InGaAs High Speed Photodiode with Ball Lens

FGA01

Description

The Thorlabs FGA01 photodiode is ideal for measuring both pulsed and CW fiber light sources, by converting the optical power to an electrical current. The FGA01 InGaAs Photodiode is a three pin device with a TO-46 package size. This specific photodiode has a ball shape lens, which is a great optical component for improving signal coupling between fibers. The photodiode anode produces a current, which is a function of the incident light power and the wavelength. The responsivity $\Re$ (λ) can be read from the plot on the following page to estimate the amount of photocurrent to expect. This can be converted to a voltage by placing a load resistor (R_L) from the photodiode anode to the circuit ground. The output voltage is derived as:

$$V_o = P \times \Re \times R_L$$

The bandwidth, f_{BW}, and the rise time response, t_R, are determined from the diode capacitance, C_J, and the load resistance, R_L, as shown below. The diode capacitance can be lowered by placing a bias voltage from the photodiode cathode to the circuit ground.

$$f_{BW} = \frac{1}{(2\pi)R_L C_J},\ t_R = \frac{0.35}{f_{BW}}$$

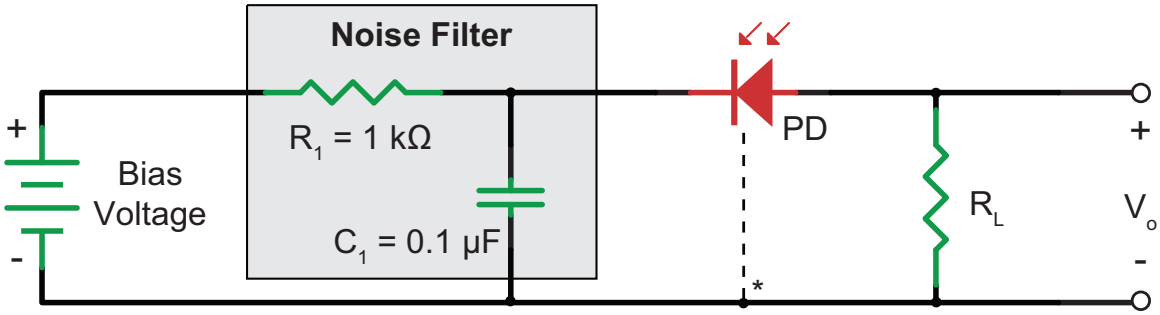
Specifications

Specification	Symbol	Value
Wavelength Range	λ	800 - 1700 nm
Peak Wavelength	λ_P	1550 nm
Responsivity	$\Re(\lambda)$	1.003 A/W
Rise/Fall Time[1] (R_L=50 Ω, 5 V)	t_r/t_f	0.30 ns / 0.30 ns
NEP, Typical (1550 nm, 20 V)	W/√Hz	4.50 x 10^{-15}
Dark Current (5 V)	I_d	0.05 nA (Typ.) 2.00 nA (Max)
Bias Voltage (Reverse)		20 V (Max)
Reverse Current		2 mA (Max)
Capacitance (5 V)	C_j	2.0 pF (Typ.)
Optical Power Damage Threshold		18 mW

[1]*Rise and Fall times are measured between 10% to 90% of the step height in accordance with Manufacture specification sheet.*

Physical Specifications	
Active Area Diameter	Ø0.12 mm
Coupling Lens	Ø0.06″ Ball Lens
Package	TO-46
Sensor Material	InGaAs
Storage Temperature	-55 to 125 °C
Operating Temperature	-40 to 75 °C

Recommended Circuit



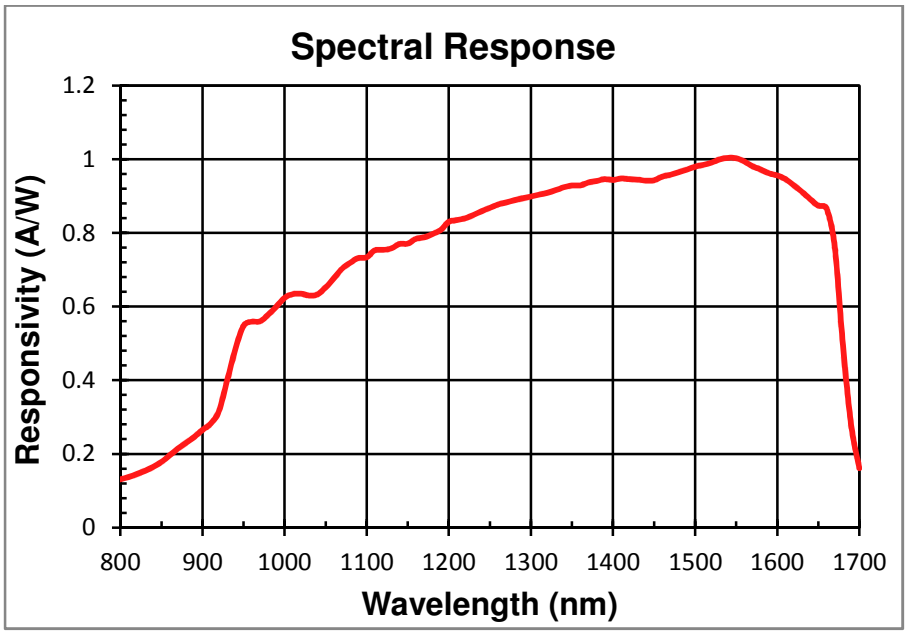
* Case ground for PD with a third lead.

Responsivity Graph

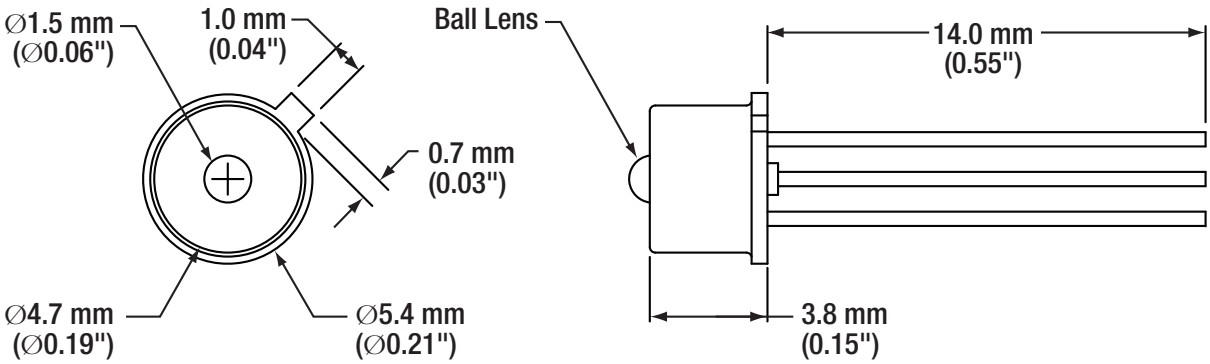
The responsivity of a photodiode is a measure of its sensitivity to light and is defined as the ratio of the photocurrent I_P to the incident light power P at a given wavelength:

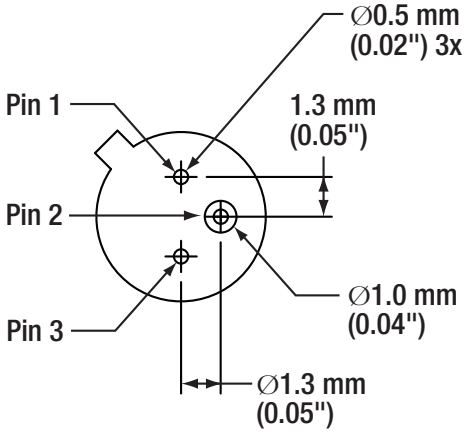
$$R_\lambda = \frac{I_P}{P}$$

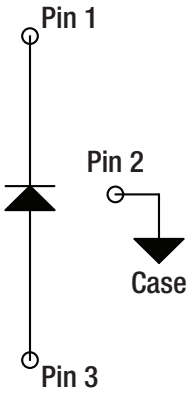
In other words, it is a measure of the effectiveness of the conversion of light power into electrical current. Responsivity constantly varies depending on the wavelength of the incident light, applied reverse bias, and temperature conditions.



Drawing







Pin Circle Diameter= 2.5 mm (0.10")

Precautions and Warranty Information

These products are ESD (electro static discharge) sensitive and as a result are not covered under warranty. In order to ensure the proper functioning of a photodiode care must be given to maintain the highest standards of compliance to the maximum electrical specifications when handling such devices. The photodiodes are particularly sensitive to any value that exceeds the absolute maximum ratings of the product. Any applied voltage in excess of the maximum specification will cause damage and possible complete failure to the product. The user must use handling procedures that prevent any electro static discharges or other voltage surges when handling or using these devices.

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