

## PDA10A Operating Manual - Wideband Amplified Silicon Detector

### Description:

The PDA10A is a wideband amplified, silicon detector designed for detection of light signals from DC to 150 MHz. A buffered output drives a 50Ω input impedance up to 5 volts. The PDA10A housing includes a removable threaded coupler that is compatible with any number of Thorlabs 1" and ½" threaded accessories. This allows convenient mounting of external optics, light filters, and apertures, as well as providing an easy mounting mechanism using the Thorlabs cage assembly accessories.

The PDA10A has two 8-32 tapped mounting hole with a 0.25" mounting depth and includes a 120VAC AC/DC power supply. The PDA10A-EC has two M4 tapped mounting holes and includes a 230VAC AC/DC power supply.

### Specifications:

| Electrical:                         |                                    |
|-------------------------------------|------------------------------------|
| Detector                            | Silicon                            |
| Active Area                         | 0.8mm <sup>2</sup> (∅1.0mm)        |
| Response                            | 200 to 1100 nm                     |
| Peak Response (typ)                 | 0.45 A/W (750nm)                   |
| Small Signal Bandwidth <sup>1</sup> | 150MHz (min.)                      |
| NEP (960 nm)                        | 5.5x10 <sup>-11</sup> W/√Hz (max.) |
| Noise (RMS)                         | 2.0mV (max.)                       |
| Dark Offset                         | 20mV (max.)                        |
| Output Voltage (50Ω)                | 0 to 5V                            |
| Output voltage                      | 0 to 10V                           |
| Transimpedance Gain                 |                                    |
| Hi-Z                                | 1 x 10 <sup>4</sup> V/A            |
| 50Ω                                 | 5 x 10 <sup>3</sup> V/A            |

| General:          |   |
|-------------------|---|
| On / Off Switch   | Slide   |
| Output            | BNC   |
| Optical Head Size | 2.8"x1.9" x 0.83"<br>70mm x 48mm x 21mm               |
| Weight            | 60 grams  |
| Accessories       | SM1T1 Coupler<br>SM1RR Retainer Ring                  |
| Storage Temp      | -25 to 70°C   |
| Operating Temp    | 10 to 50°C  |
| AC Power Supply   | AC - DC Converter                                     |
| Input Power       | 100-120VAC<br>(220-240VAC -EC version)<br>50-60Hz, 5W |

1. The small signal bandwidth was measured with output amplitude of 200mV and a dc offset of 200mV, driving a 50Ω load termination.
2. All measurements performed with 50Ω load unless stated otherwise.

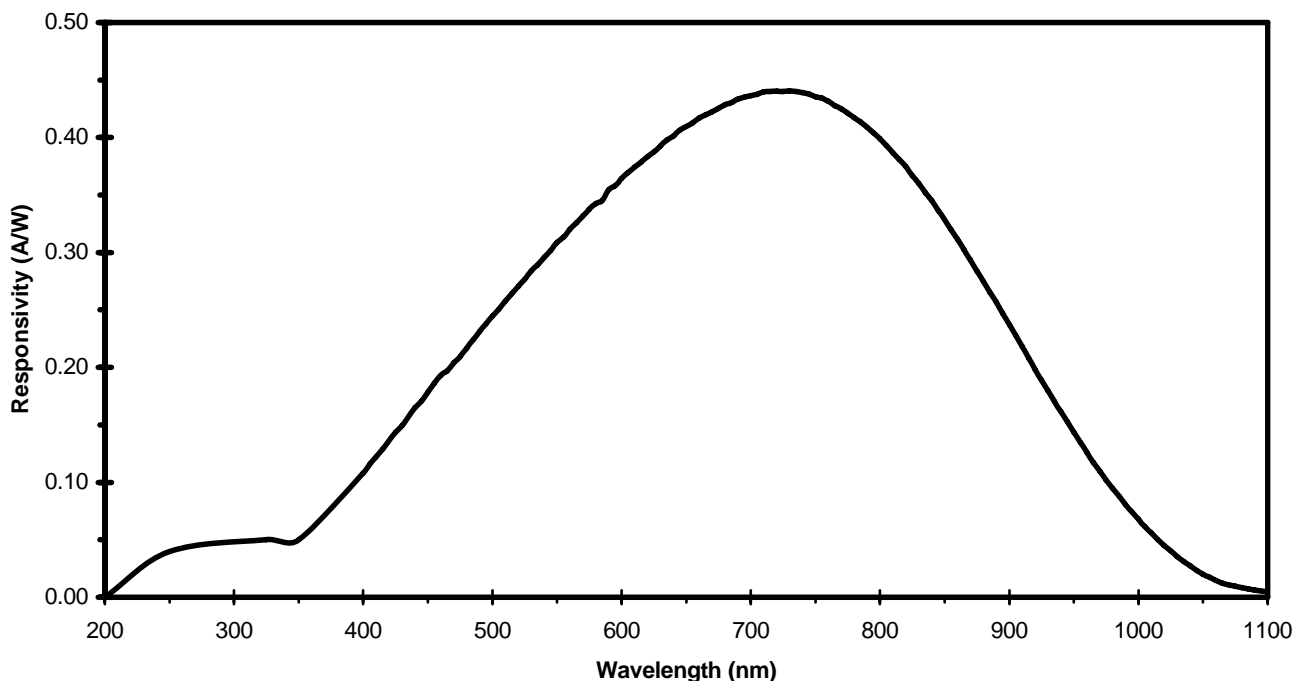
### Setup

- Unpack the optical head, install a Thorlabs TR-series ½" diameter post into one of the 8-32 (M4 on -EC version) tapped holes, located on the bottom and side of the sensor, and mount into a PH-series post holder.
- Connect the power supply 3-pin plug into the mating receptacle on the PDA10A.
- Plug the power supply into a 50-60Hz, 100-120VAC outlet (220-240VAC for -EC version).
- Attach a 50Ω 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 50Ω resistor (Thorlabs p/n T4119) for maximum performance.

### Operation

- The PDA10A is switched on by the 'POWER' Slide switch, located on the top of the optical sensor.
- The light to voltage conversion can be estimated by factoring the wavelength-dependent responsivity of the Silicon detector with the transimpedance gain as shown below:  
 [E.g. output in volts / watt = transimpedance gain (V/A) x responsivity (A/W)]
- The maximum output of the PDA10A is 10 volts for high impedance loads (5V for 50Ω loads). 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<sup>2</sup>.
- Because of the finite gain-bandwidth performance common to all amplifier circuits, the bandwidth of the PDA10A decreases with increased output signal levels.

Figure 1 - PDA10A Spectral Responsivity Curve



## Fiber Adapters and Other Accessories

Thorlabs sells a number of accessories that are compatible with the 1" and ½" threads 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 PDA10A was designed to allow maximum accessibility to the photodetector by having the front surface of the diode flush with the outside of the PDA housing. When using fiber adapters, make sure that the fiber ferrule does not crash into the detector. Failure to do so may cause damage to the diode and / or the fiber. An easy way to accomplish this is to install a SM1RR retaining ring (included with the PDA10A) inside the 1" threaded coupler *before* installing the fiber adapter.

Also available in the PDA series are InGaAs, switchable gain InGaAs and switchable gain silicon models.

## Maintaining the PDA10A

There are no serviceable parts in the PDA10A 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 PDA10A please call Thorlabs and an engineer will be happy to assist you.

## Contact

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## WEEE

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

This offer is valid for Thorlabs electrical and electronic equipment

- sold after August 13<sup>th</sup> 2005
- marked correspondingly with the crossed out “wheelie bin” logo (see fig. 1)
- sold to a company or institute within the EC
- currently owned by a company or institute within the EC
- still complete, not disassembled and not contaminated

As the WEEE directive applies to self contained operational electrical and electronic products, this “end of life” take back service does not refer to other Thorlabs products, such as

- pure OEM products, that means assemblies to be built into a unit by the user (e. g. OEM laser driver cards)
- components
- mechanics and optics
- left over parts of units disassembled by the user (PCB's, housings etc.).

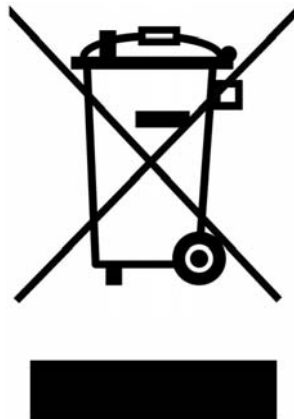
If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

### Waste treatment on your own responsibility

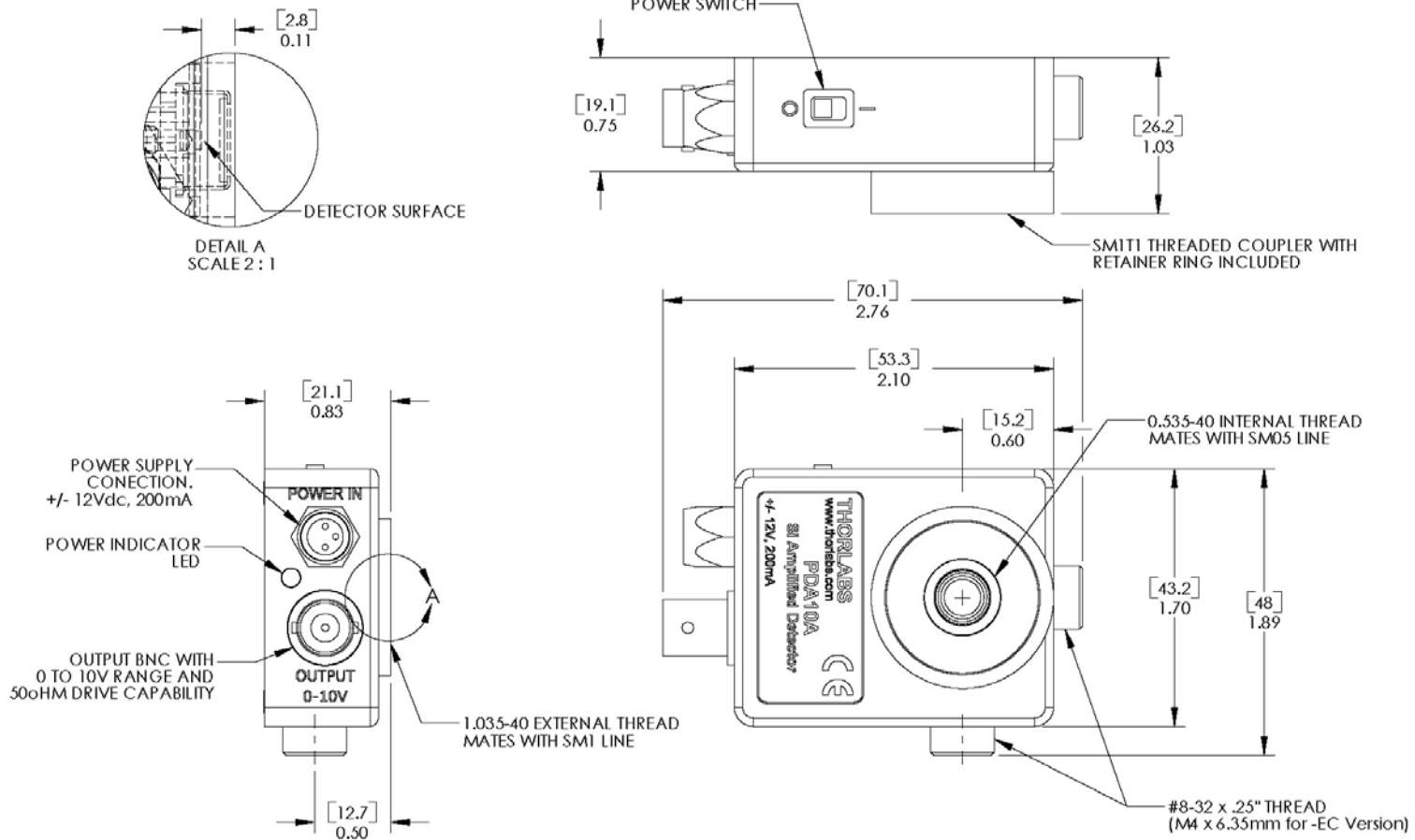
If you do not return an “end of life” unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

### Ecological background

It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future. The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of live products will thereby avoid negative impacts on the environment.



Crossed out “wheelie bin” symbol



| TOLERANCES                     |  |
|--------------------------------|--|
| UNLESS OTHERWISE SPECIFIED:    |  |
| DIMENSIONS ARE IN INCHES       |  |
| LINEAR TOLERANCES:             |  |
| TWO PLACE DECIMAL: ±0.010      |  |
| THREE PLACE DECIMAL: ±0.005    |  |
| ANGULAR: ±30'                  |  |
| SURFACE FINISH: 32 MICROINCHES |  |
| PARALLELISM: 0.002             |  |
| FLATNESS: 0.002                |  |
| STRAIGHTNESS: 0.002            |  |
| CONCENTRICITY: 0.002           |  |
| PERPENDICULARITY: 0.002        |  |
| THREAD: CLASS 2 FIT            |  |

| NAME  | DATE    |
|---|---------|
| DRAWN EC  | 9/26/05 |
| ENG APPR. EC  | 9/26/05 |
| MFG APPR. EC  | 9/26/05 |
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|  |                    |                         |           |
|--|--------------------|-------------------------|-----------|
| THORLABS INC.                            |                    | PO BOX 366<br>NEWTON NJ |           |
| TITLE:<br>WIDEBAND Si AMPLIFIED DETECTOR |                    |                         |           |
| MATERIAL:<br>PDA10A                      |                    | SIZE<br>A               | REV.<br>A |
| SCALE: 1:1                               |                    | SHEET 1 OF 1            |           |
| DWG. NO.<br>13054-E01                    | PART NO.<br>PDA10A |                         |           |

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