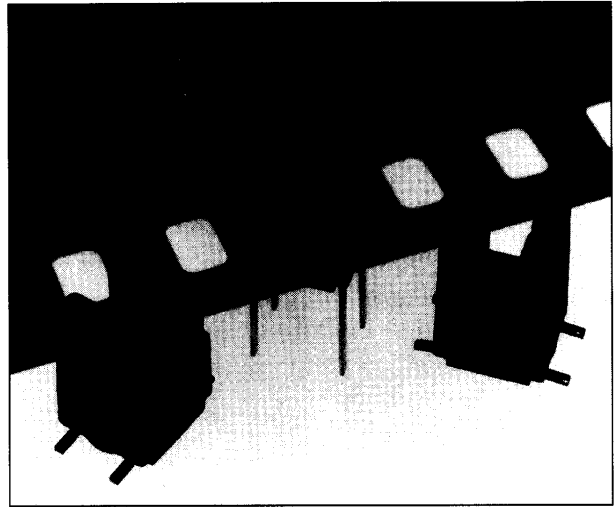


EE-SX1101, EE-SX1102, EE-SX4101

Ultra Compact Photomicrosensors with 5.2-mm Height and 2.0-mm Width Slot

- Models EE-SX1101 and EE-S1102 have photo-transistor output.
- Model EE-SX4101 has Light-ON photo IC output.
- Model EE-SX1102 has leads configured for surface mounting.
- Compact size makes all three models ideal in applications with restricted space.



Ordering Information

Appearance	Sensing method	Sensing object	Output configuration	Model	Weight
	Transmissive	Opaque, 0.6 x 1.0 mm, min.	Phototransistor	EE-SX1101	0.11 g
				EE-SX1102	0.10 g
			Light-ON	EE-SX4101	0.12 g

Specifications

■ Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ EE-SX1101, EE-SX1102

Item		Symbol	Rated value
Emitter	Forward current	I_F	50 mA*
	Reverse voltage	V_R	4V
Detector	Collector-emitter voltage	V_{CEO}	30V
	Collector current	I_C	20 mA
	Collector dissipation	P_C	75 mW
Ambient temperature	Operating	T_{OPR}	-40° to 85°C
	Storage	T_{STG}	-40° to 100°C

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

EE-SX4101

	Item	Symbol	Rated value
Emitter	Forward current	I_F	50 mA*
	Reverse voltage	V_R	4V
Detector	Supply voltage	V_{CC}	9V
	Output voltage	V_{OUT}	17V
	Output current	I_{OUT}	8 mA
	Output permissible dissipation	P_{OUT}	80 mW
Ambient temperature	Operating	T_{OPR}	-40° to 85°C
	Storage	T_{STG}	-40° to 100°C

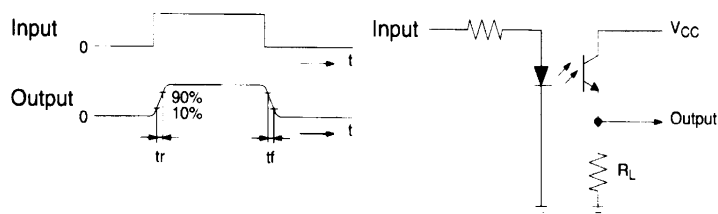
*Refer to Engineering Data if the ambient temperature is not within the normal room temperature range.

■ Characteristics

EE-SX1101, EE-SX1102

	Item	Symbol	Rated value	Rated value
Emitter	Forward voltage	V_F	1.4 V max.	$I_F = 20 \text{ mA}$
	Reverse current	I_R	10 μA max.	$V_R = 4 \text{ V}$
	Peak emission wavelength	$\lambda_P (L)$	940 nm typ.	$I_F = 20 \text{ mA}$
Detector	Dark current	I_D	100 nA max.	$V_{CE} = 20 \text{ V}, 0 \text{ lx}$
	Peak spectral sensitivity wavelength	$\lambda_P (P)$	850 nm max.	$V_{CE} = 5 \text{ V}$
Combination	Light current (collector current)	I_L	0.4 mA min.	$I_F = 10 \text{ mA}$ $V_{CE} = 5 \text{ V}$
	Collector-emitter saturated voltage	$V_{CE} (\text{sat})$	0.4 V max.	$I_F = 20 \text{ mA}$ $I_L = 0.1 \text{ mA}$
	Rising time*	t_r	30 μs typ.	$V_{CC} = 5 \text{ V}$ $R_L = 1 \text{ k}\Omega$
	Falling time*	t_f	30 μs typ.	$I_L = 100 \mu\text{A}$

*The following figures show the rising time (t_r) and falling time (t_f).

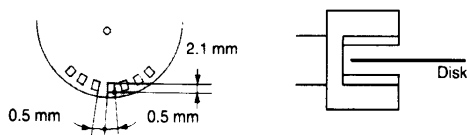


EE-SX4101

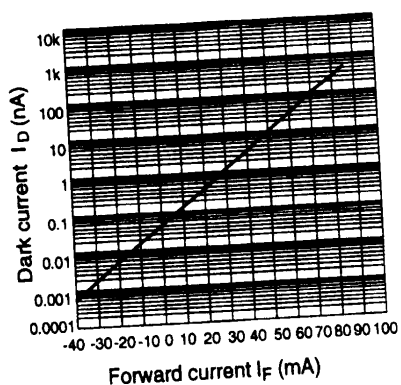
	Item	Symbol	Rated value	Rated value
Emitter	Forward voltage	V_F	1.4 V max.	$I_F = 20 \text{ mA}$
	Reverse current	I_R	10 μA max.	$V_R = 4 \text{ V}$
Detector	Low level output voltage	V_{OL}	0.4 V max.	$V_{CC} = 2.2 \text{ to } 7 \text{ V}$, $I_{OL} = 8 \text{ mA}$, $I_F = 5 \text{ mA}$
	High level output current	I_{OH}	10 μA max.	$V_{CC} = 2.2 \text{ to } 7 \text{ V}$, $I_F = 0 \text{ mA}$, $V_O = 17 \text{ V}$
	Current consumption	I_{CC}	4 mA max.	$V_{CC} = 7 \text{ V}$
Combination	LED current when output is OFF	I_{FT}	2.5 mA min.	$V_{CC} = 2.2 \text{ to } 7 \text{ V}$
	Hysteresis*	ΔH	21%	$V_{CC} = 2.2 \text{ to } 7 \text{ V}$
	Response frequency**	f	3 KHz min.	$V_{CC} = 2.2 \text{ to } 7 \text{ V}$ $I_F = 5 \text{ mA}$
	Propagation delay*** (high $\rightarrow$ low)	t_{PHL}	5 μs typ.	$I_{OL} = 8 \text{ mA}$
	Propagation delay*** (low $\rightarrow$ high)	t_{PHL}	18 μs typ.	

* Hysteresis denotes the difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC is turned ON and when the photo IC is turned OFF.

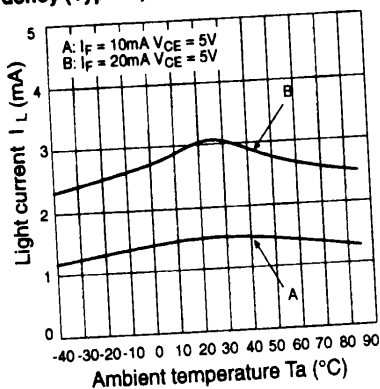
** The value of the response frequency is measured by rotating the disk as shown below.



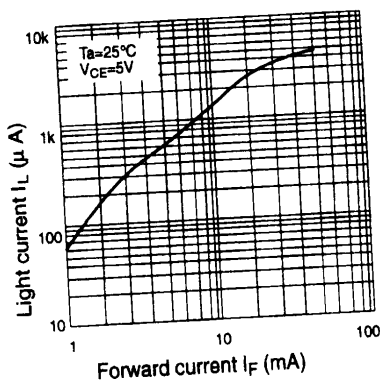
Dark Current Temperature Dependency (Typical)



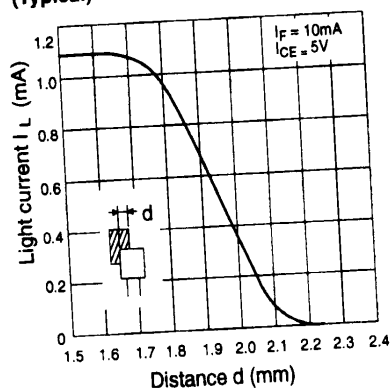
Light Current Temperature Dependency (Typical)



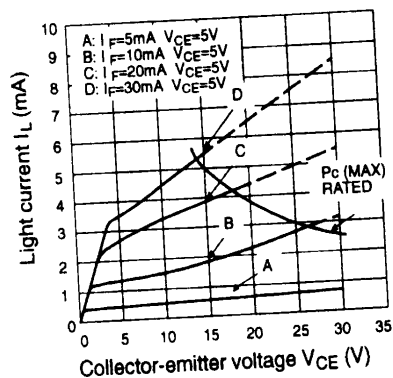
I/O Characteristics (Typical)



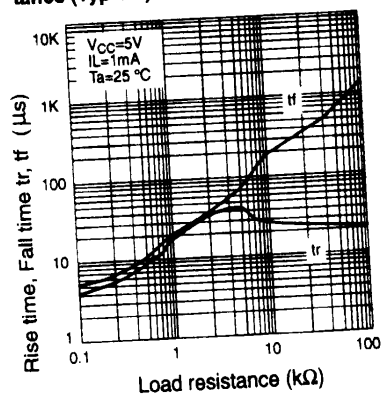
Sensing Position Characteristics (Typical)



Output Characteristics (Typical)

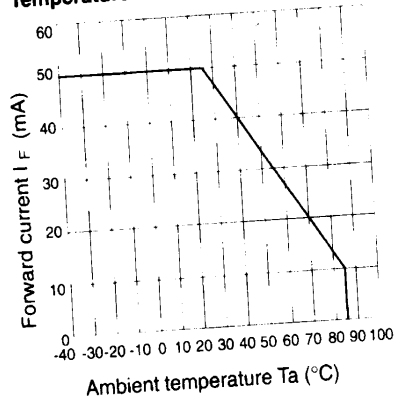


Rise Time, Fall Time vs Load Resistance (Typical)

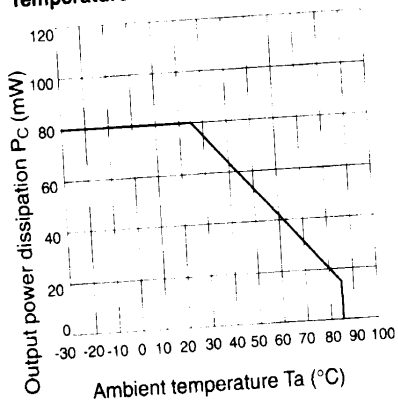


EE-SX4101

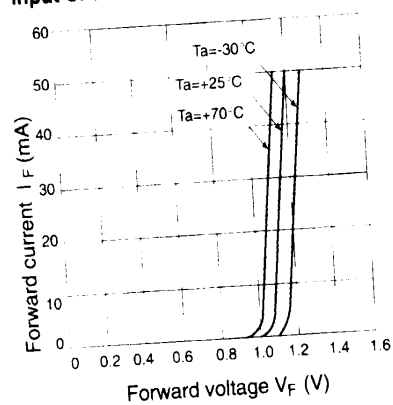
Temperature Characteristics



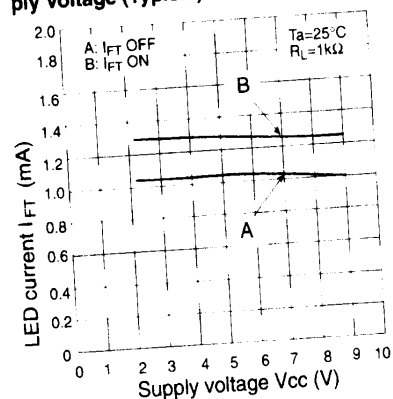
Temperature Characteristics



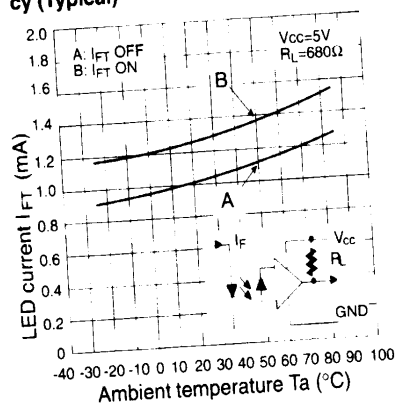
Input Characteristics (Typical)



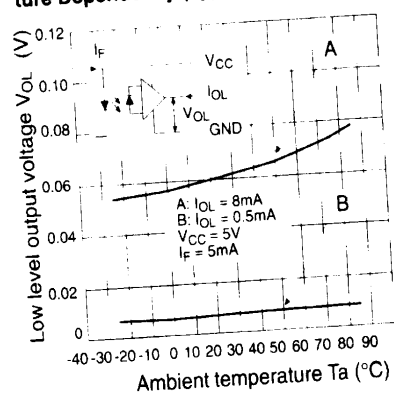
Dependency of LED Current on Supply Voltage (Typical)



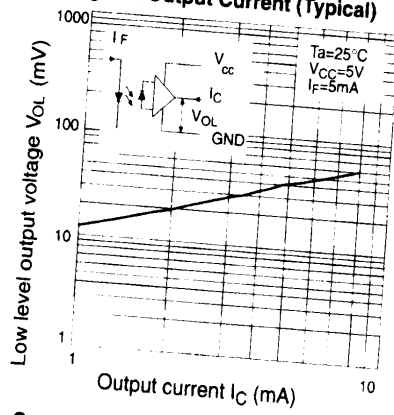
LED Current Temperature Dependency (Typical)



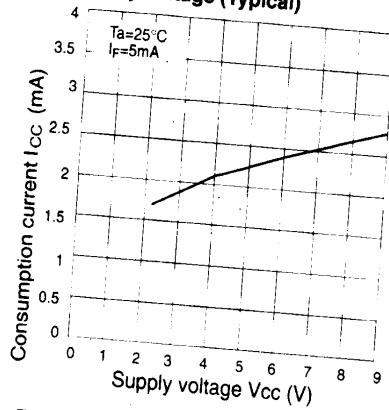
Low-level Output Voltage Temperature Dependency (Typical)



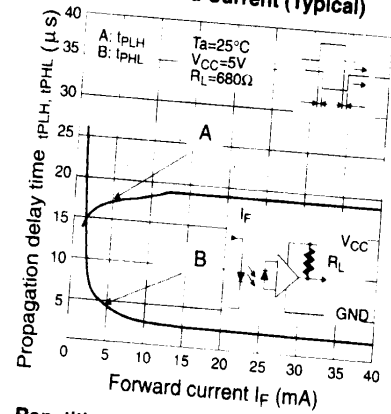
Dependency of Low Level Output Voltage on Output Current (Typical)



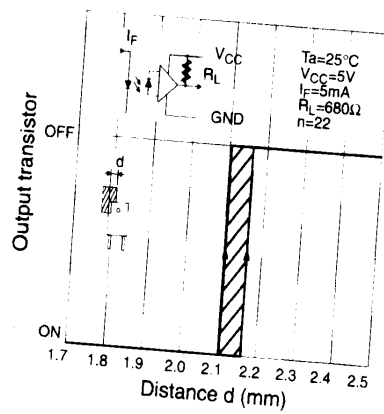
Dependency of Current Consumption on Supply Voltage (Typical)



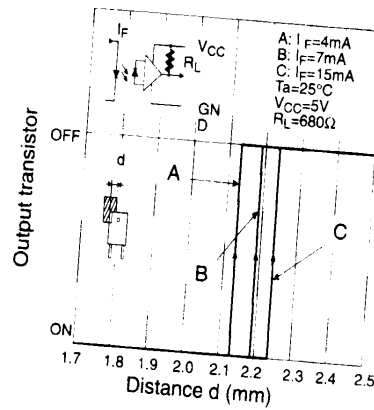
Dependency of Propagation Delay Time on Forward Current (Typical)



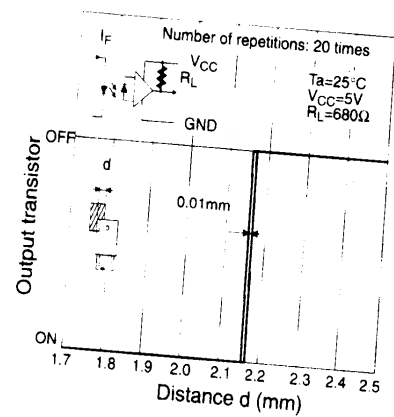
Sensing Position Characteristics (Typical)



Dependency of Sensing Position Characteristics on Forward Current (Typical)



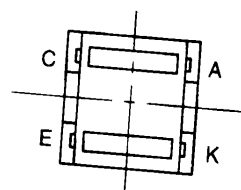
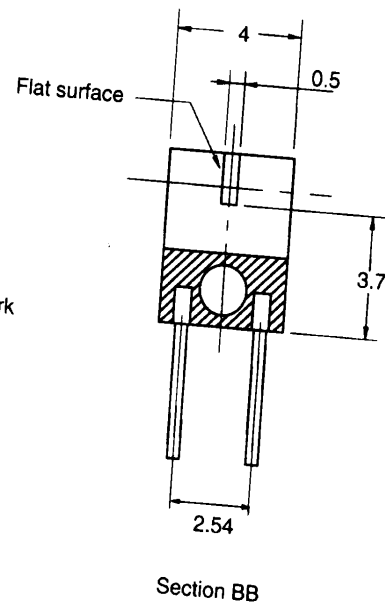
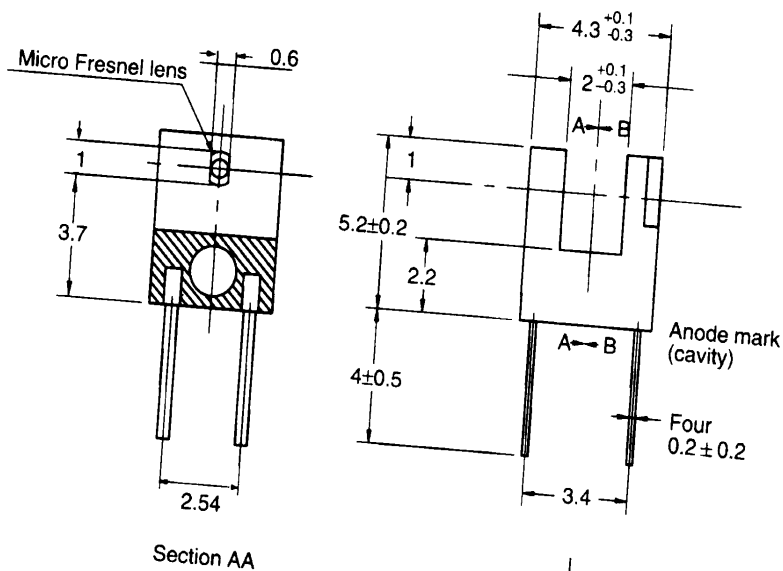
Repetitive Sensing Position Characteristics



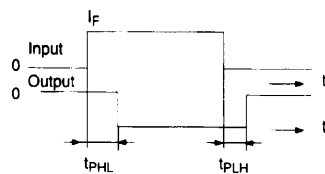
Dimensions

Note: All units are in millimeters.

EE-SX1101



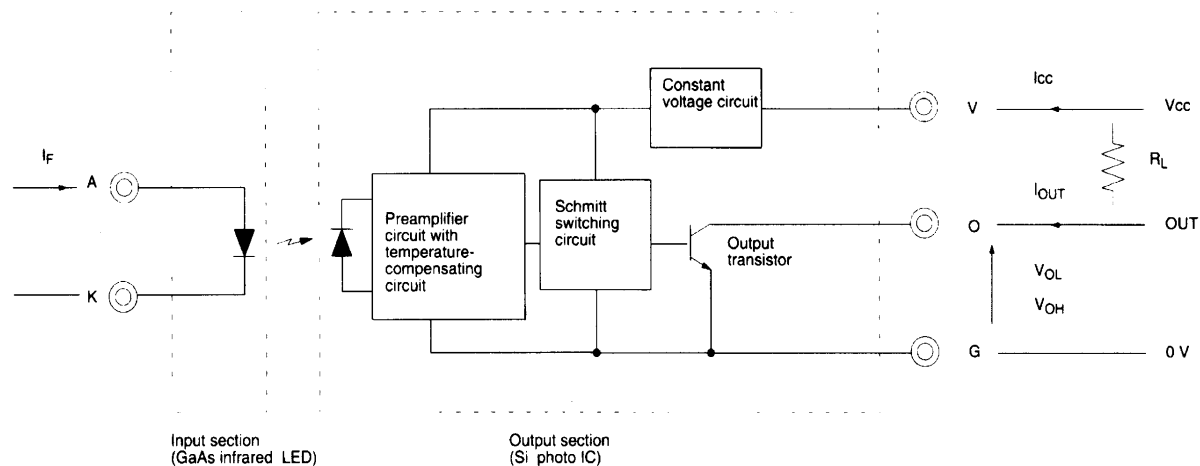
*** The following illustrations show the definition of response delay time.



Operation

Internal Circuit Diagram

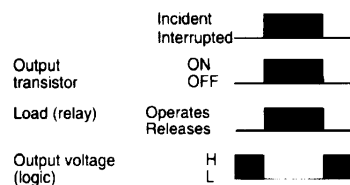
EE-SX4101



Timing Chart

EE-SX4101

Light ON

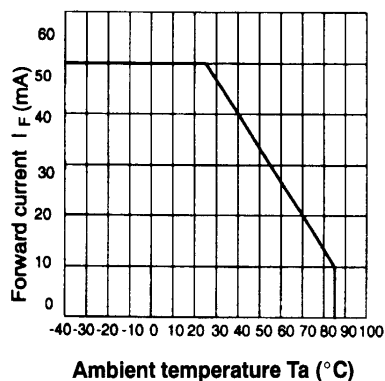


Engineering Data

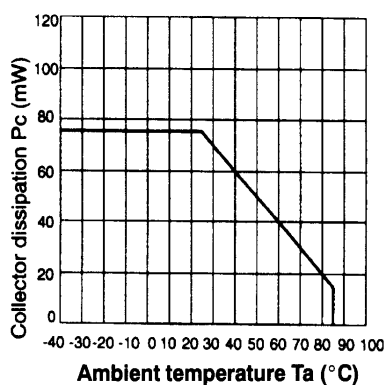
Note: The operating conditions of the photomicrosensor must be within the absolute maximum rating ranges.

EE-SX1101, EE-SX1102

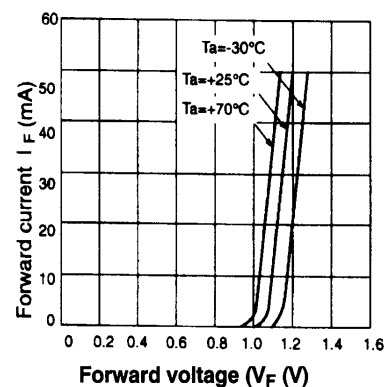
Temperature Characteristics



Temperature Characteristics



Input Characteristics (Typical)



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