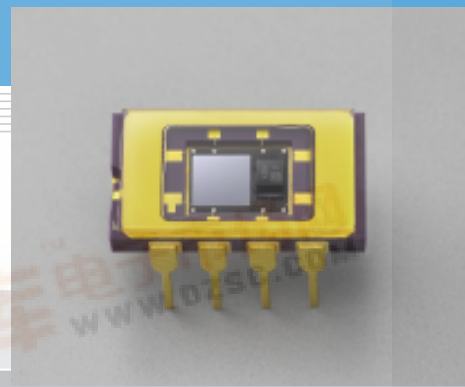


PHOTODIODE

Si photodiode with preamp S7998

Photodiode (3 × 3 mm)/preamplifier assembly in compact package



S7998 is a UV to near IR detector using a 3 × 3 mm photodiode integrated with preamplifier. The photodiode chip and the preamplifier are assembled at high density by direct bump connections. The preamplifier bias current is so small that a high feedback resistance of 1 GΩ can be used. Built-in feedback resistance types and metal package types are also available upon request.

Features

- Compact ceramic package: 13.2 × 7.37 mm
- Uses a UV to near IR Si photodiode (3 × 3 mm) for high-precision photometry
- Uses a low bias current preamplifier: $I_b=64$ pA Max.
- Low noise
- Low current consumption

Applications

- Precision photometry
- General photometry

■ Absolute maximum ratings (Ta=25 °C)

Parameter	Symbol	Value	Unit
Preamplifier supply voltage	Vcc	± 6	V
Photodiode reverse voltage	VR	5	V
Operating temperature	Topr	-20 to +60	°C
Storage temperature	Tstg	-20 to +80	°C

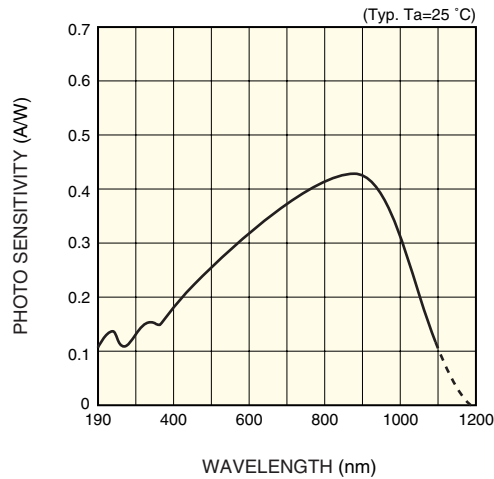
■ Electrical and optical characteristics of photodiode (Ta=25 °C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Spectral response range	λ		-	190 to 1100	-	nm
Peak sensitivity wavelength	λ_p		-	880	-	nm
Photo sensitivity	S	$\lambda=200$ nm	0.1	0.12	-	A/W
		$\lambda=\lambda_p$	-	0.43	-	A/W
Dark current	Id	VR=10 mV	-	50	250	pA
Shunt resistance	Rsh	VR=10 mV	-	0.2	-	GΩ
Terminal capacitance	Ct	VR=0 V, f=10 kHz	-	120	-	pF

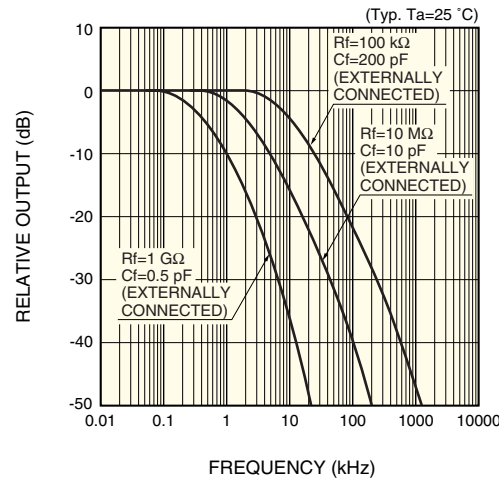
■ Electrical and optical characteristics of preamp (Ta=25 °C, Vcc=±5 V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input offset voltage	Vos		-	±0.7	±5	mV
Input offset voltage temperature drift	ΔV_{os}		-	4	-	μV/°C
Input bias current	Ib			±1	±64	pA
Input offset current	Ios		-	0.5	32	pA
Output voltage amplitude	Vo	RL=2 kΩ	±4.8	±4.9	-	V
Gain bandwidth	GBW		-	1.3	-	MHz
Equivalent noise input voltage	Vn	f=10 kHz	-	33	-	nVrms/Hz ^{1/2}
Equivalent noise input current	In	f=10 kHz	-	1.5	-	fA/Hz ^{1/2}
Supply current	Icc		-	1.3	1.7	mA

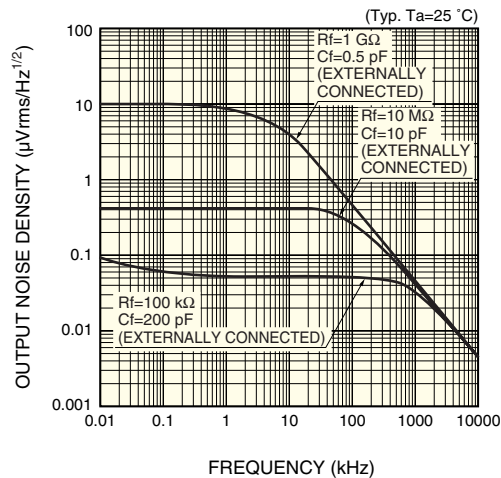
■ Spectral response (photodiode only)



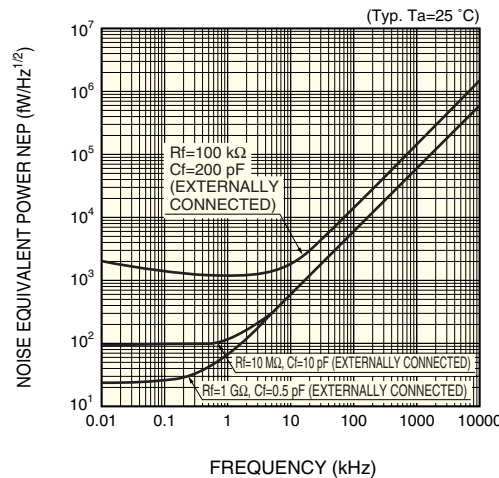
■ Frequency response



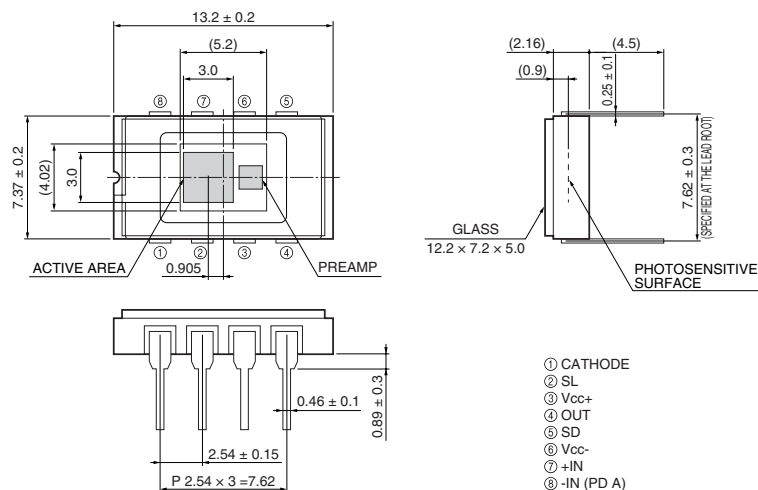
■ Output noise characteristics



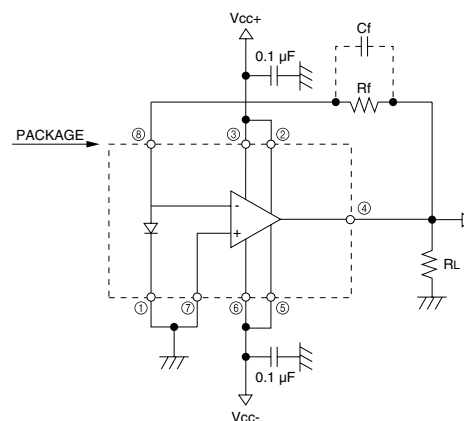
■ Noise equivalent power vs. frequency



■ Dimensional outline (unit: mm)



■ Application circuit example



KSPDA0147EA

KSPDC0040EA

Precautions for use

● ESD

S7998 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 MΩ).
- A semiconductive sheet (1 MΩ to 100 MΩ) 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 MΩ.
- 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 MΩ/cm² to 1 GΩ/cm².

● 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.