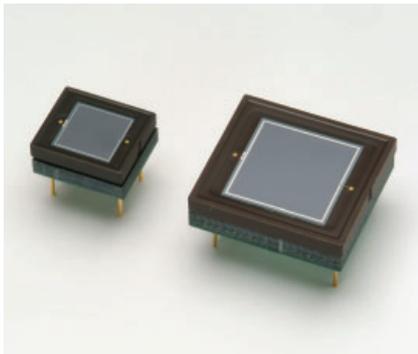


# Si photodiode with preamp



S9269

S9270

## Photodiode and preamp integrated with feedback resistance and capacitance

S9269 and S9270 are low-noise photosensors consisting of a Si photodiode, op amp, and feedback resistance and capacitance, all integrated into same package with a surface size equal to our standard ceramic packages. These photosensors are ideal for a wide range of photometric applications including analytical equipment and measurement equipment. The active area of the photodiode is internally connected to the GND terminal making it highly resistant to EMC noise. Combinations with various photodiodes such as UV sensitivity enhanced type, IR sensitivity suppressed type and IR sensitivity enhanced type are also available. (Custom order products)

### Features

- Si photodiode for visible to near IR Si precision photometry
- Small package  
S9269: 10.1 × 8.9 × 40<sup>t</sup> mm  
S9270: 16.5 × 15.0 × 4.15<sup>t</sup> mm
- Active area  
S9269: 5.8 × 5.8 mm  
S9270: 10 × 10 mm
- FET input operational amplifier with low power dissipation
- Built-in R<sub>f</sub>=1 GΩ, C<sub>f</sub>=5 pF
- Low noise and NEP

### Applications

- Precision photometry
- General-purpose optical measurement

### Absolute maximum ratings (Ta=25 °C)

Parameter	Symbol	Value	Unit
Supply voltage (op amp)	V <sub>cc</sub>	±20	V
Power dissipation	P	500	mW
Operating temperature	T <sub>opr</sub>	-20 to +60	°C
Storage temperature	T <sub>stg</sub>	-20 to +80	°C

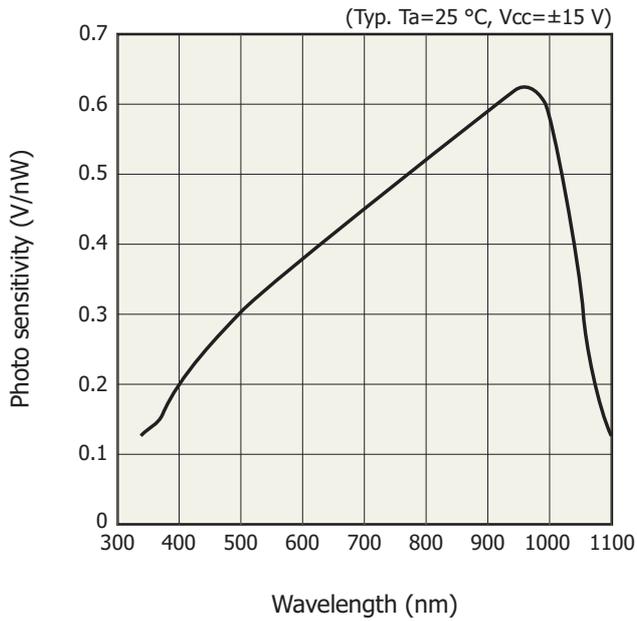
Note: Absolute maximum ratings are the values that must not be exceeded at any time. If even one of the absolute maximum ratings is exceeded even for a moment, the product quality may be impaired. Always be sure to use the product within the absolute maximum ratings.

### Electrical and optical characteristics (Ta=25 °C, V<sub>cc</sub>=±15 V, R<sub>L</sub>=1 MΩ)

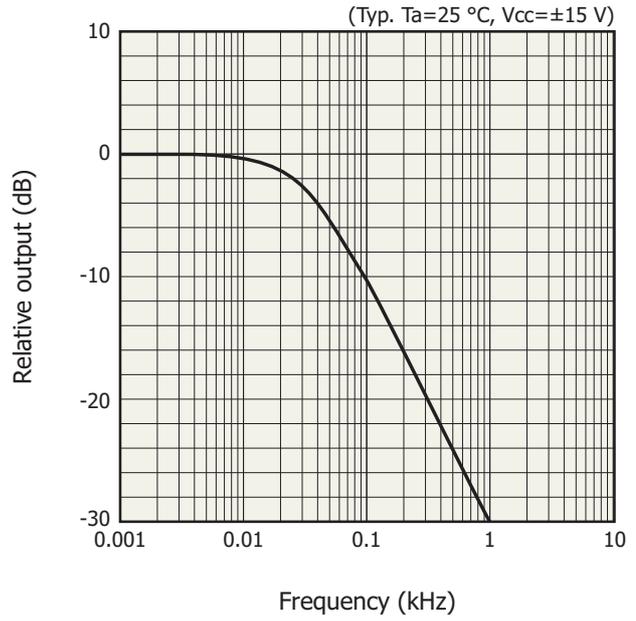
Parameter	Symbol	Condition	S9269			S9270			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Spectral response range	λ		-	340 to 1100	-	-	340 to 1100	-	nm
Peak sensitivity wavelength	λ <sub>p</sub>		-	960	-	-	960	-	nm
Feedback resistance (built-in) *	R <sub>f</sub>		-	1	-	-	1	-	GΩ
Feedback capacitance (built-in) *	C <sub>f</sub>		-	5	-	-	5	-	pF
Photo sensitivity	S	λ=λ <sub>p</sub>	0.5	0.62	-	0.5	0.62	-	V/nW
Output noise voltage	V <sub>n</sub>	Dark state, f=10 Hz	-	7.3	-	-	9.7	-	μVrms/Hz <sup>1/2</sup>
		Dark state, f=20 Hz	-	6.5	-	-	9.1	-	
Noise equivalent power	NEP	λ=λ <sub>p</sub> , f=10 Hz	-	12	-	-	16	-	fW/Hz <sup>1/2</sup>
		λ=λ <sub>p</sub> , f=20 Hz	-	12	-	-	17	-	
Output offset voltage	V <sub>os</sub>	Dark state	-	±4	-	-	±4	-	mV
Cut-off frequency	f <sub>c</sub>	-3 dB	-	32	-	-	32	-	Hz
Output voltage swing	V <sub>o</sub>	R <sub>L</sub> =10 kΩ	-	13	-	-	13	-	V
Supply current	I <sub>cc</sub>	Dark state	-	0.3	0.6	-	0.3	0.6	mA

\* Custom devices available with different R<sub>f</sub>, C<sub>f</sub>, etc.

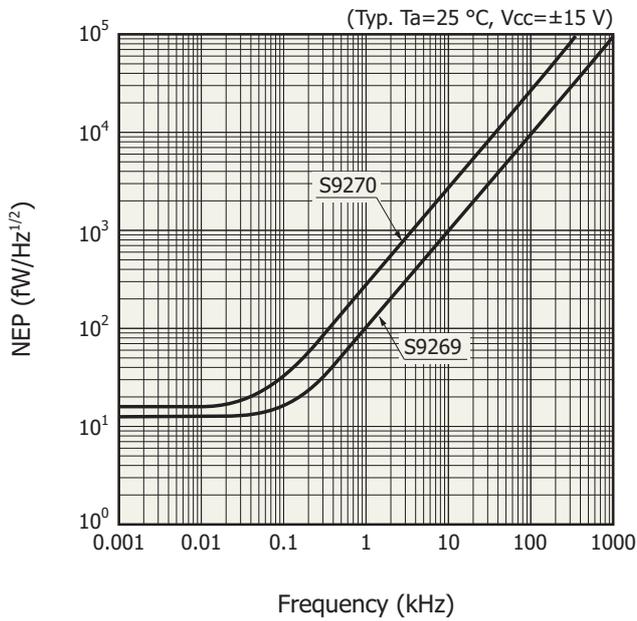
**Spectral response**



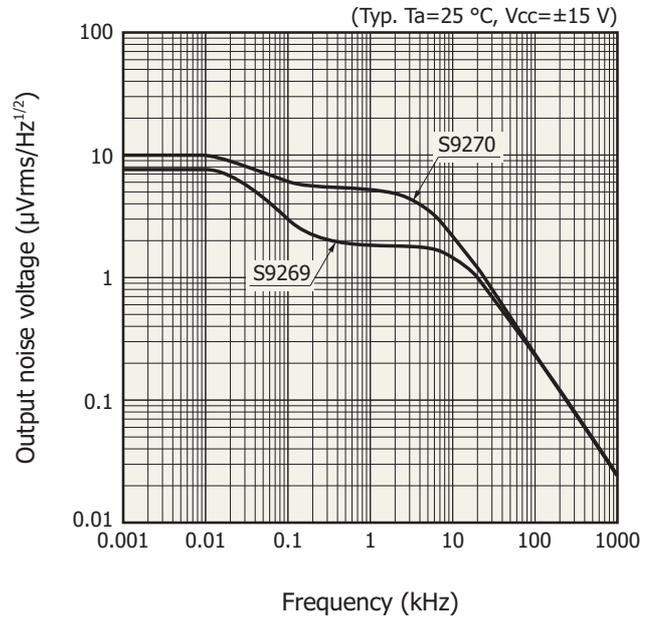
**Frequency response**



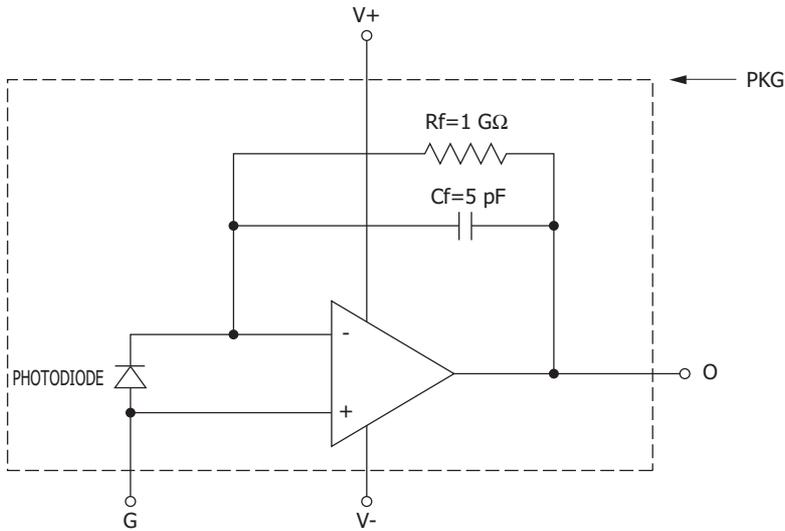
**NEP vs. frequency**



**Output noise voltage vs. frequency**



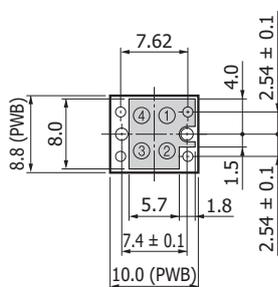
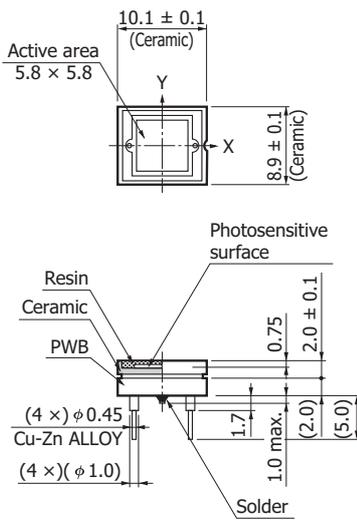
Application circuit example



KSPDC0050EA

Dimensional outline (unit: mm, tolerance unless otherwise noted: ±0.2)

S9269	S9270
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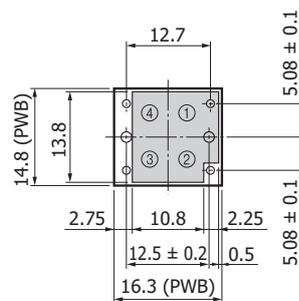
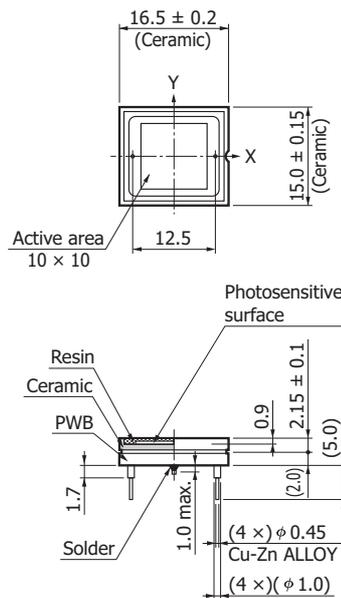


Active area position accuracy versus package center  
 $-0.165 \leq X \leq +0.335$   
 $-0.25 \leq Y \leq +0.25$

Resin potting may extend a maximum of 0.1 mm above the upper surface of the package.

- ① GND
- ② Vcc-
- ③ OUT
- ④ Vcc+

KSPDA0160EB



Active area position accuracy versus package center  
 $-0.3 \leq X, Y \leq +0.3$

Resin potting may extend a maximum of 0.1 mm above the upper surface of the package.

- ① GND
- ② Vcc-
- ③ OUT
- ④ Vcc+

KSPDA0161EB

## ⚠ Precautions for use

### ● ESD

S9269, S9270 may be damaged or their performance may deteriorate by such factors as electro static discharge from the human body, surge voltages from measurement equipment, leakage voltages from soldering irons and packing materials, etc. As a countermeasure against electro static discharge, the device, operator, work place and measuring jigs must all be set at the same potential. The following precautions must be observed during use:

- To protect the device from electro static discharge which accumulate on the operator or the operator's clothes, use a wrist strap or similar tools to ground the operator's body via a high impedance resistor (1 M $\Omega$ ).
- A semiconductive sheet (1 M $\Omega$  to 100 M $\Omega$ ) should be laid on both the work table and the floor in the work area.
- When soldering, use an electrically grounded soldering iron with an isolation resistance of more than 10 M $\Omega$ .
- For containers and packing, use of a conductive material or aluminum foil is effective. When using an antistatic material, use one with a resistance of 0.1 M $\Omega$ /cm<sup>2</sup> to 1 G $\Omega$ /cm<sup>2</sup>.

### ● Wiring

If electric current or voltage is applied in reverse polarity to an electronic device such as a preamplifier, this can degrade device performance or destroy the device. Always check the wiring and dimensional outline to avoid misconnection.

Information described in this material is current as of October, 2011.

Product specifications are subject to change without prior notice due to improvements or other reasons. Before assembly into final products, please contact us for the delivery specification sheet to check the latest information.

The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use.

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# HAMAMATSU

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