

FDG10X10



Description

Thorlabs' FDG10X10 photodiode is ideal for measuring both pulsed and CW fiber light sources by converting optical power into electrical current. The detector is ceramic with an anode and cathode. The photodiode anode 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 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.

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

Specifications

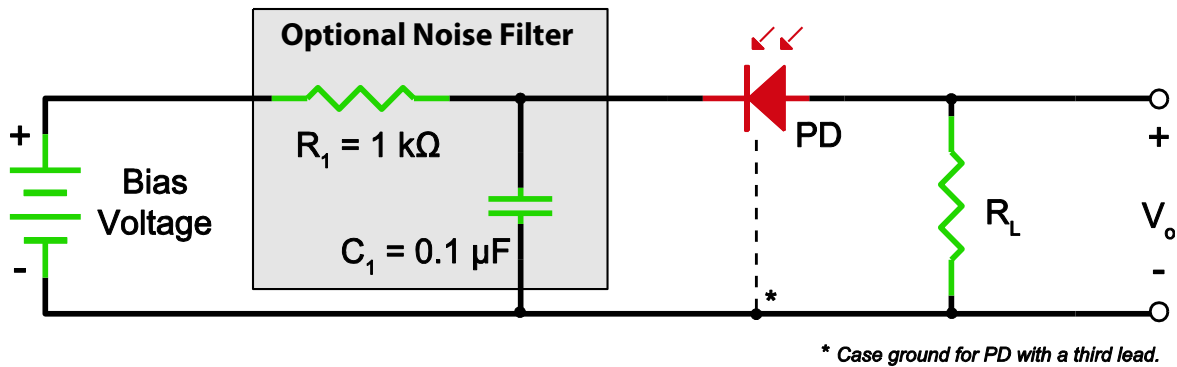
Specifications ^a		
Wavelength Range	λ	800 - 1800 nm
Peak Wavelength	λ_P	1550 nm (Typ.)
Responsivity ^b	$\mathfrak{R}(\lambda)$	0.95 A/W (Typ.)
Active Area Size		10 mm x 10 mm
Rise/Fall Time ($R_L=50 \Omega$, 1 V)	t_r/t_f	10 μ s (Typ.)
NEP (1550 nm) ^b		4.0×10^{-12} W/Hz (Typ.)
Dark Current (0.3 V)	I_d	50 μ A (Max)
Capacitance (1 V)	C_j	80 nF (Typ.)
Capacitance (0 V)		135 nF (Typ.)
Shunt Resistance	R_{shunt}	2 k Ω (Min)
Package		Ceramic
Sensor Material		Ge

- Unless otherwise noted, all measurements are performed at 25 °C ambient temperature.
- Responsivity Specified at the Peak Wavelength
- NEP is Specified for the Photovoltaic Mode

Maximum Rating	
Max Bias (Reverse) Voltage	1 V
Reverse Current	10 mA
Operating Temperature	-40 to 85 °C
Storage Temperature	-40 to 125 °C



Recommended Circuit

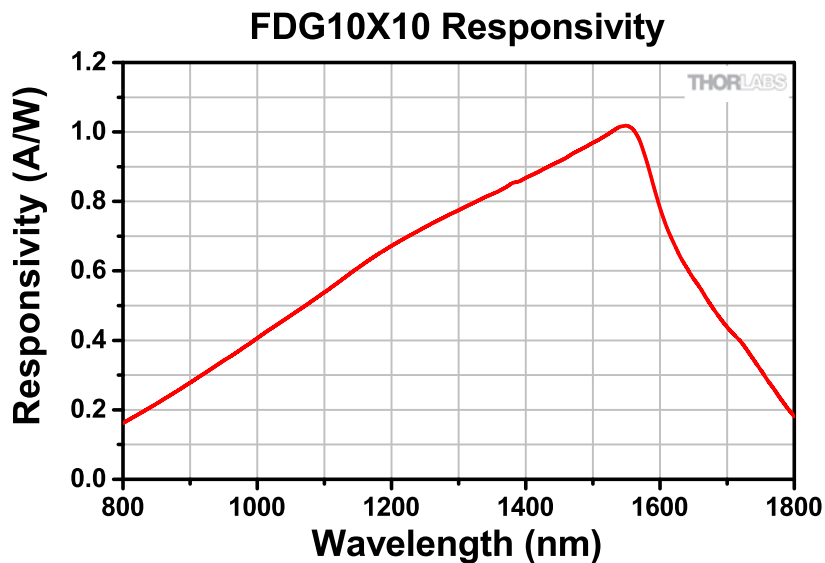


Responsivity Graph

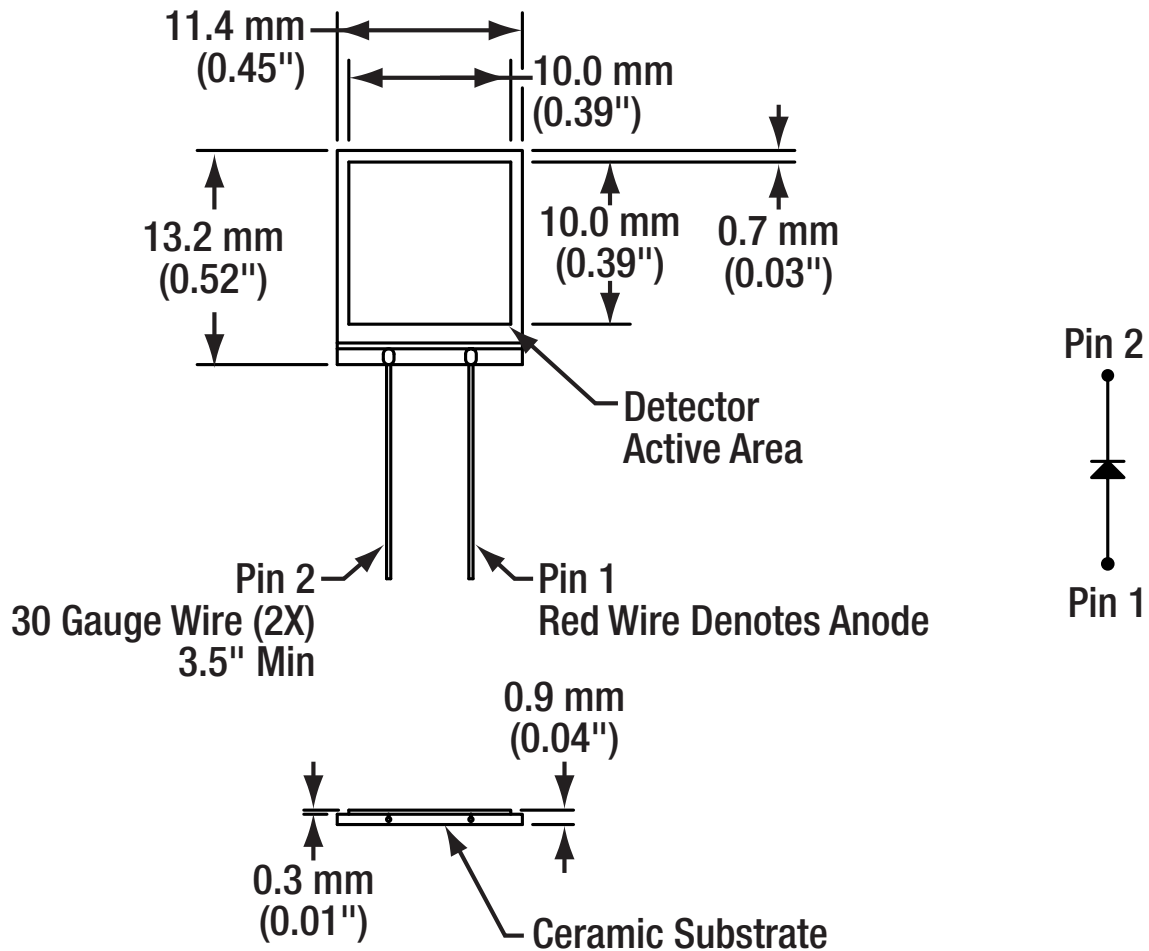
The responsivity of a photodiode is a measure of its sensitivity to light and is defined as the ratio of the photocurrent I_p to the incident light power P at a given wavelength:

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

In other words, it is a measure of the effectiveness of the conversion of light power into electrical current. Responsivity varies from lot to lot and with the wavelength of the incident light, applied reverse bias, and temperature. It increases slightly with applied reverse bias due to improved charge collection efficiency in the photodiode. An increase or decrease in the temperature changes the width of the band gap, which will vary inversely with the temperature change.



Drawing



Additional Information

The FDG10X10 can easily be damaged from exposure to high temperatures, which can result in high dark current. An electrically conductive epoxy is used to assemble this photodiode, making the bonded anode and cathode wires fragile. Use additional care when handling this device to prevent damage, and do not apply additional stress to the epoxied bonds. Do not solder this device.

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.

Thorlabs, Inc. Life Support and Military Use Application Policy is stated below:

THORLABS' PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS OR IN ANY MILITARY APPLICATION WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF THORLABS, INC. As used herein:

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- 2. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.*
- 3. The Thorlabs products described in this document are not intended nor warranted for usage in Military Applications.*