

Photodiodes



Description

The Thorlabs FGA04 photodiode is ideal for measuring both pulsed and CW fiber light sources, by converting the optical power to an electrical current. The detector is housed in a TO-46 (mod) package with an anode, cathode, and case connection and mounted in an FC bulkhead connector. 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 Figure 1 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:

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

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. The effect of the bias voltage verse diode capacitance can be read from Figure 2.

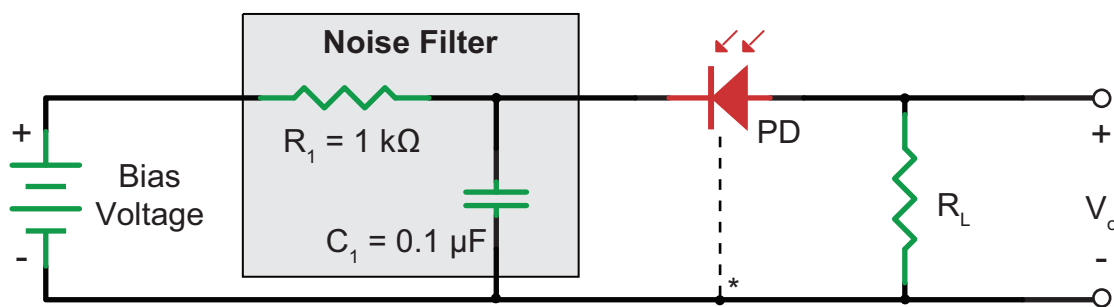
$$f_{BW} = \frac{1}{(2\pi)R_L C_J}, t_R = \frac{0.35}{f_{BW}}$$

Specifications

| Specification | Value |
|---|--|
| Wavelength Range | 800 - 1800 nm |
| Active Area | $\varnothing 100 \mu\text{m}$ (.0079 mm ²) |
| Rise/Fall Time ($R_L=50 \Omega$, 5 V) | 0.1 ns Min |
| NEP, Typical (1550 nm) | $1.5 \times 10^{-15} \text{ W/Hz}^{1/2}$ |
| Dark Current (5 V) | 0.5 nA Typ. (1.0 nA Max) |
| Capacitance (5 V) | 1.0 pF Typ. (1.2 pF Max) |
| Package | TO-46 (mod) w/ FC/PC Bulkhead Connector |

| Specification | Value |
|----------------------------|---------------|
| Sensor Material | InGaAs Pin |
| Max Ratings | |
| Damage Threshold CW | 70 mW |
| Max Bias (Reverse) Voltage | 25 V |
| Operating Temperature | -40 to 85 °C |
| Storage Temperature | -40 to 125 °C |
| Reverse Current | 10 mA |
| Forward Current | 10 mA |

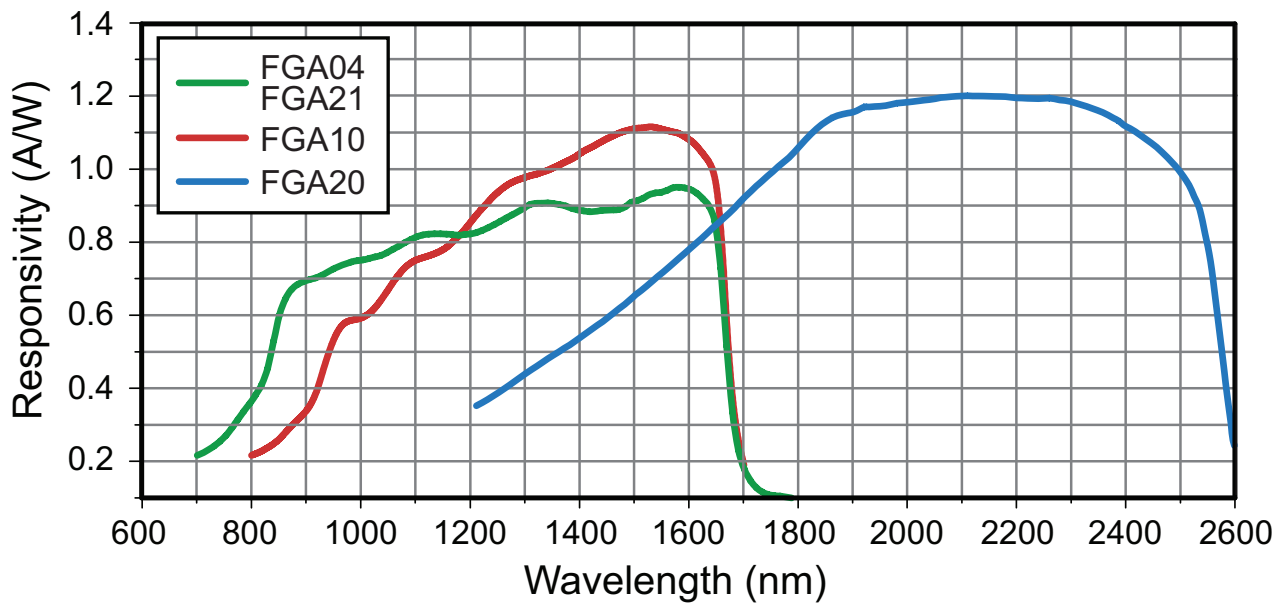
Recommended Circuit Diagram



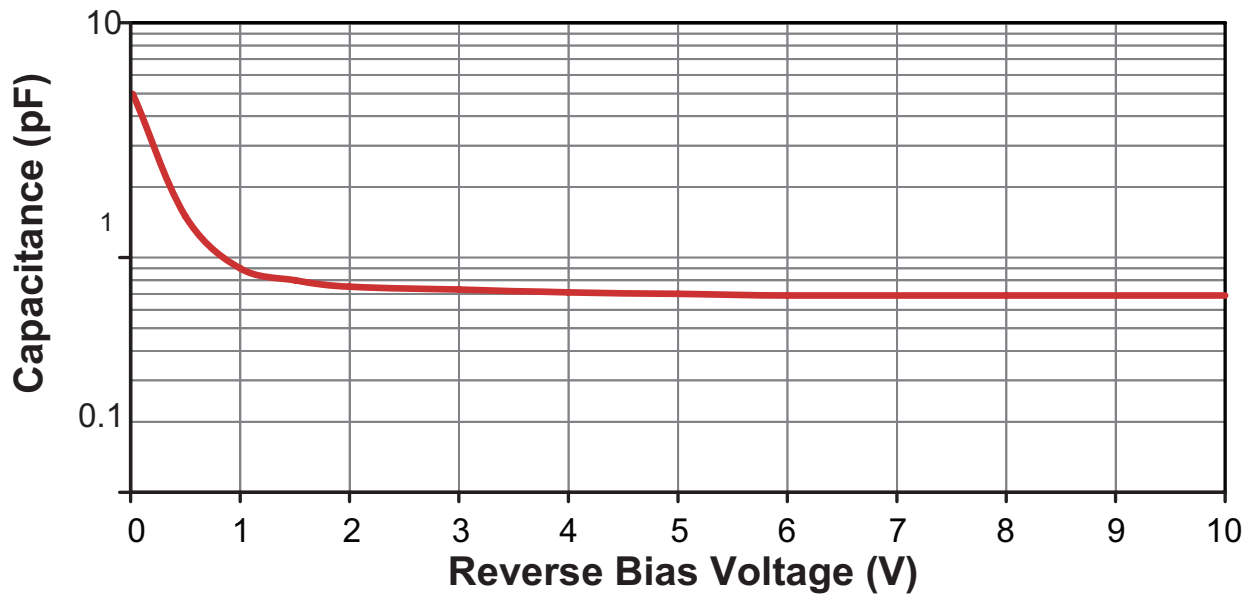
* Case ground for PD with a third lead.

Graphs

FGA Series Photodiode Responsivity

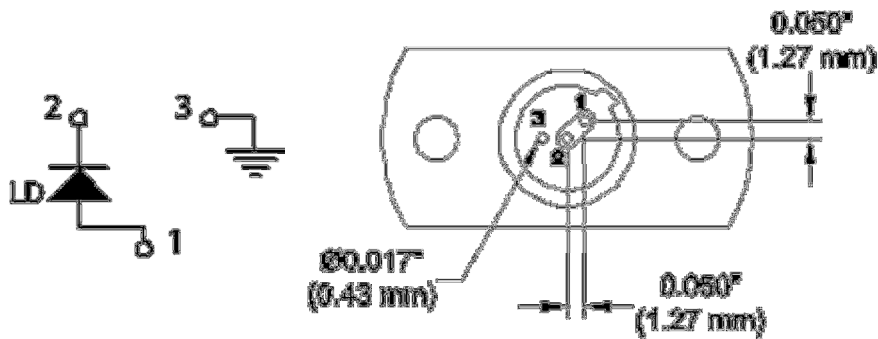
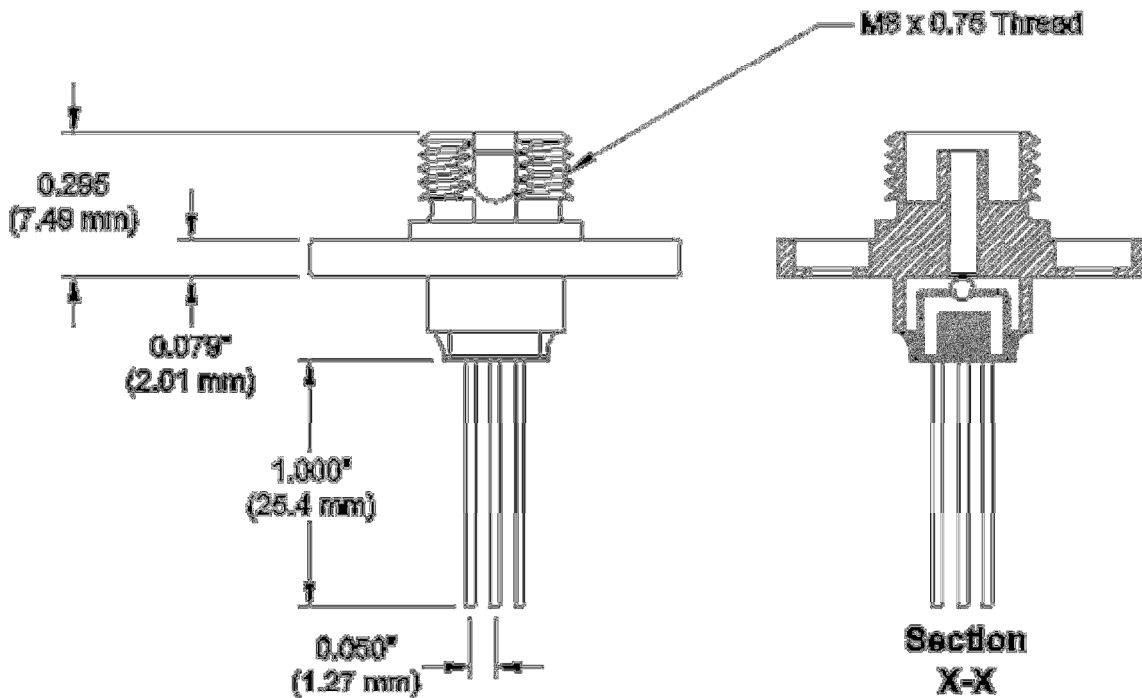
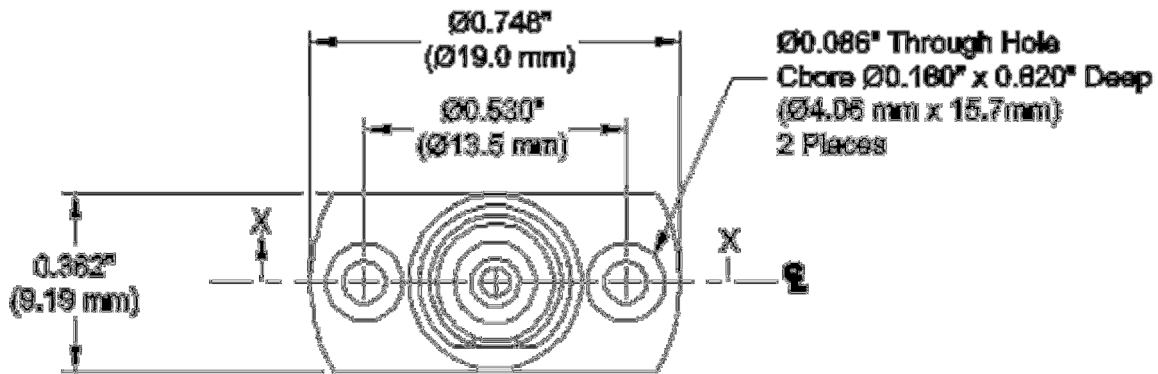


Capacitance vs Reverse Bias



Figures 1 and 2

Drawings



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