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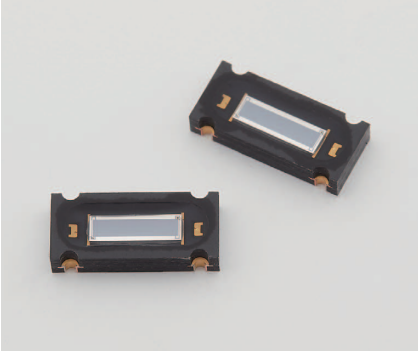
One-dimensional PSD



S7105-16

PSD compatible to lead-free reflow soldering

The S7105-16 is a position sensitive detector (PSD) compatible to lead-free reflow soldering. The small and thin leadless package allows reducing the mount area on a printed circuit board.

Features

- **Photosensitive area: 1 × 4.2 mm (resistance length: 4.2 mm)**
- **Compatible lead reflow soldering**
- **Surface mount type, compact, thin leadless package**

Applications

- **Distance measuring equipment**
- **Proximity switches**
- **Displacement meters**

Absolute maximum ratings (Ta=25 °C)

Parameter	Symbol	Condition	Value	Unit
Reverse voltage	V_R max		20	V
Operating temperature	Topr	No dew condensation*1	-25 to 85	°C
Storage temperature	Tstg	No dew condensation*1	-40 to 100	°C
Reflow soldering conditions	Tsol	JEDEC level 4	Peak temperature: 250 °C, twice (see P.5)	-

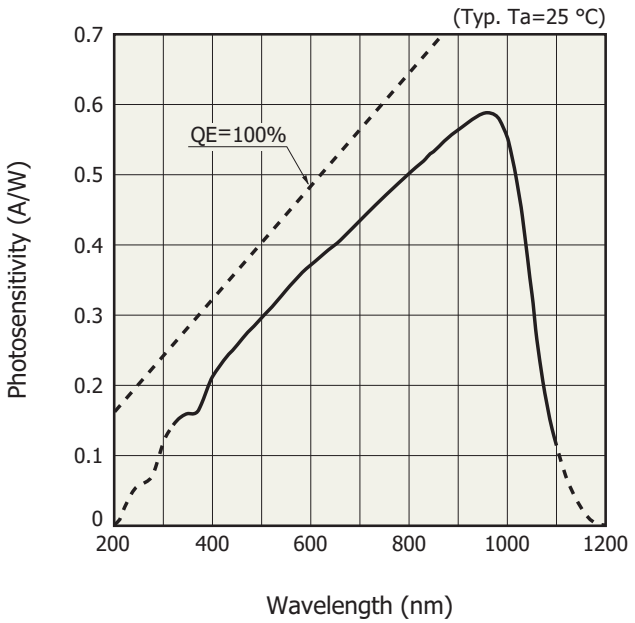
*1: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

Electrical and optical characteristics (Ta=25 °C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Spectral response range	λ		-	320 to 1100	-	nm
Peak sensitivity wavelength	λp		-	960	-	nm
Photosensitivity	S	λ=890 nm	-	0.55	-	A/W
Interelectrode resistance	Rie	Vb=0.1 V	100	140	180	kΩ
Position detection error*2	-	V_R=1 V Light spot size=ϕ300 μm	-	±15	±35	μm
Saturation current*3	Ist	V_R=1 V, R_L=1 kΩ	30	-	-	μA
Dark current	I_D	V_R=1 V	-	0.1	2	nA
Dark current temperature coefficient	ΔT_{ID}		-	1.15	-	times/°C
Rise time*4	tr	V_R=1 V, R_L=1 kΩ λ=890 nm	-	5	15	μs
Terminal capacitance	Ct	V_R=1 V, f=10 kHz	-	40	80	pF
Position resolution*5	-	*5	-	-	0.1	μm

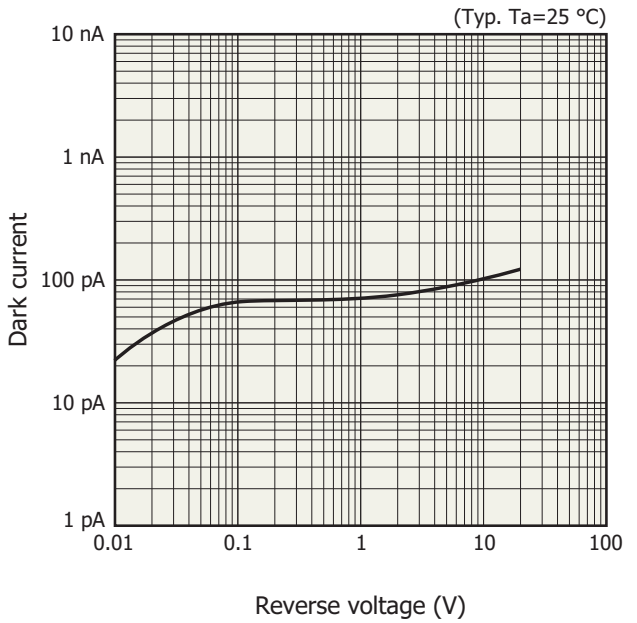
*2: In the range 75% from the center of the photosensitive area to the edge
*3: Upper limit of linearity of the photocurrent relative to the total incident light level. Photocurrent at a point 10% deviation from linearity
*4: Time required for output change from 10 to 90% of the steady output value when stepped function light is input to the PSD
*5: Equivalent to the detectable light spot displacement. The detection limit is expressed as a distance on the photosensitive area.
· Photocurrent: 1 μA
· Frequency bandwidth 1 kHz
· Equivalent input noise voltage of circuit: 1 μV

Spectral response



KPSDB0115EA

Dark current vs. reverse voltage



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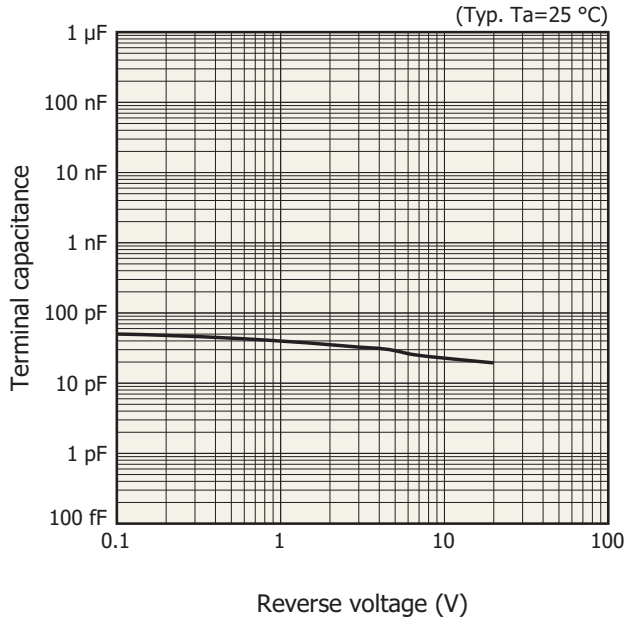
Terminal capacitance vs. reverse voltage



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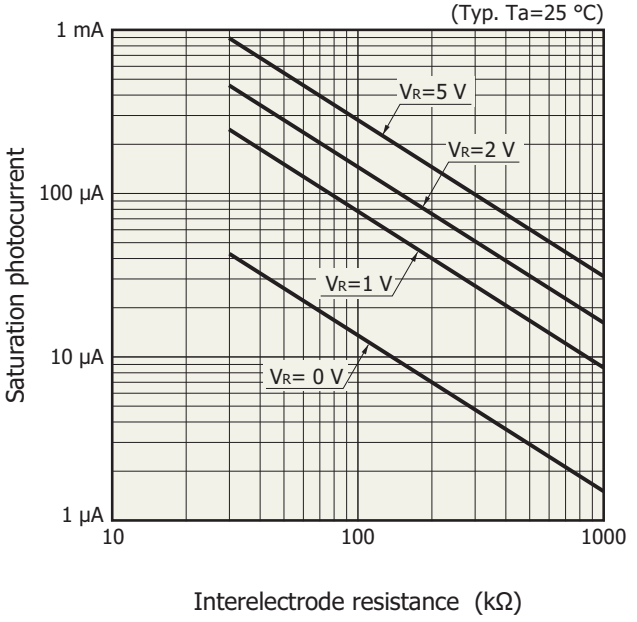
Saturation photocurrent vs. interelectrode resistance



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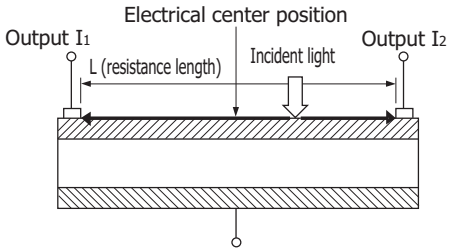
Definition of position detection error

Given the electrical center position to be the incident position that produces $I_1=I_2$, the position detection error at each incident position is defined by the following equation.

$$\text{Position detection error (μm)} = \text{Incident position} - \frac{I_2 - I_1}{I_1 + I_2} \times \frac{L}{2}$$

The value at the incident position assumes that the electrical center position is 0 with the I_1 side as negative and I_2 side as positive.



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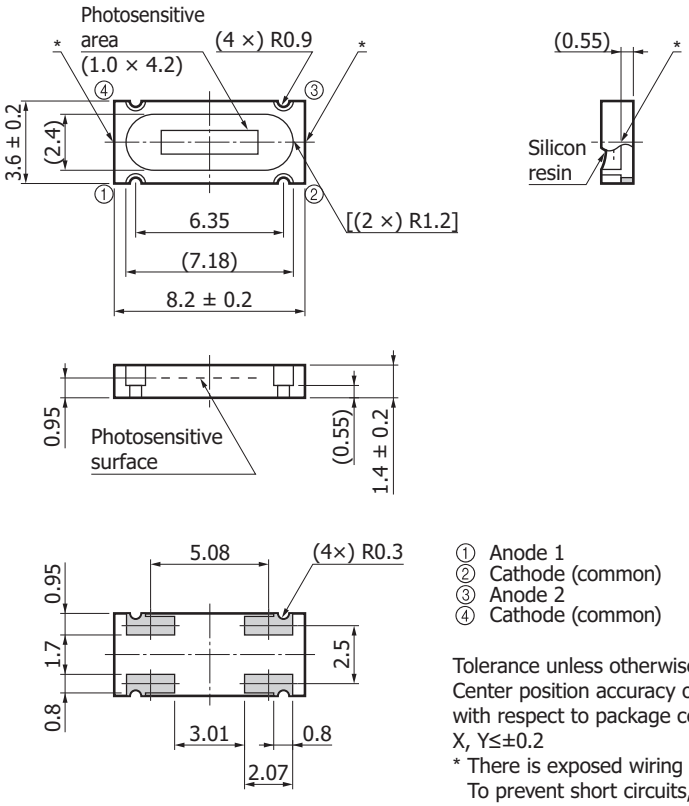
Dimensional outline (unit: mm)



① Anode 1
② Cathode (common)
③ Anode 2
④ Cathode (common)

Tolerance unless otherwise noted: ±0.1
Center position accuracy of photosensitive area: with respect to package center
X, Y≤±0.2
* There is exposed wiring on the side of the device. To prevent short circuits, do not allow any conductors to come in contact with the device.

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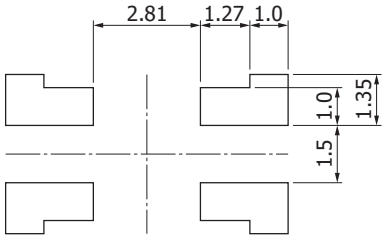
Recommended land pattern (unit: mm)



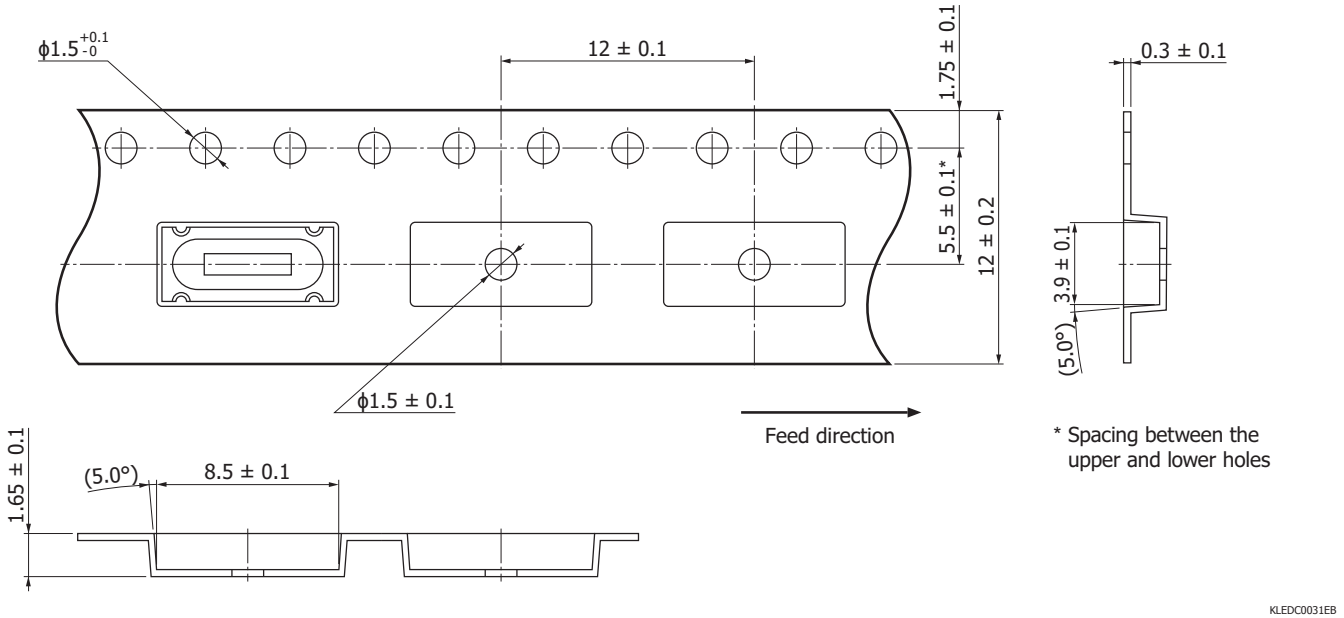
KPSDC0030EA

Standard packing specifications

■ Reel

Dimensions	Hub diameter	Tape width	Material	Electrostatic characteristics
254 mm	100 mm	12 mm	Polystyrene	Conductive

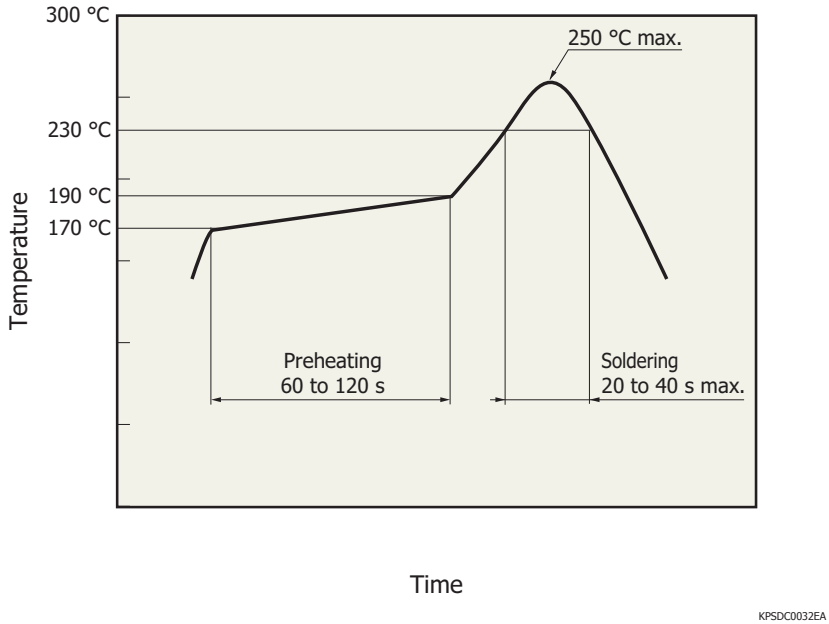
■ Embossed tape (unit: mm, material: polystyrene, conductive)



■ Packing quantity
1000 pcs/reel

■ Packing type
Reel and desiccant in moisture-proof packaging (vacuum-sealed)

Measured example of temperature profile with our hot-air reflow oven for product testing



· This product supports lead-free soldering. After unpacking, store it in an environment at a temperature of 30 °C or less and a humidity of 60% or less, and perform soldering within 72 hours.

· The effect that the product is subject to during reflow soldering varies depending on the circuit board and reflow oven that are used. When you set reflow soldering conditions, check that problems do not occur in the product by testing out the conditions in advance.

Related information

www.hamamatsu.com/sp/ssd/doc_en.html

■ Precautions
· Disclaimer
· Metal, ceramic, plastic packages

■ Technical information
· PSD

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