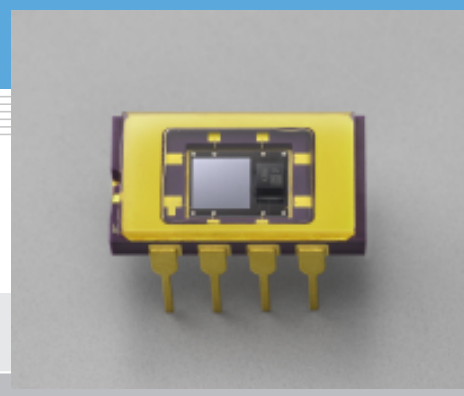


Si photodiode with preamp S7998

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 ($T_a=25$ °C)

| Parameter | Symbol | Value | Unit |
|-----------------------------|-----------|------------|------|
| Preamplifier supply voltage | V_{cc} | ± 6 | V |
| Photodiode reverse voltage | V_R | 5 | V |
| Operating temperature | T_{opr} | -20 to +60 | °C |
| Storage temperature | T_{stg} | -20 to +80 | °C |

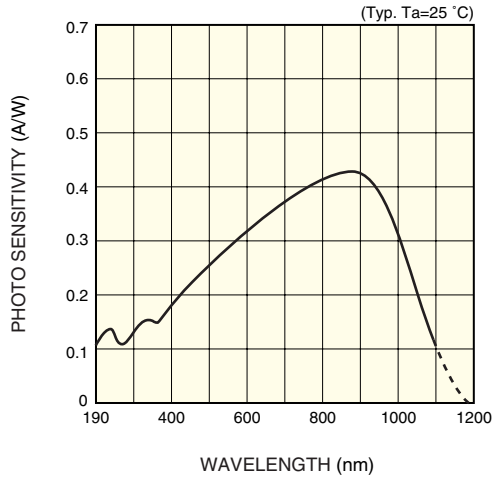
■ Electrical and optical characteristics of photodiode ($T_a=25$ °C)

| 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 | I_D | $V_R=10$ mV | - | 50 | 250 | pA |
| Shunt resistance | R_{sh} | $V_R=10$ mV | - | 0.2 | - | GΩ |
| Terminal capacitance | C_t | $V_R=0$ V, $f=10$ kHz | - | 120 | - | pF |

■ Electrical and optical characteristics of preamp ($T_a=25$ °C, $V_{cc}=\pm 5$ V)

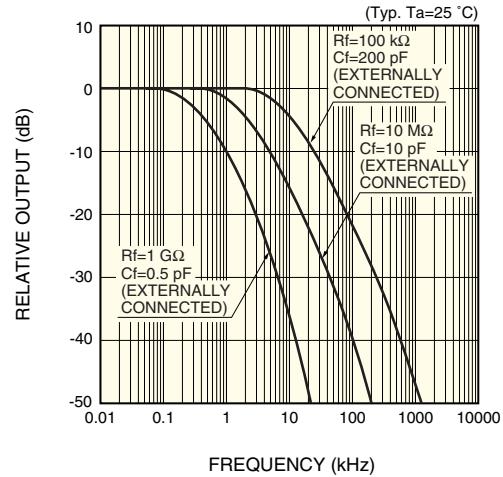
| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--|-----------------|------------|-----------|-----------|----------|---------------------|
| Input offset voltage | V_{os} | | - | ± 0.7 | ± 5 | mV |
| Input offset voltage temperature drift | ΔV_{os} | | - | 4 | - | $\mu V/^\circ C$ |
| Input bias current | I_b | | | ± 1 | ± 64 | pA |
| Input offset current | I_{os} | | - | 0.5 | 32 | pA |
| Output voltage amplitude | V_o | $R_L=2$ kΩ | ± 4.8 | ± 4.9 | - | V |
| Gain bandwidth | GBW | | - | 1.3 | - | MHz |
| Equivalent noise input voltage | V_n | $f=10$ kHz | - | 33 | - | $nV_{rms}/Hz^{1/2}$ |
| Equivalent noise input current | I_n | $f=10$ kHz | - | 1.5 | - | $fA/Hz^{1/2}$ |
| Supply current | I_{cc} | | - | 1.3 | 1.7 | mA |

■ Spectral response (photodiode only)



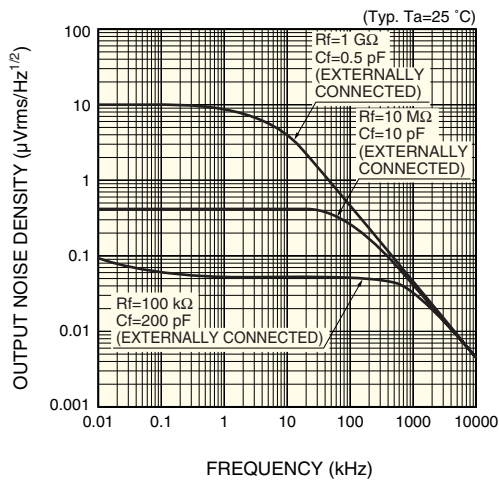
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■ Frequency response



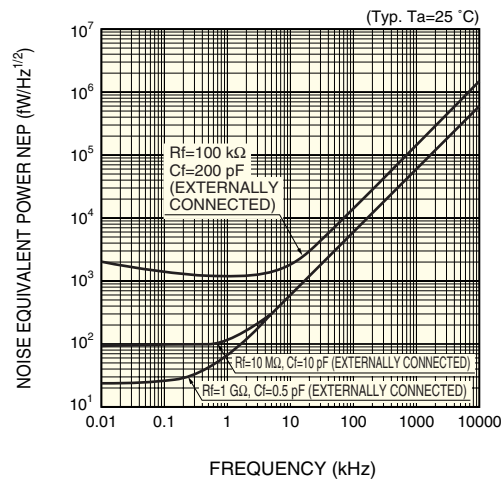
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■ Output noise characteristics



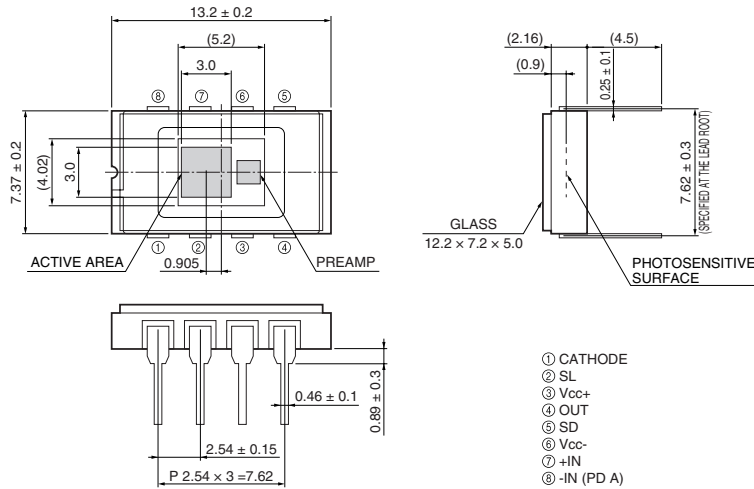
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■ Noise equivalent power vs. frequency

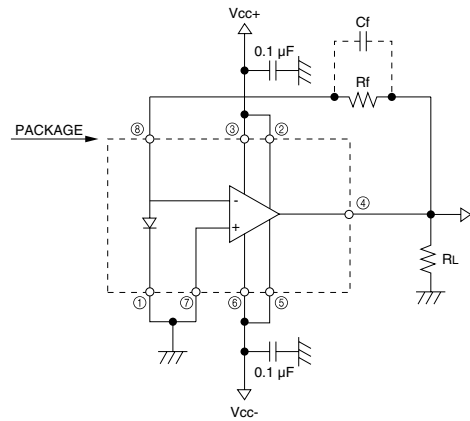


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■ Dimensional outline (unit: mm)



■ Application circuit example



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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.