THORLABS INC
PO Box 366, 435 Route 206N, Newton, NJ 07860
Ph (973) 579-7227, Fax (973) 300-3600, http://www.thorlabs.com

Operating Manual PDA155 - High Speed Amplified Silicon Detector

Description:

The PDA155 is a high speed amplified, silicon detector designed for detection of light signals from DC to 50 MHz. A buffered output drives 50 ohm input impedance up to 5 volts. The PDA155 housing includes a removable threaded coupler that is compatible with any number of Thorlabs 1" threaded accessories. This allows convenient mounting of external optics, light filters apertures, as well as providing an easy mounting mechanism using the Thorlabs cage assembly accessories.

The PDA155 has an 8-32 tapped mounting hole with a 0.25" mounting depth and includes a 120VAC AC/DC power supply. The PDA155-EC has a M4 tapped mounting hole and includes a 230VAC AC/DC power supply.

Specifications:

Electrical:	
Detector	Silicon
Active Area	0.8mm^2 (∅1.0mm)
Response	200 to 1100 nm
Peak Response	0.65 A/W (960 nm)
*Small Signal Bandwidth	50MHz (min.)
NEP (960 nm)	4 x 10^{-11} W/√Hz (max.)
Transimpedence Gain	1 x 10^4 V/A
Noise (RMS)	2.0mV (max.)
Dark Offset	20mV (max.)
Output Voltage(50Ω)	0 to 5V
Output voltage	0 to 10V

General:	
On / Off Switch	Toggle
Output	BNC
Damage Threshold	100mW CW
	0.5J/cm^2 10ns PW
Optical Head Size	ϕ1.5" x 0.79"
Weight	60 grams
Accessories	SM1T1 Coupler
Storage Temp	-25 to 70°C
Operating Temp	10 to 50°C
AC Power Supply	AC - DC Converter
Input Power	100-120VAC, (220-240VAC -EC version) 50-60Hz, 5W

***** The small signal bandwidth was measured with output amplitude of 200mV and a dc offset of 200mV, driving a 50Ω load termination.

Setup

- Unpack the optical head, install a Thorlabs TR-series ½" diameter post into the 8-32 (M4 on -EC version) tapped hole on the bottom of the head, and mount into a PH-series post holder. **Note: Do not install a mounting post more than ¼" into the housing. This will damage the unit.**
- Plug the 5-pin DIN plug on the power supply provided with the PDA155 into the mating jack on the PDA155.
- Plug the power supply into an 50-60Hz, 100-120VAC outlet (220-240VAC for -EC version).
- Attach a 50-ohm coax cable (i.e. RG-58U) to the output of the PDA. When running cable lengths longer than 12" we recommend terminating the opposite end of the coax with a 50-ohm resistor (Thorlabs p/n T4119) for maximum performance.

Operation

- The PDA155 is switched on by the POWER toggle switch on the rear of the head.
- The light to voltage conversion can be estimated by factoring the wavelength-dependent responsivity of the Silicon detector with the transimpedance gain:

(E.g. output in volts / watt = transimpedance gain (V/A) x responsivity (A/W))

- The maximum output of the PDA155 is 10 volts with a Hi Impedance termination and 5V with a 50-Ohm termination. The output signal should be below the maximum output voltage to avoid saturation. If necessary, use external neutral density filters to reduce the input light level.
- For maximum linearity performance when measuring focused beams, fiber outputs, or small diameter beams, do not exceed a maximum intensity of 10mW/cm^2.
- Because of the finite gain-bandwidth performance common to all amplifier circuits, the bandwidth of the PDA155 goes down with increased output signal levels.

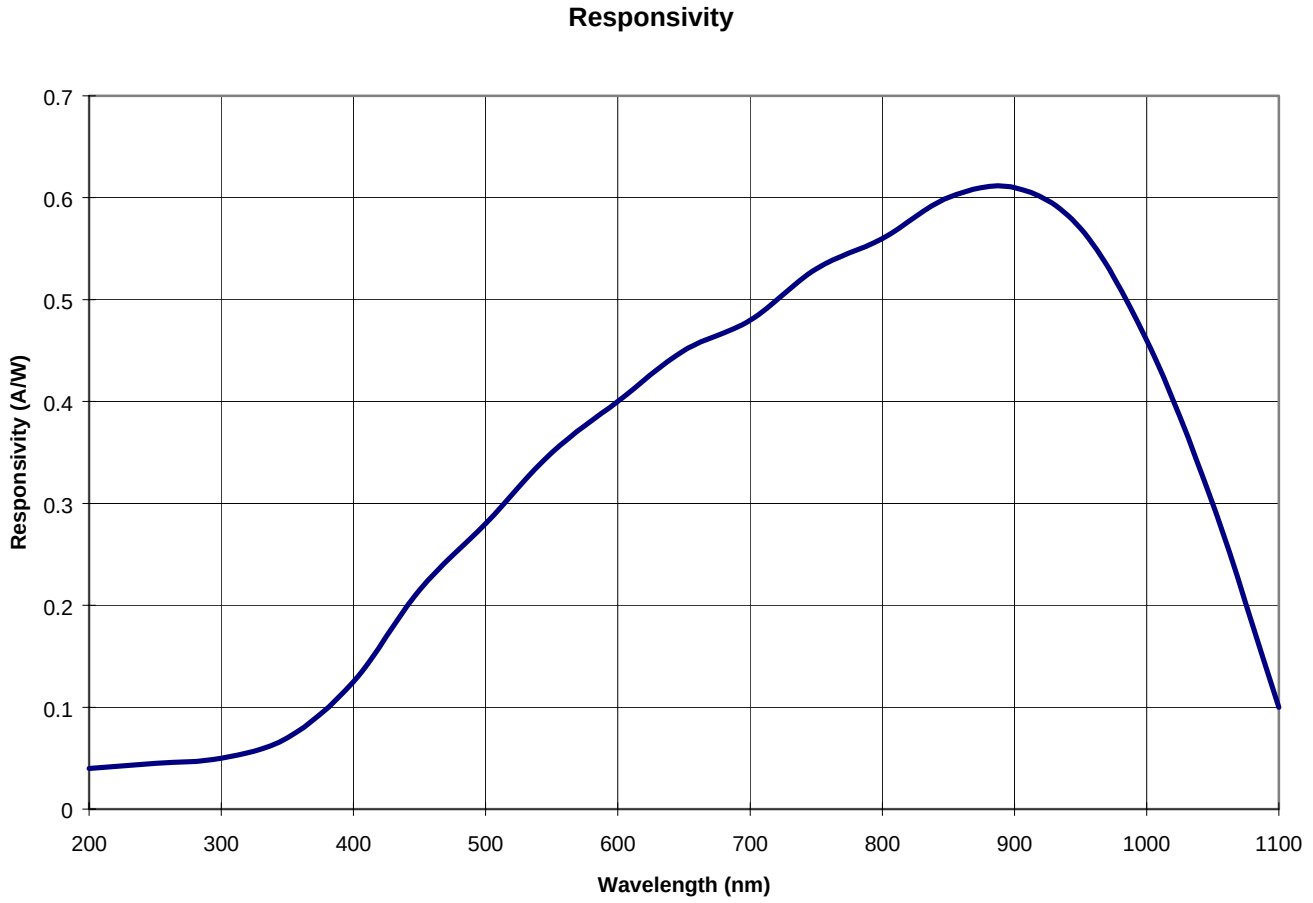

Figure 1. Detector Responsivity

Fiber Adapters and Other Accessories

Thorlabs sells a number of accessories that are compatible with the 1" thread on the PDA housing including FC, SMA, and ST fiber adapters, stackable lens tubes for mounting optics, and cage assemblies that allow the PDA to be incorporated into elaborate 3-D optical assemblies.

Caution: The PDA155 was designed to allow maximum accessibility to the photodetector by having the front surface of the diode to extend outside of the PDA housing. When using fiber adapters make sure that the fiber ferrule does not crash into the detector to avoid damage to the diode and or the fiber. An easy way to accomplish this is to install a SM1RR retaining ring (included with the PDA155) inside the 1" threaded coupler *before* installing the fiber adapter.

Also available are variable gain InGaAs, variable gain silicon, and high bandwidth InGaAs models of the PDA series.

Maintaining the PDA155

There are no serviceable parts in the PDA155 optical head or power supply. The housing may be cleaned by wiping with a soft damp cloth. The window of the detector should only be cleaned using optical grade wipes. If you suspect a problem with your PDA155 please call Thorlabs and an engineer will be happy to assist you.