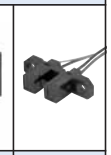
Model	EE-SX1107	EE-SX1018	EE-SX1103	EE-SX1105	EE-SX1108	EE-SX1131	EE-SX4134	EE-SX493	EE-SX1055	EE-SX1046	EE-SX1082	EE-SX1106	EE-SX1109	EE-SX199	EE-SX398/498	EE-SV3	EE-SX1071	EE-SX1096
	Transmissive slot width up to 3mm									Transmissive slot width 3mm - < 5mm								
																		
Dimensions (LxWxH)	3.4 x 3 x 3	8 x 4 x 6	5 x 4.2 x 5.2	4.9 x 2.6 x 3.3	5 x 4 x 4	5 x 4 x 4	5 x 4 x 4	11 x 8 x 9.5	8.9 x 4 x 5.4	10 x 6.5 X 5	10 x 6.5 x 5.2	6.4 x 4.2 x 5.4	6 x 4 x 5	12.2 x 5 x 10	12.2 x 5 x 10	19 x 15.1 x 10.2	13.6 x 6.2 x 10.2	25 x 6 x 10
Sensing method	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive
Sensing Distance	1mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2.8mm	3mm	3mm	3mm	3mm	3mm	3mm	3.4mm	3.4mm	3.4mm
Aperture Size	0.15mm	0.5mm	0.4mm	0.4mm	0.3mm	0.3mm	0.3mm	0.2mm	0.5mm	0.5mm	0.2mm	0.4mm	0.5mm	0.5mm	0.5mm	0.2/0.5/1.0mm	0.5mm	0.5mm
Emitter Wavelength	940nm	940nm	950nm	950nm	940nm	940nm	940nm	940nm	940nm	920nm	920nm	950nm	940nm	940nm	940nm	940nm	940nm	940nm
Mounting Type	Surface Mount	Through-hole	Through-hole	Through-hole	Surface Mount	Surface Mount	Surface Mount	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Surface Mount	Through-hole	Through-hole	Through-hole	Through-hole	Lead Wires

Model	EE-SX1088	EE-SH3	EE-SX3088/4088	EE-SG3/SG3B	EE-SX1057	EE-SX1128	EE-SX1041	EE-SX1042	EE-SX1081	EE-SX1235A-P2	EE-SX3009-P1 /4009-P1	EE-SX4019-P2	EE-SX3081 /4081	EE-SX4235A-P2	EE-SX1070	EE-SX3070 /4070	EE-SX1140	EE-SX461-P11
	Transmissive slot width 3mm - < 5mm							Transmissive slot width 5mm - 8mm									Transmissive slot width over 12mm	
																		
Dimensions (LxWxH)	25 x 6 x 10	25.4 x 6.2 x 10.2	25 x 6 x 10	25.4 x 6.3 x 11.5	13 x 6.3 x 8.6	13.5 x 5.2 x 9.3	14 x 6 x 10	14 x 5 x 14.5	13.7 x 5 x 10	27 x 8 x 15.9	34 x 11 x 21	38 x 11 x 21	13.7 x 5 x 10	27 x 8 x 15.9	17.7 x 6 x 10	17.7 x 6 x 10	23 x 5 x 16.3	32.5 x 12 x 23.6
Sensing method	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive	Transmissive
Sensing Distance	3.4mm	3.4mm	3.4mm	3.6mm	3.6mm	4.2mm	5mm	5mm	5mm	5mm	5mm	5mm	5mm	5mm	8mm	8mm	14mm	15mm
Aperture Size	0.5mm	0.2/0.5/1.0mm	0.5mm	2.0mm	2.0mm	0.5mm	0.5mm	0.5mm	0.5mm	0.5mm	0.5mm	0.5mm	0.5mm	0.5mm	0.5mm	0.5mm	1.5mm	2.0mm
Emitter Wavelength	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm
Mounting Type	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Snap-In	Screw Mounting	Screw Mounting	Through-hole	Snap-In	Through-hole	Through-hole	Through-hole	Snap-In

Model	EE-SY124	EE-SY125	EE-SY193	EE-SY171	EE-SY169A/B	EE-SY113	EE-SY313/413	EE-SF5B	EE-SY110	EE-SY310/410	EE-SA102	EE-SA103	EE-SA104	EE-SA107-P2	EE-SA407-P2	Z4D-B01	EY3A-1081	EY3A-112
	Reflective Type										Actuator Type					Micro Displacement	Multi-beam	
																		
Dimensions (LxWxH)	4 x 4 x 1.7	4 x 5 x 1.7	3.4 x 2.7 x 1	15 x 4.2 x 3	12.5 x 6 x 8	15.2 x 6.2 x 6	15.2 x 6.2 x 6	13 x 5.4 x 8	15.2 x 4.6 x 4.8	17 x 4.6 x 4.8	17 x 6 x 16.5	9 x 4 x 6	9 x 4 x 9.7	27 x 8 x 21.9	27 x 8 x 21.9	15 x 35.5 x 20	56.3 x 32 x 15	73 x 32 x 17.3
Sensing method	Reflective	Reflective	Reflective	Reflective	Reflective	Reflective	Reflective	Reflective	Reflective	Reflective	Actuator	Actuator	Actuator	Actuator	Actuator	Micro Displacement	Multi-beam	Multi-beam
Sensing Distance	1mm	1mm	1mm	3.5mm	4mm	4.4mm	4.4mm	5mm	5mm	5mm	3mm	3mm	3mm	3.6mm	3.6mm	6.5mm +-1mm	80mm	125mm
Aperture Size	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable	0.5mm	0.5mm	0.5mm	0.5mm	0.5mm	not applicable	not applicable	not applicable
Emitter Wavelength	940nm	940nm	940nm	940nm	920nm	940nm	920nm	940nm	940nm	920nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm	940nm
Mounting Type	Through-hole	Surface Mount	Surface Mount	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Through-hole	Snap-in	Snap-in	Screw Mounting	Screw Mounting	Screw Mounting

- Surface mount design, tape and reel packaging facilitate automated PCB.
- Compact size makes these sensors ideal for use in applications with restricted space.
- High-resolution sensing with phototransistor output.
- Dual channel model that is ideal for encoder applications (EE-SX1131).

Ordering Information

Appearance	Sensing Method	Slot Width	Slot Depth	Sensing Object	Weight	Part No.
	Transmissive	1 mm	2 mm	Opaque 0.15 x 0.6 mm min.	0.05 g	**EE-SX1107**
		2 mm	2.8 mm	Opaque 0.3 x 1.0 mm min.	0.1 g	**EE-SX1108**
		3 mm	3.5 mm	Opaque 0.5 x 1.0 mm min.	0.1 g	**EE-SX1109**
	Dual channel transmissive	2 mm	2.8 mm	Opaque 0.3 x 1.0 mm min.	0.1 g	**EE-SX1131**

Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

Item		Symbol	Rated value
Emitter	**Forward current**	I_F	25 mA (see note 1)
	Pulse foward current	I_{FP}	100 mA (see note 2)
	Reverse Voltage	V_R	5 V
Detector	**Collector-Emitter voltage**	V_{CEO}	20 V
	Emitter-Collector voltage	V_{ECO}	5 V
	Collector current	I_C	20 mA
	Collector dissipation	P_C	75 mW (see note 1)
Ambient temperature	**Operating**	Topr	-30°C to 85°C
	Storage	Tstg	-40°C to 90°C
	Reflow soldering	Tsol	240°C (see note 3)
	Manual soldering	Tsol	300°C (see note 3)

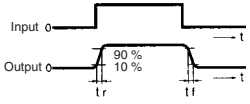
Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.
2. Duty: 1/100; Pulse width: 0.1 ms.
3. Complete soldering within 10 seconds for reflow soldering and within 3 seconds for manual soldering.

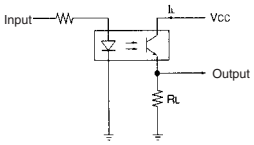
■ Electrical and Optical Characteristics (Ta = 25°C)

Item		Symbol	Value	Condition
Emitter	**Forward voltage**	V_F	1.1 V typ., 1.3 V max.	I_F = 5 mA
	Reverse current	I_R	10 µA max.	V_R = 5 V
	Peak emission wavelength	λ_P	940 nm typ.	I_F = 20 mA
Detector	**Light current**	I_L	50 µA min., 150 µA typ., 500 µA max.	I_F = 5 mA, V_{CE} = 5 V
	Dark current	I_D	100 nA max.	V_{CE} = 10 V, 0 ℓx
	Leakage current	I_{LEAK}	–	–
	Collector-Emitter saturated voltage	V_{CE} (sat)	0.1 V typ., 0.4 V max.	I_F = 20 mA, I_L = 50 µA
	Peak spectral sensitivity wavelength	λ_P	900 nm typ.	–
Rising time		tr	10 µs typ.	V_{CC} = 5 V, R_L = 1 kΩ, I_L = 100 µA
Falling time		tf	10 µs typ.	V_{CC} = 5 V, R_L = 1 kΩ, I_L = 100 µA

Note: The following figures show the rising time (tr) and falling time (tf).1

■ Response Time Measurement Circuit

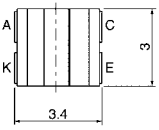


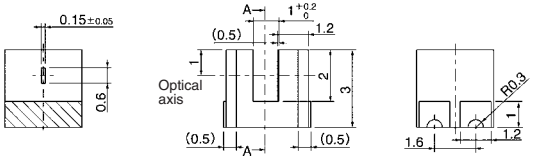


■ Dimensions

Note: All units are in millimetres unless stated.

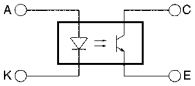
EE-SX1107



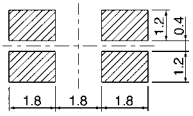


Cross section AA

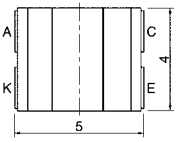
Internal Circuit

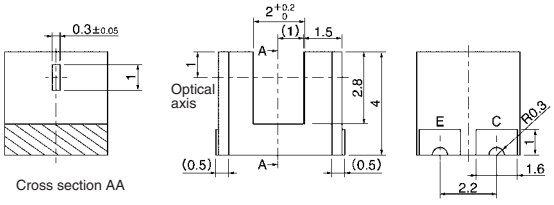


Recommended Soldering Pattern



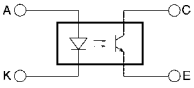
EE-SX1108



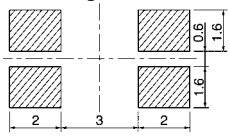


Cross section AA

Internal Circuit



Recommended Soldering Pattern

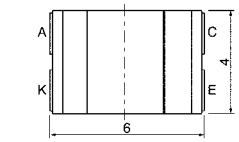


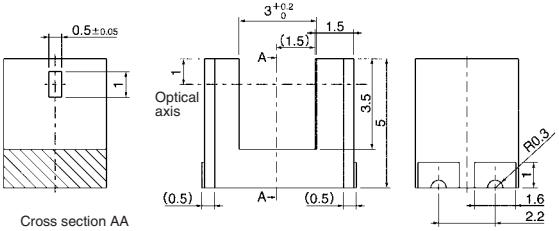
Unless otherwise stated the tolerances are ±0.15mm.

■ Dimensions

Note: All units are in millimetres unless stated.

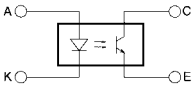
EE-SX1109



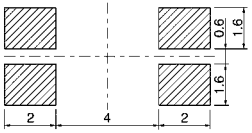


Cross section AA

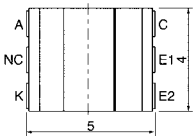
Internal Circuit

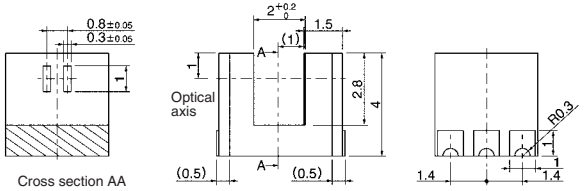


Recommended Soldering Pattern



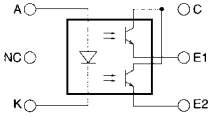
EE-SX1131



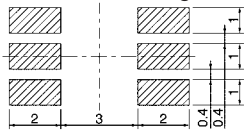


Cross section AA

Internal Circuit



Recommended Soldering Pattern

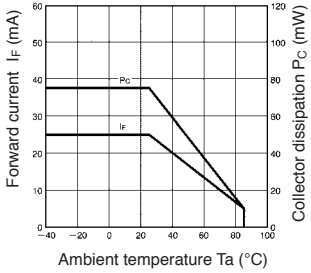


Terminal No.	Name
A	Anode
K	Cathode
C	Collector
E	Emitter
E1	Emitter 1
E2	Emitter 2

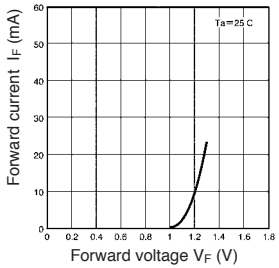
Unless otherwise stated the tolerances are ±0.15mm.

■ Engineering Data

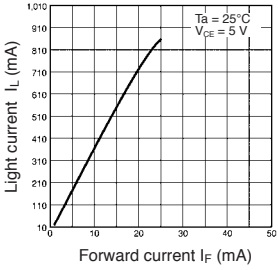
EE-SX1107/1108/1109/1131
Forward Current vs. Collector Dissipation Temperature Rating



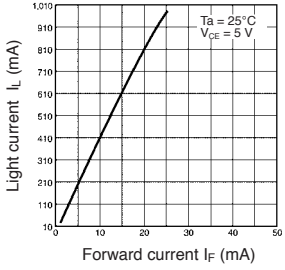
EE-SX1107/1108/1109/1131
Forward Current vs. Forward Voltage Characteristics (Typical)



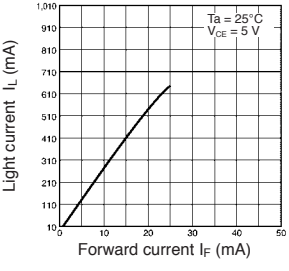
EE-SX1107
Light Current vs. Forward Current Characteristics (Typical)



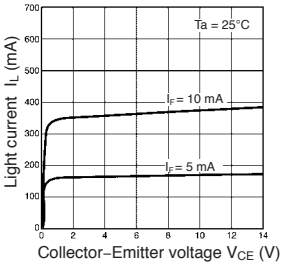
EE-SX1108/1131
Light Current vs. Forward Current Characteristics (Typical)



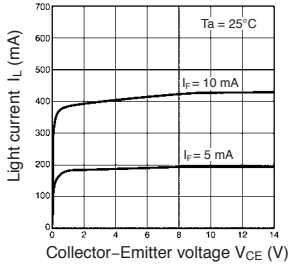
EE-SX1109
Light Current vs. Forward Current Characteristics (Typical)



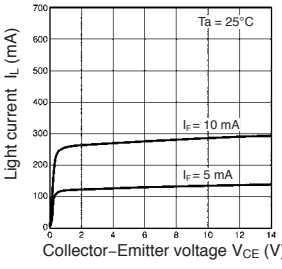
EE-SX1107
Light Current vs. Collector–Emitter Voltage Characteristics (Typical)



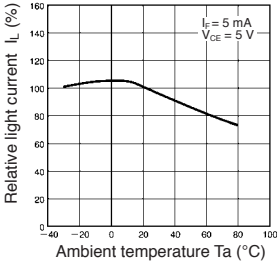
EE-SX1108/1131
Light Current vs. Collector–Emitter Voltage Characteristics (Typical)



EE-SX1109
Light Current vs. Collector–Emitter Voltage Characteristics (Typical)

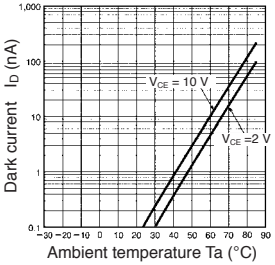


EE-SX1107/1108/1109/1131
Relative Light Current vs. Ambient Temperature Characteristics (Typical)

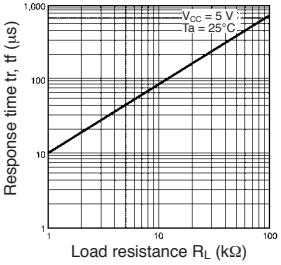


■ Engineering Data

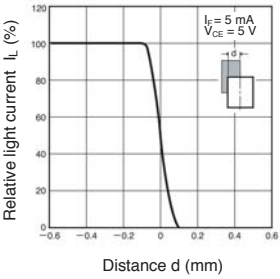
EE-SX1107/1108/1109/1131
Dark Current vs. Ambient Temperature Characteristics (Typical)



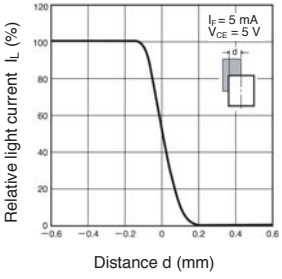
EE-SX1107/1108/1109/1131
Response Time vs. Load Resistance Characteristics (Typical)



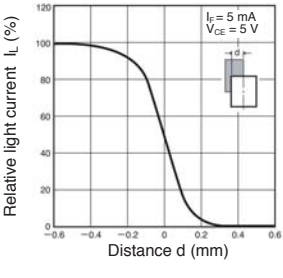
EE-SX1107
Sensing Position Characteristics (Typical)



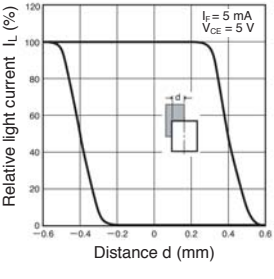
EE-SX1108
Sensing Position Characteristics (Typical)



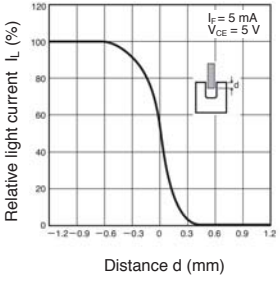
EE-SX1109
Sensing Position Characteristics (Typical)



EE-SX1131
Sensing Position Characteristics (Typical)



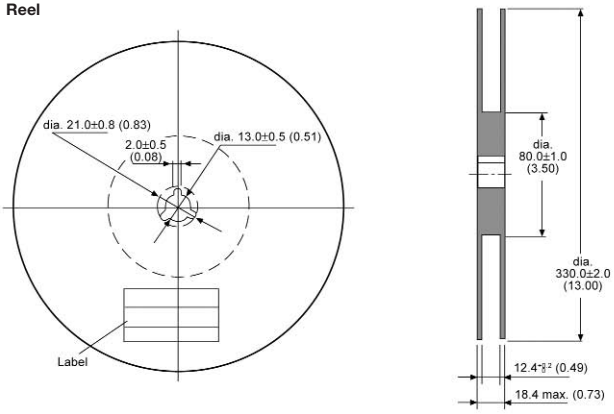
EE-SX1107/1108/1109/1131
Sensing Position Characteristics (Typical)



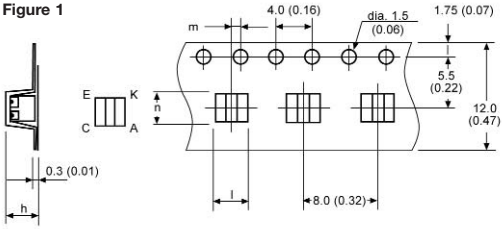
■ Tape and Reel – EE-SX1107, EE-SX1108, EE-SX1109 & EE-SX1131

Unit: mm (inch).

Reel

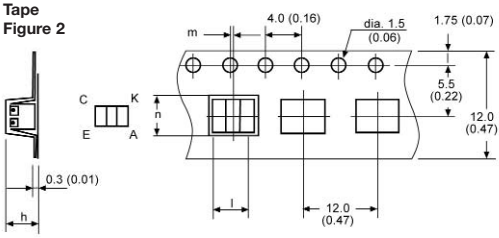


Tape
Figure 1



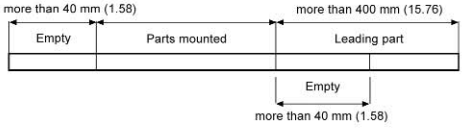
Part No.	*h*	*i*	*m*	*n*
EE-SX1107	3.2 (013)	3.6 (014)	0.9 (0.04)	3.2 (013)
EE-SX1108	4.2 (0.17)	5.2 (0.20)	0.25 (0.01)	4.2 (0.17)
EE-SX1131	4.2 (0.17)	5.2 (0.20)	0.25 (0.01)	4.2 (0.17)

Tape
Figure 2



Part No.	*h*	*i*	*m*	*n*
EE-SX1109	5.2 (0.20)	6.2 (0.24)	0.25 (0.01)	4.2 (0.17)

Tape configuration



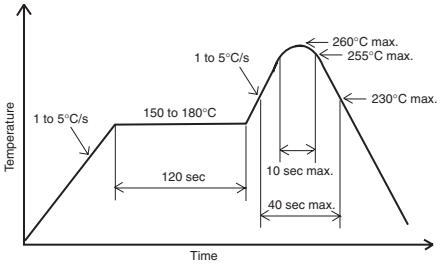
Part No.	Pieces per reel
EE-SX1107	2000
EE-SX1108/1131	2000
EE-SX1109	1000

Precautions

■ Soldering Information

Reflow soldering

- The following soldering paste is recommended:
  Melting temperature: 216 to 220°C
  Composition: Sn 3.5 Ag, 0.75 Cu
- The recommended thickness of the metal mask for screen printing is between 0.2 and 0.25 mm.
- Set the reflow oven so that the temperature profile shown in the following chart is obtained for the upper surface of the product being soldered.



Manual soldering

- Use “Sn 60” (60% tin and 40% lead) or solder with silver content.
- Use a soldering iron of less than 25W, and keep the temperature of the iron tip at 350°C or below.
- Solder each point for a maximum of three seconds.
- After soldering, allow the product to return to room temperature before handling it.

Storage

To protect the product from the effects of humidity until the package is opened, dry-box storage is recommended. If this is not possible, store the product under the following conditions:

Temperature: 10 to 30°C
Humidity: 60% max.

The product is packed in a humidity-proof envelope. Reflow soldering must be done within 48 hours after opening the envelope, during which time the product must be stored under 30°C at 80% maximum humidity.

If it is necessary to store the product after opening the envelope, use dry-box storage or reseal the envelope.

Baking

If a product has remained packed in a humidity-proof envelope for six months or more, or if more than 48 hours have lapsed since the envelope was opened, bake the product under the following conditions before use:

Reel: 60°C for 24 hours or more
Bulk: 80°C for 4 hours or more

ALL DIMENSIONS SHOWN ARE IN MILLIMETRES.
To convert millimetres into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

CAT. No.E904-E2-01