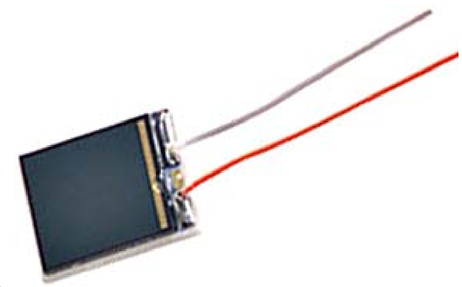
Product Specification Sheet

Photodiodes

CAUTION
ELECTROSTATIC SENSITIVE DEVICE
DO NOT HANDLE EXCEPT
WITH AN ESD WRIST STRAP AT A
STATIC-FREE WORKSTATION

FDS1010



Description

The Thorlabs FDS1010 photodiode is ideal for measuring both pulsed and CW fiber light sources, by converting the optical power to an electrical current. The detector is an un-housed ceramic wafer with anode and cathode lead wires. The photodiode anode produces a current, which is a function of the incident light power and the wavelength. The responsivity $\Re(\lambda)$, can be read from the responsivity graph 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:

$$V_o = P \times \Re(\lambda) \times R_L$$

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. Placing a bias voltage from the photo diode cathode to the circuit ground can lower the photo diode capacitance.

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

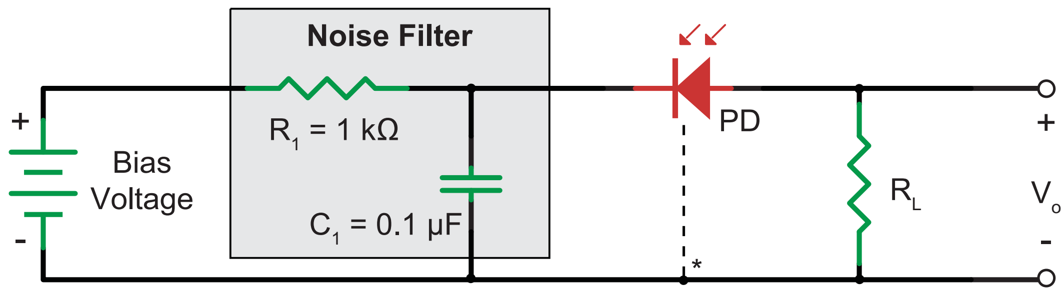
Specifications

Specification	Value
Wavelength Range	400 - 1100 nm
Active Area	9.7 mm x 9.7 mm (94 mm^2)
Rise/Fall Time (R_L=50 Ω, 5 V)	45 ns
Bandwidth (R_L=50 Ω, -3 dB, 5 V)	8 MHz
NEP (900 nm)	5.5 x 10^{-14} W/Hz^{½}
Dark Current, Max (5 V)	600 nA
Capacitance, Typical (5 V)	375 pF
Package	Ceramic Wafer

Specification	Value
Sensor Material	Si PIN
Max Ratings	
Damage Threshold, CW	n/a
Damage Threshold, 10 ns Pulse	n/a
Max Bias (Reverse) Voltage	25 V
Operating Temperature	-10 to 60 °C
Storage Temperature	-20 to 70 °C
Reverse Current	10 mA
Forward Current	10 mA

Recommended Circuit Diagram

Application of a reverse bias can greatly improve the response speed and linearity of the device. This is due to increase in the depletion region width and, consequently, decrease in junction capacitance. However, the dark current and noise will increase.



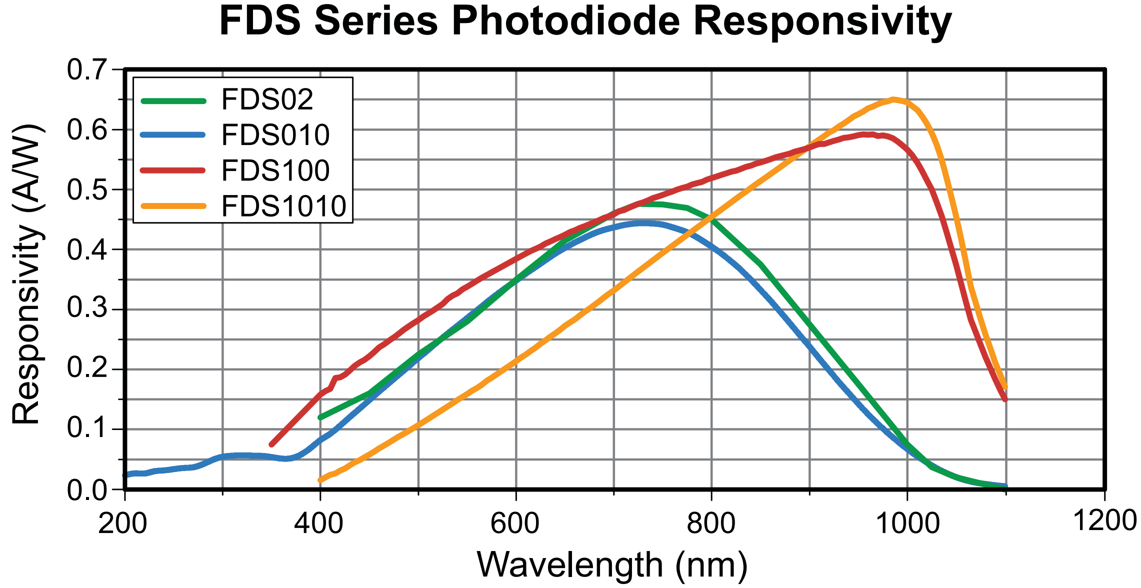
** Case ground for PD with a third lead.*

Graphs

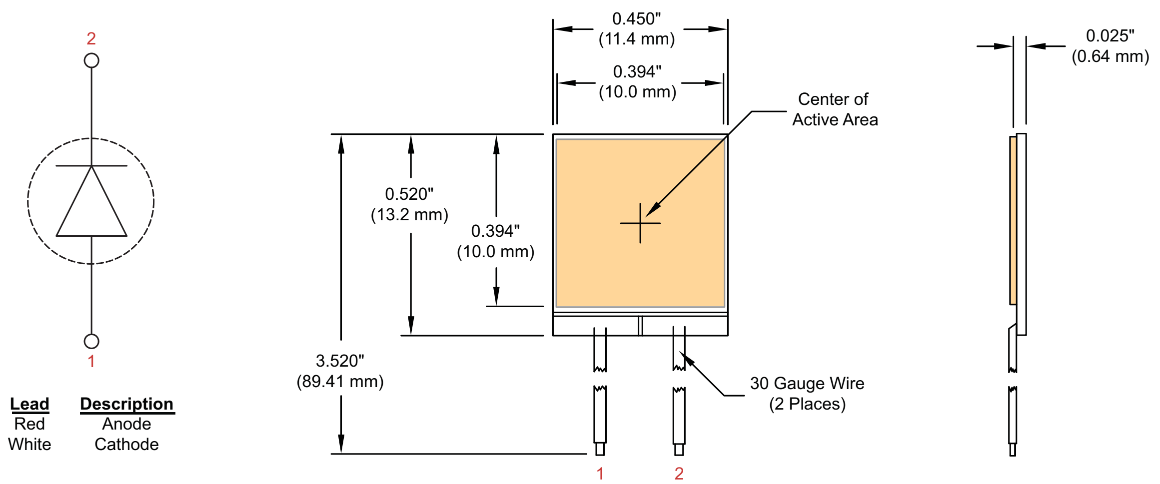
The responsivity of a photodiode is a measure of its sensitivity to light, and it is defined as the ratio of the photocurrent I_P to the incident light power P at a given wavelength:

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

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. The change in temperature increases or decreases the width of the band gap and varies inversely with the temperature.



Drawings



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