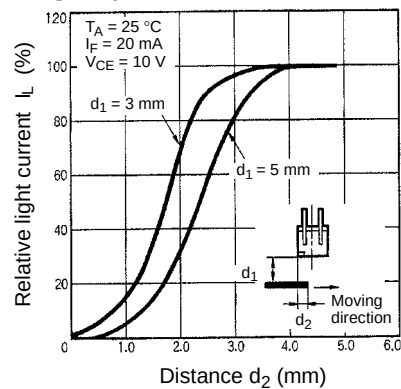


SENSING DISTANCE CHARACTERISTICS (TYPICAL)

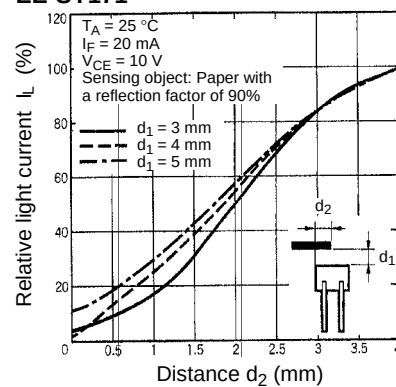
EE-SY171



EE-SY110

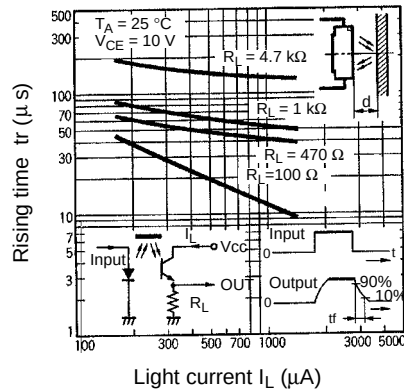


EE-SY171

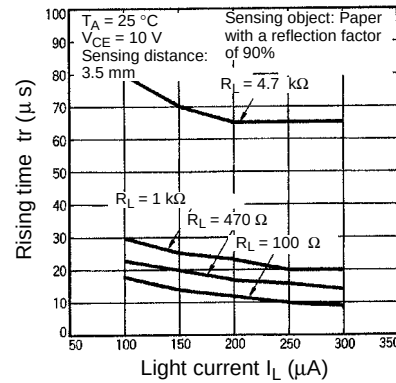


SWITCHING CHARACTERISTICS (RISE TIME, TYPICAL)

EE-SY110/113

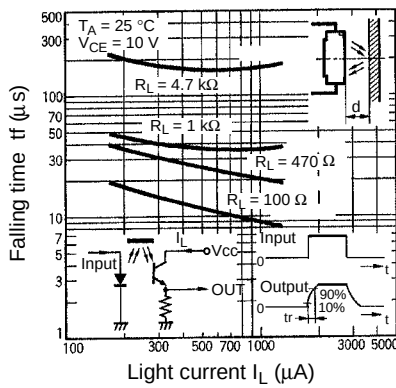


EE-SY171

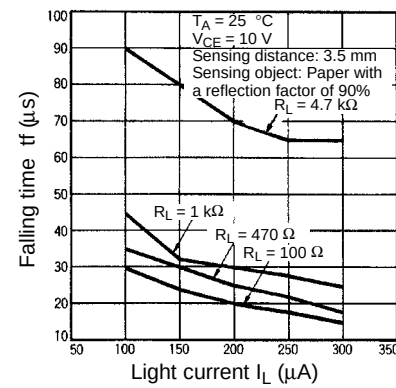


SWITCHING CHARACTERISTICS (FALL TIME, TYPICAL)

EE-SY110/113

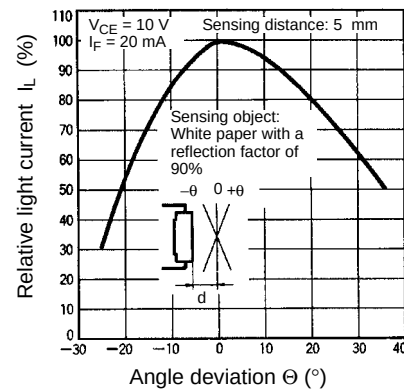


EE-SY171

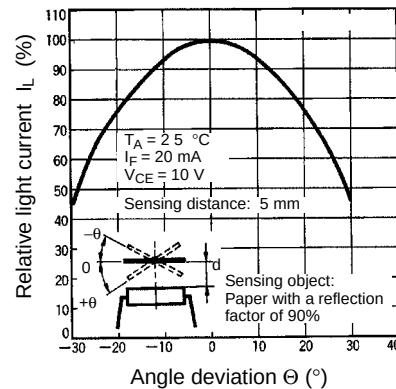


SENSING ANGLE CHARACTERISTICS (TYPICAL)

EE-SY110

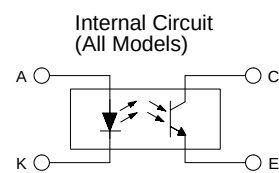
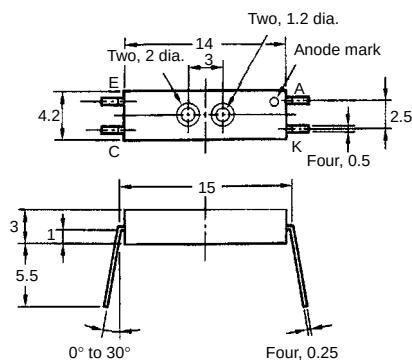
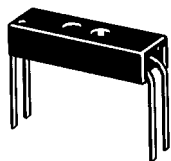


EE-SY171



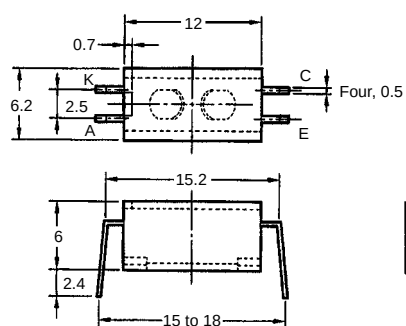
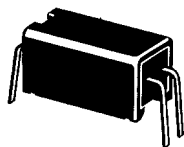
Unit: mm (inch)

EE-SY171

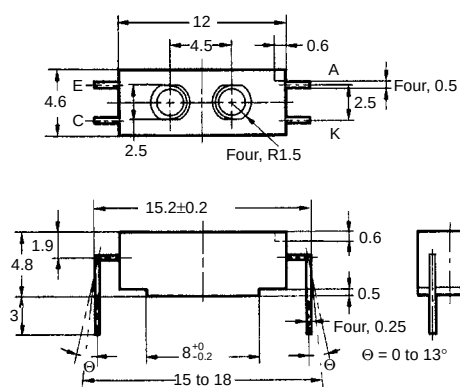
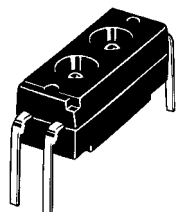


Terminal No.	Name
A	Anode
K	Cathode
C	Collector
E	Emitter

EE-SY113



EE-SY110



Precautions

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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