Mounted Si Photodiode

SM1PD2A

Description

Thorlabs' SM1PD2A photodiode is ideal for measuring both pulsed and CW fiber light sources by converting optical power to electrical current. The detector is mounted in a convenient, externally-threaded SM1 (Ø1.035"-40) housing for easy mounting and integration into existing setups. The photodiode is a Type A (cathode-grounded) arrangement, and the pin codes for the specific package can be found in the drawing below. The photodiode anode produces a current, which is a function of the incident light power (P) and the wavelength (λ). The responsivity, $\mathcal{R}(\lambda)$, can be read from the responsivity curve below to estimate the amount of photocurrent. This current 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

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

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. The diode capacitance can be lowered by placing a bias voltage from the photodiode cathode to the circuit ground.

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

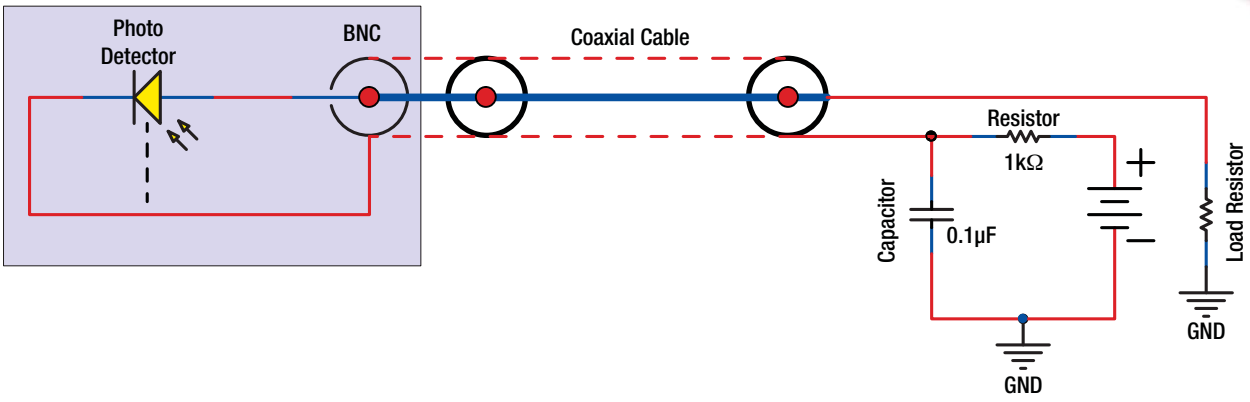
Specifications

Specifications[a]		
Wavelength Range	λ	200 - 1100 nm
Peak Wavelength	λ_P	970 nm
Responsivity	$\Re(\lambda_P)$	0.50 A/W
Rise/Fall Time (R_L=50 Ω, 5 V, 650 nm)	t_r/t_f	450 ns / 450 ns (Typ.)
NEP, Typical (970 nm, 0 V)		5.74 x 10^{-14} W/√Hz
Dark Current (5 V)	I_d	1.0 µA (Max)
Capacitance (0 V)	C_j	1.75 nF (Typ.)
Shunt Resistance	R_{shunt}	20.0 MΩ (Typ.)
Sensor Material		Si
Active Area		10 mm x 10 mm behind Ø9 mm Clear Aperture
Package		SM1, External Thread

a. Unless otherwise noted, all measurements are performed at 25 °C ambient temperature.

Maximum Ratings	
Max Bias (Reverse) Voltage	5 V
Reverse Current	-
Operating Temperature	-20 to 60 °C
Storage Temperature	-20 to 80 °C

Recommended Circuit Diagram

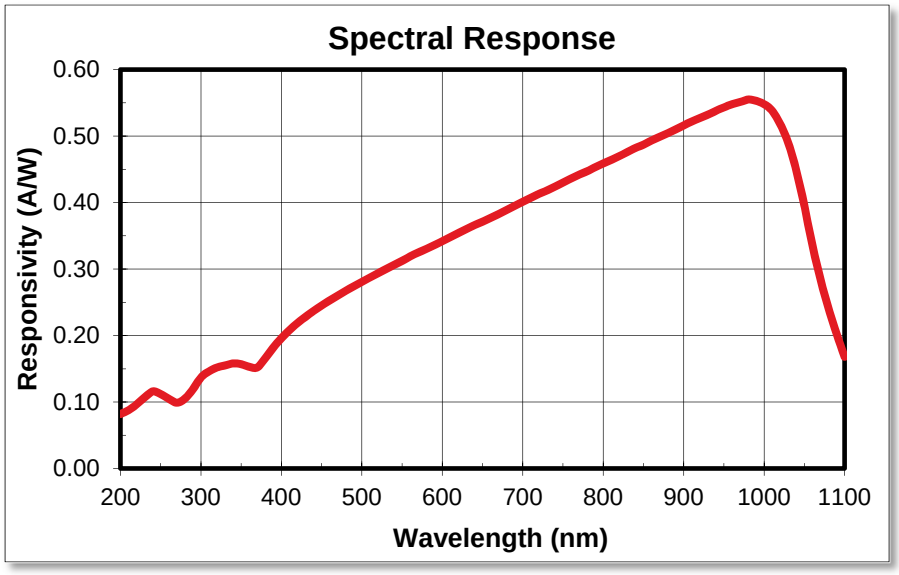


Spectral Response

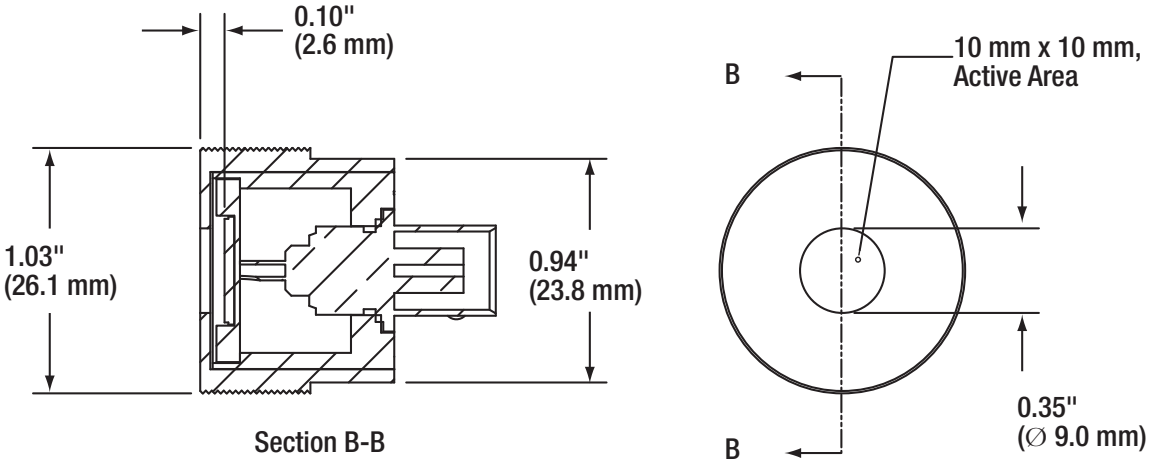
The responsivity of a photodiode is a measure of its sensitivity to light and is defined as the ratio of the photocurrent I_P to the incident light power P at a given wavelength:

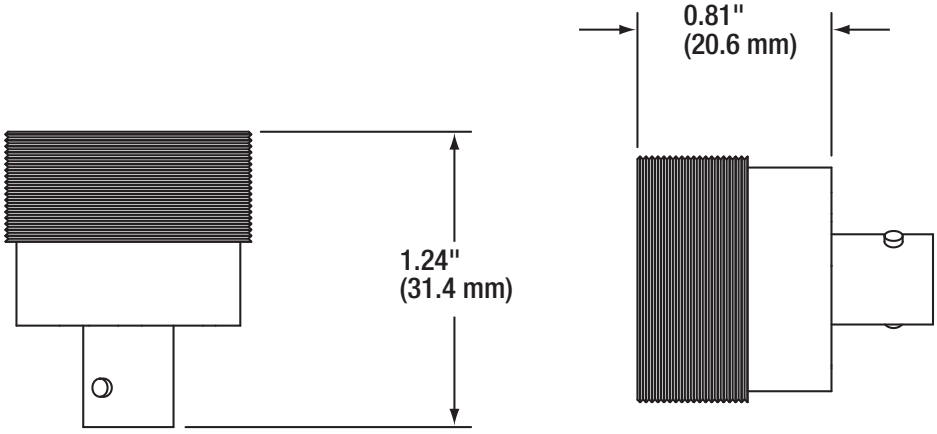
$$R_\lambda = \frac{I_P}{P}$$

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. Responsivity is a function of the wavelength of the incident light, applied reverse bias, and temperature conditions.



Drawing


0.10"
(2.6 mm)
1.03"
(26.1 mm)
0.94"
(23.8 mm)
Section B-B
B
10 mm x 10 mm,
Active Area
B
0.35"
(∅ 9.0 mm)


1.24"
(31.4 mm)
0.81"
(20.6 mm)

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:

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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.