

InGaAs Photodiode

FGA015



Description

Thorlabs' FGA015 photodiode is ideal for measuring both pulsed and CW fiber light sources by converting optical power to electrical current. The FGA015 is a high-speed TO-18 package with an anode, cathode, and case connection, and features a flat window with a broadband AR coating centered at 1550 nm. The photodiode produces a current, which is a function of the incident light power and the wavelength. The responsivity $\mathfrak{R}(\lambda)$ can be read from the plot on the following page to estimate the amount of photocurrent. This can be converted to a voltage by placing a load resistor (R_L) from the photodiode anode to the circuit ground. Where P is the power, the output voltage is expressed by

$$V_o = P \times \mathfrak{R} \times R_L$$

The bandwidth, f_{BW} , and the rise time response, t_R , are approximately determined from the diode capacitance, C_j , and the load resistance, R_L , as shown below.

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

Specifications

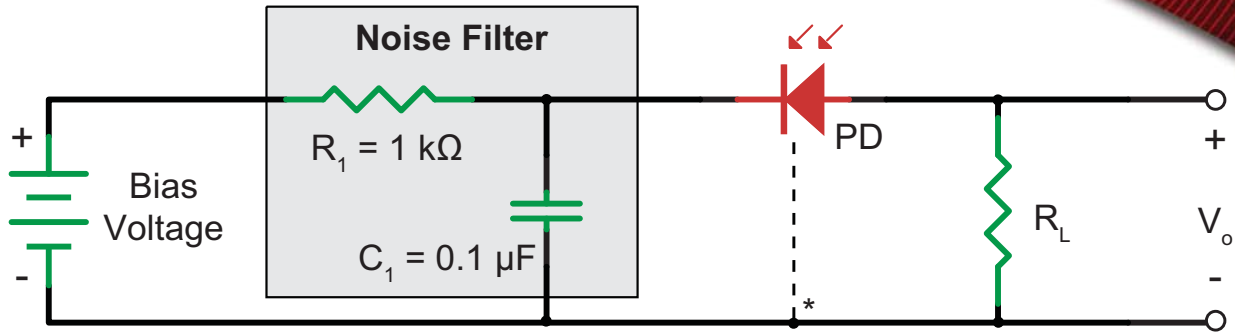
Specifications		
Wavelength Range	λ	800 - 1700 nm
Peak Wavelength	λ_P	1550 nm
Responsivity (1550 nm)	$\mathfrak{R}(\lambda)$	0.95 A/W (Typ.)
Rise/Fall Time (5 V)	t_r/t_f	300 ps / 300 ps
NEP, Typical (1550 nm, 5 V) ^a		1.30×10^{-14} W/√Hz
Dark Current (5 V)	I_d	0.5 nA (Typ.) 3 nA (Max)
Bias Voltage (Reverse)		5 V (Typ.) 20 V (Max)
Capacitance (5 V)	C_j	1.5 pF (Typ.) 2.0 pF (Max)
Optical Input Power (1550 nm)		10 mW (Max)

Physical Specifications	
Active Area Diameter	Ø150 µm
Package	TO-18 with Flat Window
Sensor Material	InGaAs
Storage Temperature	-40 to 100 °C
Operating Temperature	-40 to 85 °C

a. NEP is experimentally limited by thermal noise of the load resistor. For a 50 Ω load, NEP = 5×10^{-11} W/√Hz @ 1550 nm.



Recommended Circuit



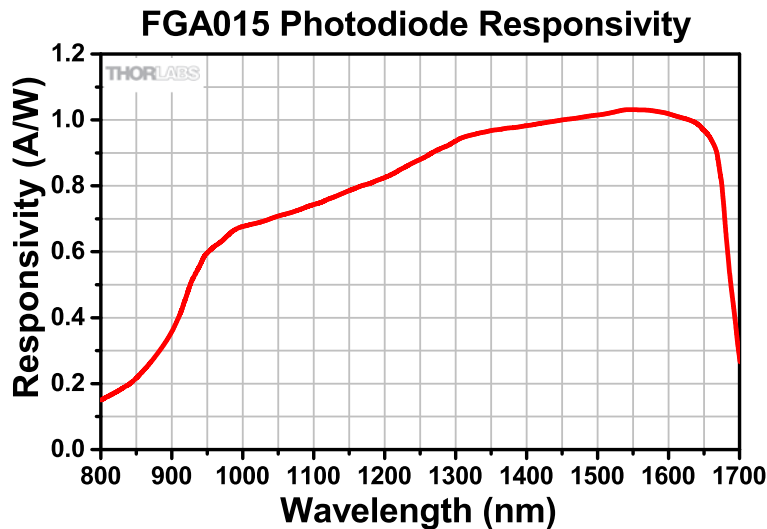
* Case ground for PD with a third lead.

Responsivity Graph

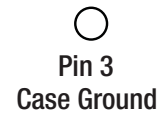
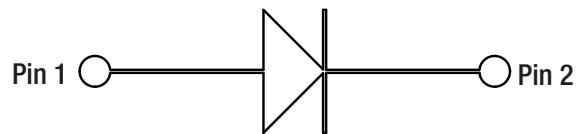
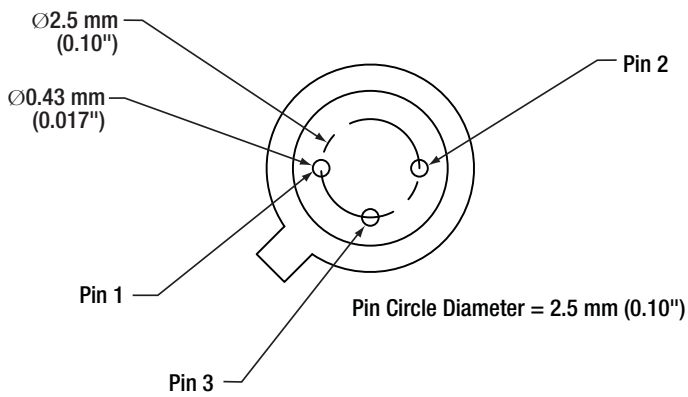
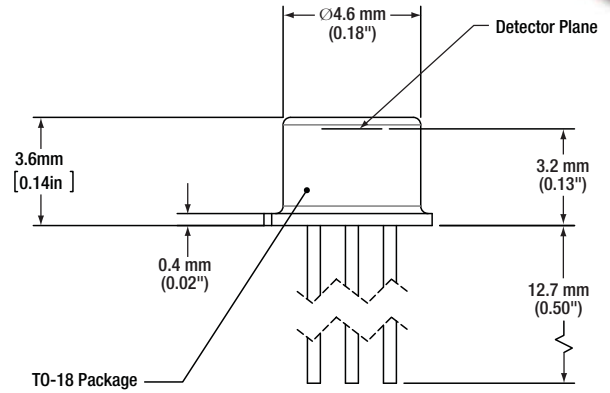
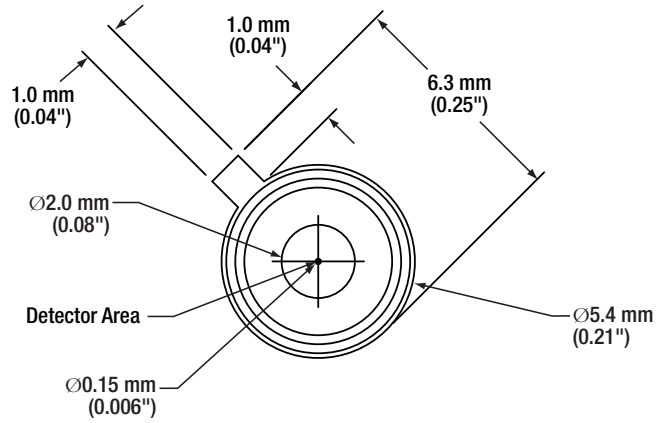
The responsivity of a photodiode is a measure of its sensitivity to light and is defined as the ratio of the photocurrent I_p to the incident light power P at a given wavelength:

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

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



Drawing



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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