THORLABS INC
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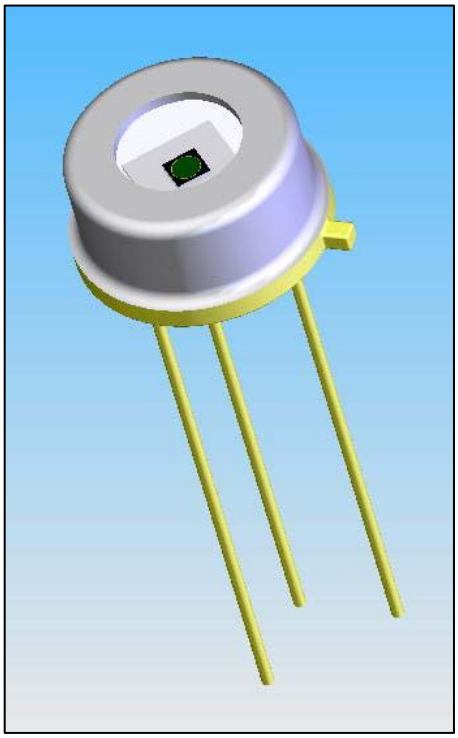
# FGA10 InGaAs Photodiode

High Speed

The FGA10 is a high-speed InGaAs photodiode with a spectral response from 700nm to 1800nm. This photodiode has a PIN structure that provides fast rise and fall times with a bias of 5V.

## Electrical Characteristics

| | |
|---|---|
| Spectral Response: | 700-1800nm |
| Active Diameter: | ϕ1.0mm |
| Active Area: | 0.81mm² |
| Rise/Fall Time: | 7ns (typ) |
| (RL=50Ω, 5V bias) | 10ns (max) |
| NEP@900nm: | 2.5 x $10^{-14}$ W/√Hz (@2V bias) |
| Dark Current: | 100nA max (5V)<br>25nA (typ) |
| Junction Capacitance (typ): | 80pF @ $0V_{bias}$<br>40pF @ $-5V_{bias}$ |
| Package: | T05, 0.36" can |



## Maximum Ratings

| | |
|---|---|
| Damage Threshold CW: | 100 mW/cm$^2$ |
| Damage 10ns Pulse: | 500mJ/cm² |
| Max Bias Voltage: | 5V |

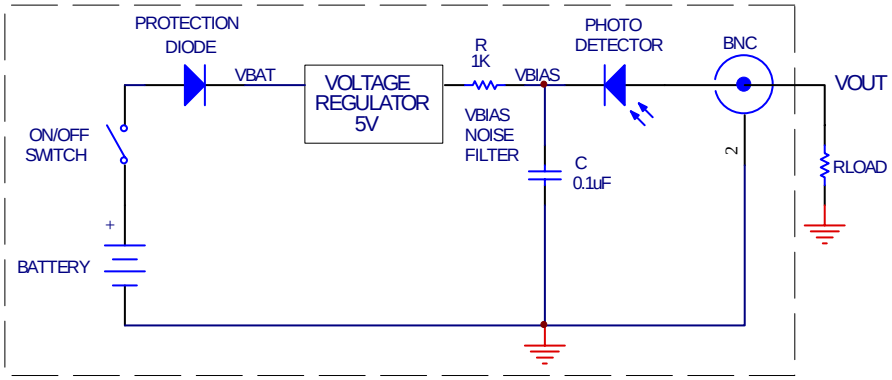
The Thorlabs FGA10 photodiode is ideal for measuring both pulsed and CW light sources, by converting the optical power to an electrical current. The InGaAs detector is housed in a T05 can, with an anode, cathode and case connection. The photodiode anode produces a current, which is a function of the incident light power and the wavelength. The responsivity $\Re(\lambda)$, can be read from Figure 1 to estimate the amount of photocurrent to expect. This can be converted to a voltage by placing a load resistor ($R_{LOAD}$) from the photodiode anode to the circuit ground. The output voltage is derived as:

$$Vo = P * \Re(\lambda) * R_{LOAD}$$

The bandwidth, $f_{BW}$, and the rise time response, $t_R$, are determined from the diode capacitance, $C_J$, and the load resistance, $R_{LOAD}$, as shown below. Placing a bias voltage from the photo diode cathode to the circuit ground can lower the photo diode capacitance.

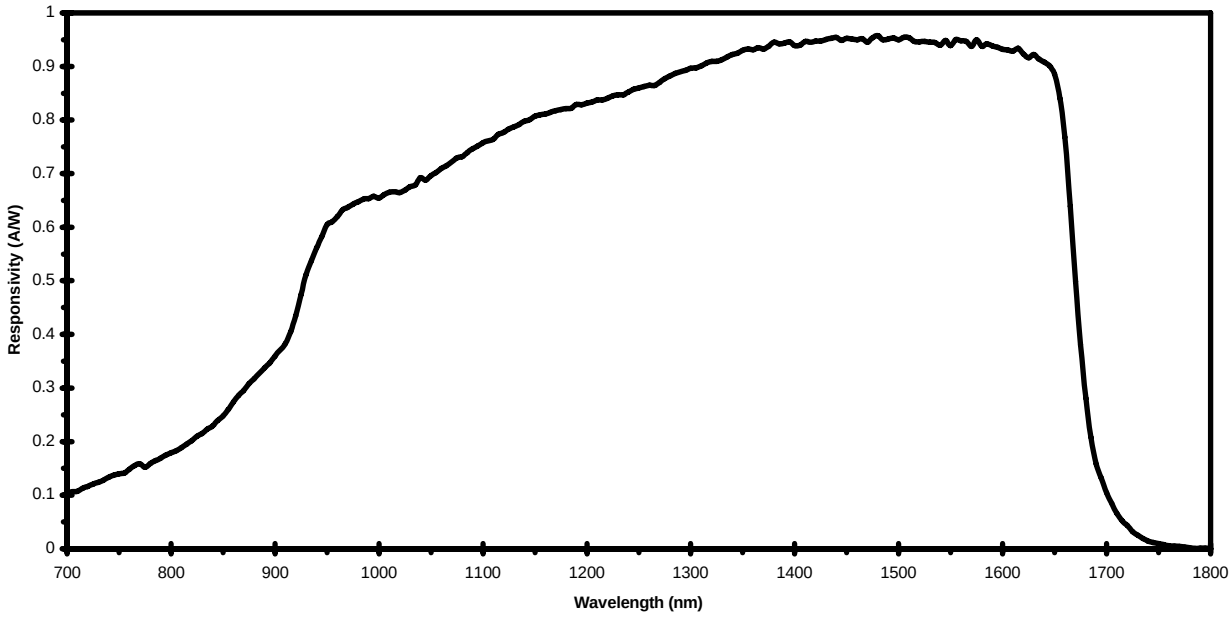
$$f_{BW} = 1/(2\pi * R_{LOAD} * CJ),\ t_R = 0.35/f_{BW}$$

## Typical Circuit Diagram

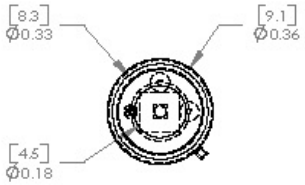


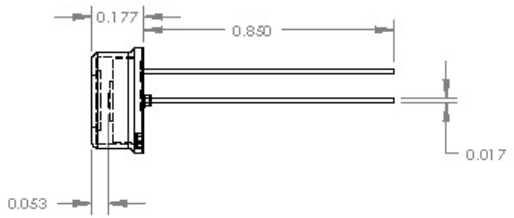

## Typical Plots

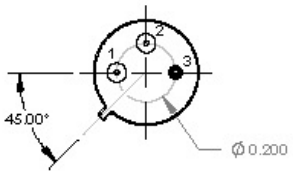
**Figure 1 - FGA10 Spectral Responsivity Curve**




**Typical Responsivity Curve using Thorlabs calibration services.**




Pin Configuration

| Pin | Description |
|---|---|
| 1 | Anode |
| 2 | Cathode |
| 3 | Case |

| TOLERANCES | | NAME | DATE |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED: | DRAWN | EC | 4/17/06 |
| DIMENSIONS ARE IN INCHES | ENG APPR. | EC | 4/17/06 |
| LINEAR TOLERANCES: | MFG APPR. | EC | 4/17/06 |
| TWO PLACE DECIMAL: ±0.010 | | | |
| THREE PLACE DECIMAL: ±0.005 | | | |
| ANGULAR: ±30' | | | |
| SURFACE FINISH: 32 MICRO INCHES | | | |
| PARALLELISM: 0.002 | | | |
| FLATNESS: 0.002 | | | |
| STRAIGHTNESS: 0.002 | | | |
| CONCENTRICITY: 0.002 | | | |
| PERPENDICULARITY: 0.002 | | | |
| THREAD: CLASS 2 FIT | | | |



THORLABS INC. PO BOX 366 NEWTON NJ

TITLE: 1mm Si Photodiode

MATERIAL: | SIZE A | REV. A

SCALE: 2:1 | SHEET 1 OF 1

DWG. NO. 2234-E01 | PART NO. FGA10

5 4 3 2 1