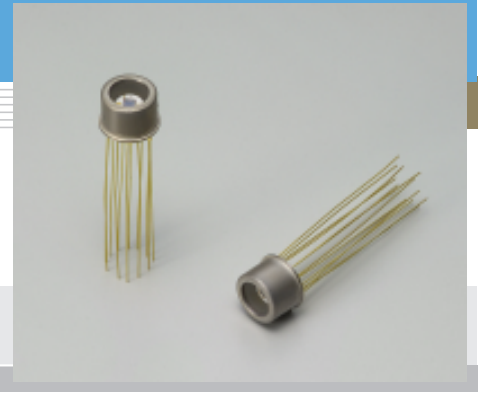


Two-color detector K3413-05/-08/-09

Wide spectral response range from UV to IR



K3413-05/-08/-09 are hybrid detectors containing an infrared-transmitting Si photodiode mounted over an InGaAs PIN photodiode, along the same optical axis. This structure delivers a wide spectral response range from 0.25 μm to nearly 1.7 μm . The built-in thermoelectric cooler maintains a constant temperature during operation, allowing precision measurement with an improved S/N ratio.

Features

- Wide spectral response range
- Allows same optical path design
- One-stage thermoelectrically cooled type

Applications

- Spectrophotometers
- Laser monitors
- Flame monitors
- Radiation thermometers

General ratings / Absolute maximum ratings

| Type No. | Package | Cooling | Detector element | Active area (mm) | Absolute maximum ratings | | | | |
|----------|---------|---------------------|------------------|------------------|---------------------------------------|---------------------------------|---------------------------|--|--|
| | | | | | Thermistor allowable dissipation (mW) | TE-cooler allowable current (A) | Reverse voltage V_R (V) | Operating temperature T_{opr} ($^{\circ}\text{C}$) | Storage temperature T_{stg} ($^{\circ}\text{C}$) |
| K3413-05 | TO-8 | One-stage TE-cooled | Si | 2.4×2.4 | 0.2 | 1.5 | 5 | -40 to +70 | -55 to +85 |
| | | | InGaAs | $\phi 0.5$ | | | 20 | | |
| K3413-08 | | | Si | 2.4×2.4 | | | 5 | | |
| | | | InGaAs | $\phi 1$ | | | 2 | | |
| K3413-09 | | | Si | 2.4×2.4 | | | 5 | | |
| | | | InGaAs | $\phi 1$ | | | 10 | | |

Electrical and optical characteristics (Typ. $T_a=25^{\circ}\text{C}$, unless otherwise noted)

| Type No. | Detector element | Measurement condition Element temperature T ($^{\circ}\text{C}$) | Spectral response range (μm) | Peak sensitivity wavelength λ_p (μm) | Photo sensitivity S $\lambda=\lambda_p$ (A/W) | Dark current I_D $V_R=10\text{ mV}$ | | Shunt Resistance R_{sh} (M Ω) | D^* $\lambda=\lambda_p$ (cm \cdot Hz $^{1/2}$ /W) | Rise time t_r $V_R=0\text{ V}$ $R_L=1\text{ k}\Omega$ 10 to 90 % (ns) | Terminal capacitance C_t $V_R=5\text{ V}$ $f=1\text{ MHz}$ (pF) |
|----------|------------------|---|---|---|---|---------------------------------------|--------------------------|---|---|---|---|
| | | | | | | Typ. (nA) | Max. (nA) | | | | |
| K3413-05 | Si | 25 | 0.32 to 1.67 | 0.94 | 0.45 | 50 (pA) | 100 (pA) | 200 | 1.4×10^{13} | 200 *3 | 60 *5 |
| | InGaAs | -10 | 1.67 | 1.55 | 0.55 | 0.05 *1 | 0.25 *1 | 3000 | 1.2×10^{13} | 1.5 *4 | 12 |
| K3413-08 | Si | 25 | 0.32 to 2.57 | 0.94 | 0.45 | 50 (pA) | 100 (pA) | 200 | 1.4×10^{13} | 200 *3 | 60 *5 |
| | InGaAs | -10 | 2.57 | 2.30 | 0.60 | 1.5 (μA) *2 | 7.5 (μA) *2 | 0.03 | 7.4×10^{10} | 23 *4 | 200 *2 |
| K3413-09 | Si | 25 | 0.32 to 1.67 | 0.94 | 0.45 | 50 (pA) | 100 (pA) | 200 | 1.4×10^{13} | 200 *3 | 60 *5 |
| | InGaAs | -10 | 1.67 | 1.55 | 0.55 | 0.07 *2 | 0.35 *2 | 1500 | 1.2×10^{13} | 7 *4 | 90 |

*1: $V_R=5\text{ V}$

*2: $V_R=1\text{ V}$

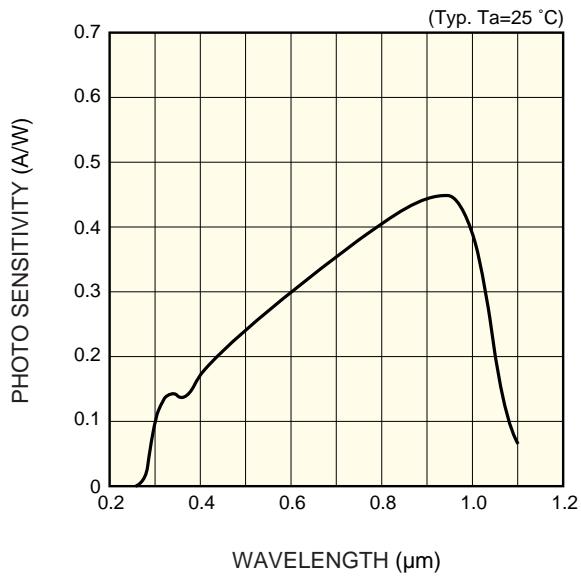
*3: $\lambda=655\text{ nm}$

*4: $V_R=5\text{ V}$, $R_L=50\ \Omega$

*5: $V_R=0\text{ V}$, $f=10\text{ kHz}$

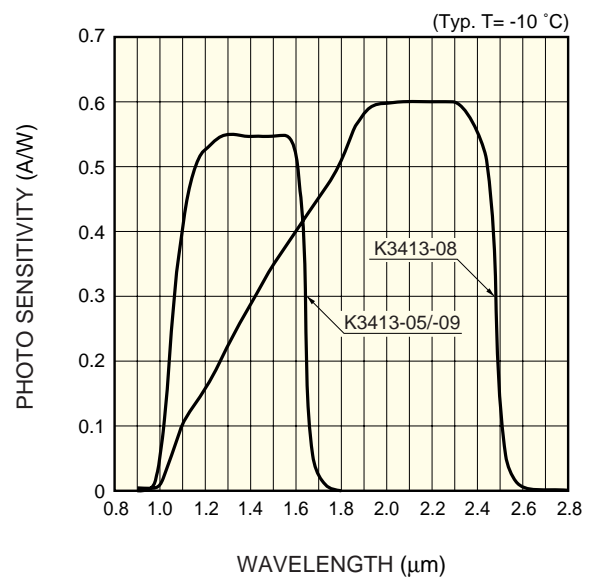
■ Spectral response

Si photodiode



KIRDB0199EA

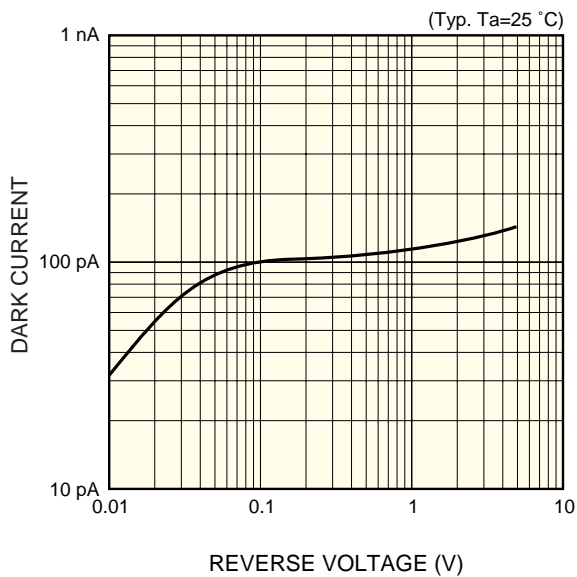
InGaAs PIN photodiode



KIRDB0212EA

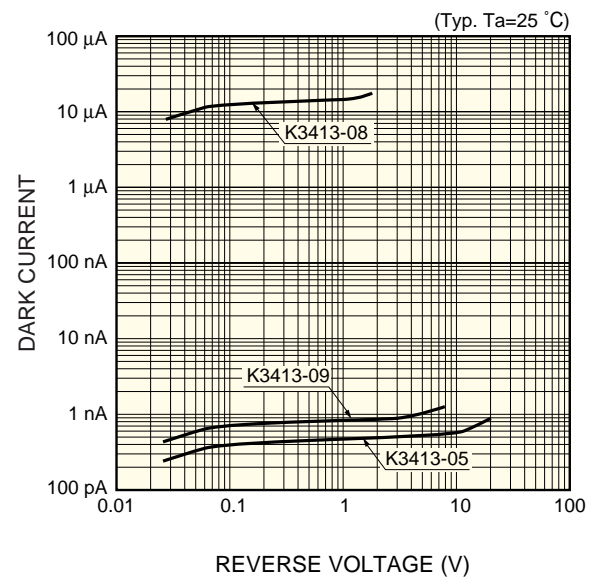
■ Dark current vs. reverse voltage

Si photodiode



KIRDB0200EA

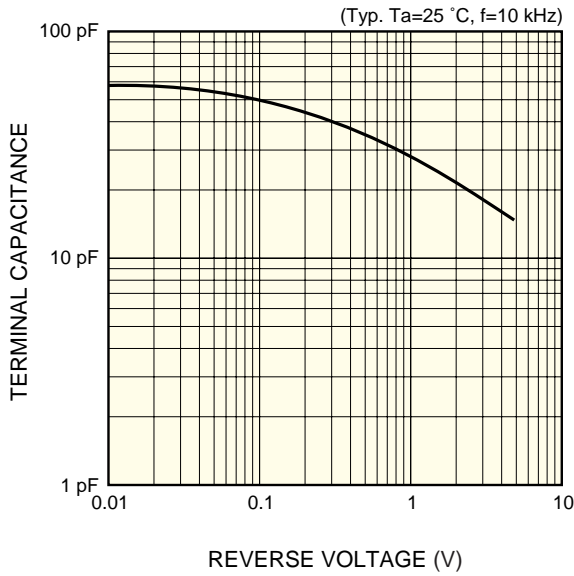
InGaAs PIN photodiode



KIRDB0213EA

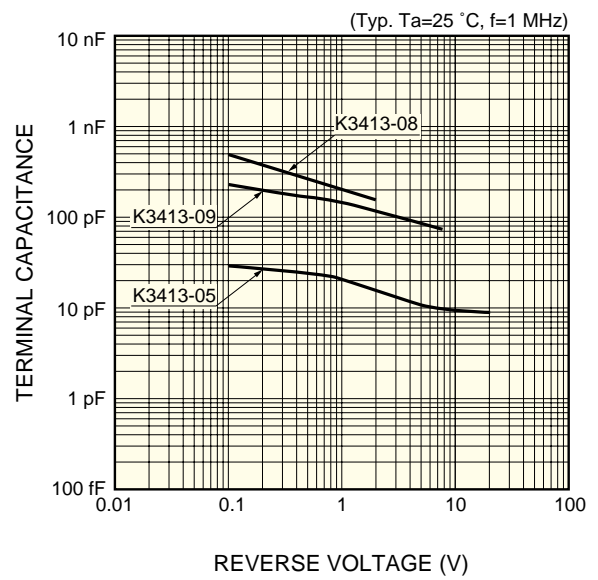
■ Terminal capacitance vs. reverse voltage

Si photodiode



KIRDB0202EA

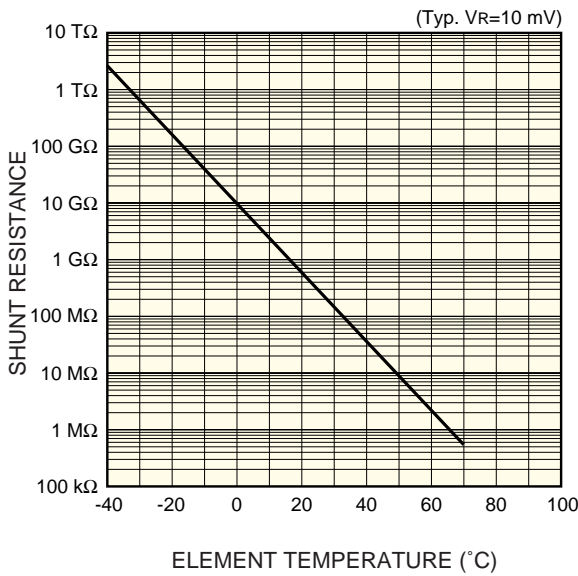
InGaAs PIN photodiode



KIRDB0214EA

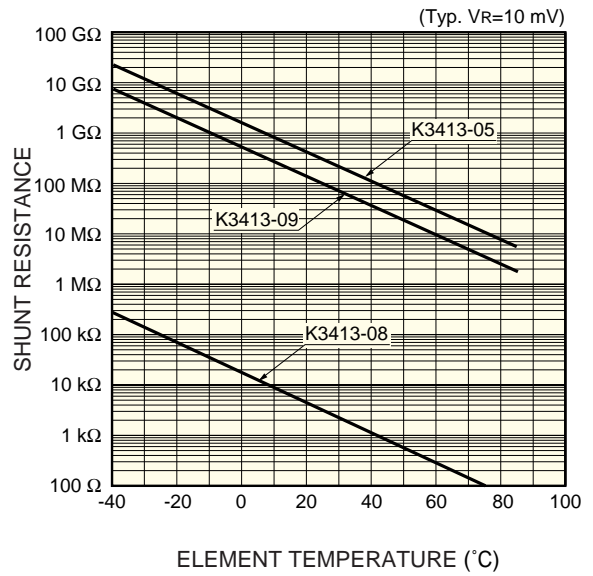
■ Shunt resistance vs. element temperature

Si photodiode



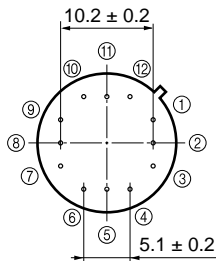
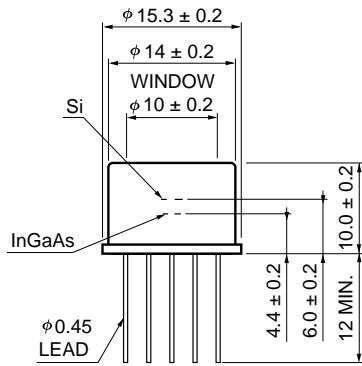
KIRDB0204EA

InGaAs PIN photodiode



KIRDB0215EA

■ Dimensional outline (unit: mm)



- ① InGaAs (ANODE)
- ② InGaAs (CATHODE)
- ③ TE-COOLER (-)
- ④ TE-COOLER (+)
- ⑤ THERMISTOR
- ⑥ Si (CATHODE)
- ⑦ Si (ANODE)

KIRDA0156ED