Large Area InGaAs Amplified Photodetectors

PDA20C
Operation Manual

2018

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Contents

We aim to develop and produce the best solution for your application in the field of optical measurement technique. To help us to live up to your expectations and improve our products permanently we need your ideas and suggestions. Therefore, please let us know about possible criticism or ideas. We and our international partners are looking forward to hearing from you.

Thorlabs GmbH

Warning

Sections marked by this symbol explain dangers that might result in personal injury or death. Always read the associated information carefully, before performing the indicated procedure.

Attention

Paragraphs preceded by this symbol explain hazards that could damage the instrument and the connected equipment or may cause loss of data.

Note

This manual also contains "NOTES" and "HINTS" written in this form.

Please read this advice carefully!

1 General Information

The PDA20C is a wideband amplified, large area InGaAs detector designed for detection of light signals from DC to 5 MHz. A buffered output drives up to 3.5 volts into 50 Ω loads.

The PDA20C 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 PDA20C has three 8-32 (M4 for /M-version) tapped mounting hole with a 0.25" mounting depth and includes a power supply.

1.1 Safety

Attention

All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly as it was designed for.

The PDA20C must not be operated in explosion endangered environments!

Do not open the cabinet, there are no parts serviceable by the operator inside!

Refer servicing to qualified personnel!

Only with written consent from Thorlabs GmbH may changes to single components be made or components not supplied by Thorlabs GmbH be used.

This precision device is only serviceable if properly packed into the complete original packaging. If necessary, ask for a replacement package prior to return.

1.2 Parts List

Inspect the shipping container for damage.

If the shipping container seems to be damaged, keep it until you have inspected the contents and you have inspected the PDA20C mechanically and electrically.

Verify that you have received the following items within the package:

1. PDA20C / PDA20C/M Amplified Photodetector
2. Metal cover cap
3. LDS12B power supply (±12V, 250 mA), 100 V, 120 V or 230 V line voltage
4. Operation manual

Thorlabs offers a DC power supply cable to PDA20C, the PDA-C-72. This cable has a connector on one end and open wires at the other. The pin-out of the PDA20C DC power jack is shown in the appendix 9.

1.3 Ordering Codes and Accessories

Ordering Code	Description
PDA20C	InGaAs Amplified Photodetector
PDA20C//M	InGaAs Amplified Photodetector; metric threads

Included Accessories

- Metal cover cap
- LDS12B power supply (±12V, 250A), 100V, 120V, or 230V line voltage

Optional Accessories

- PDA-C-72 DC power supply cable to PDA20C

Please visit our homepage http://www.thorlabs.com for various accessories like fiber adapters, posts and post holders, data sheets and further information.

2 Getting Started

- Unpack the optical head
- Install a Thorlabs TR-series ½" diameter post into one of the 8-32 (M4 on /M version) tapped holes, located on the bottom and side of the sensor, and mount into a PH series post holder.
- Switch the power supply to your local main voltage (100 VAC, 120 VAC, or 230 VAC)

Voltage Selector Switch

- Connect the power supply 3-pin plug into the mating receptacle on the PDA20C.
- Plug the power supply into a outlet
- Attach a 50 Ω coaxial cable (i.e. RG-58U) to the output of the PDA20C. When running cable lengths longer than 12" we recommend terminating the opposite end of the coax with a 50 Ω resistor (Thorlabs p/n T4119) for maximum performance.

3 Operating Instruction

The PDA20C is switched on by the 'POWER' slide switch, located on the side wall of the optical sensor.

Thorlabs PDA20C photodetectors deliver an OUTPUT voltage, which is a function of incident light power P_{opt}, detector's responsivity $\Re(\lambda)$ at a given wavelength and the transimpedance gain G:

$$V_{out} = P_{opt} \; x \; \Re(\lambda) \; x \; G$$

The detector's responsivity $\Re(\lambda)$ for a given wavelength can be read from the spectral responsivity curve (see Appendix 6).

The maximum output of the PDA20C is 10 V for high impedance loads and 3.5 V for 50 Ω 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 10 mW/cm^2.

4 Maintenance and Service

Protect the PDA20C from adverse weather conditions. The PDA20C is not water resistant.

Attention

To avoid damage to the instrument, do not expose it to spray, liquids or solvents!

The unit does not need a regular maintenance by the user. It does not contain any modules and/or components that could be repaired by the user himself. If a malfunction occurs, please contact Thorlabs GmbH for return instructions.
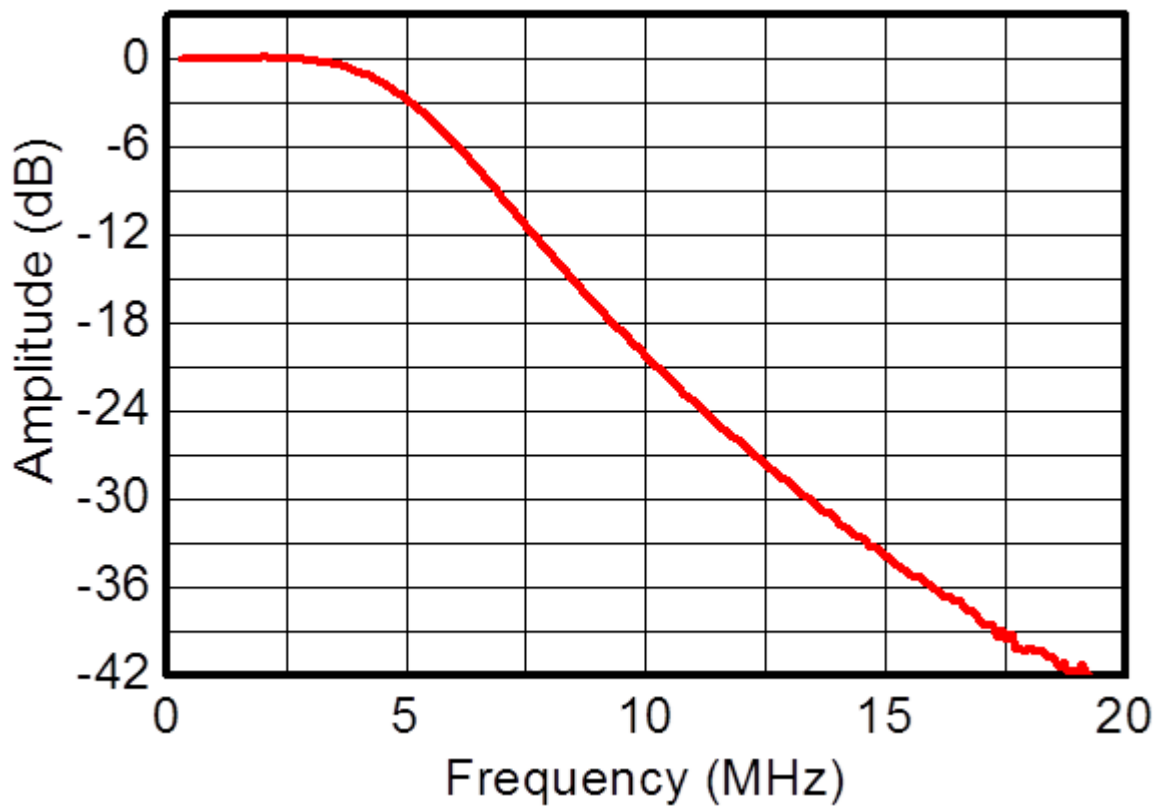
Do not remove covers!

5   Appendix

5.1   PDA20C Spectral Responsivity and Frequency Response
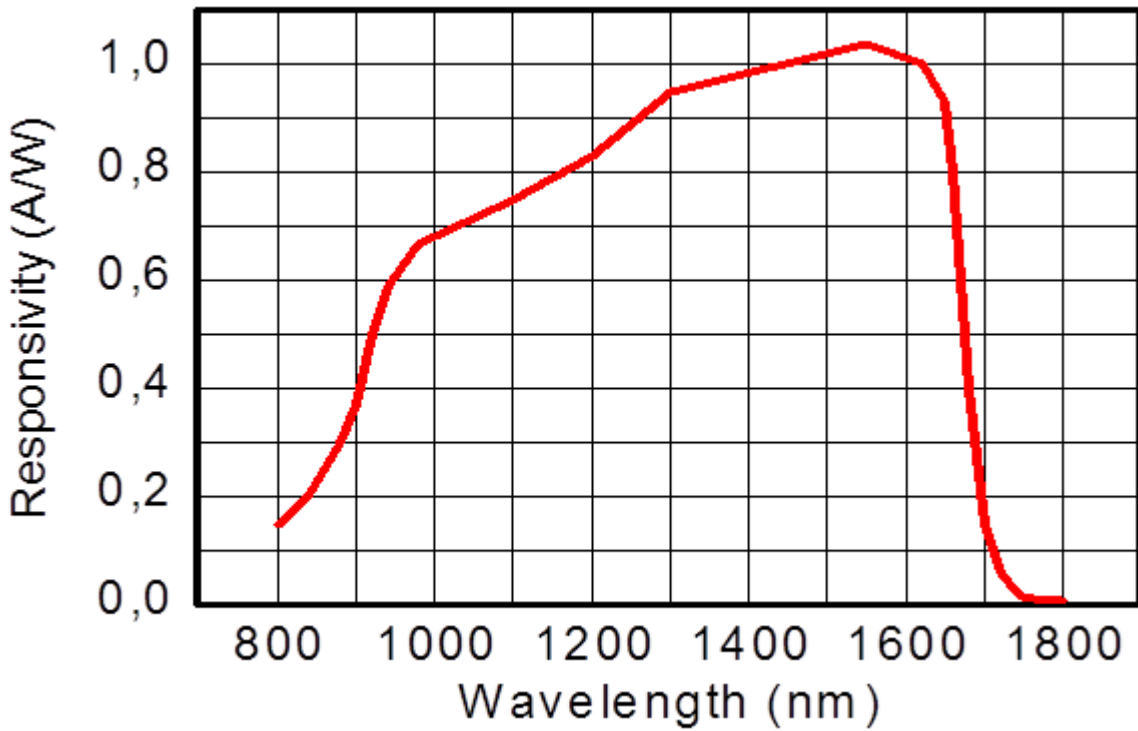
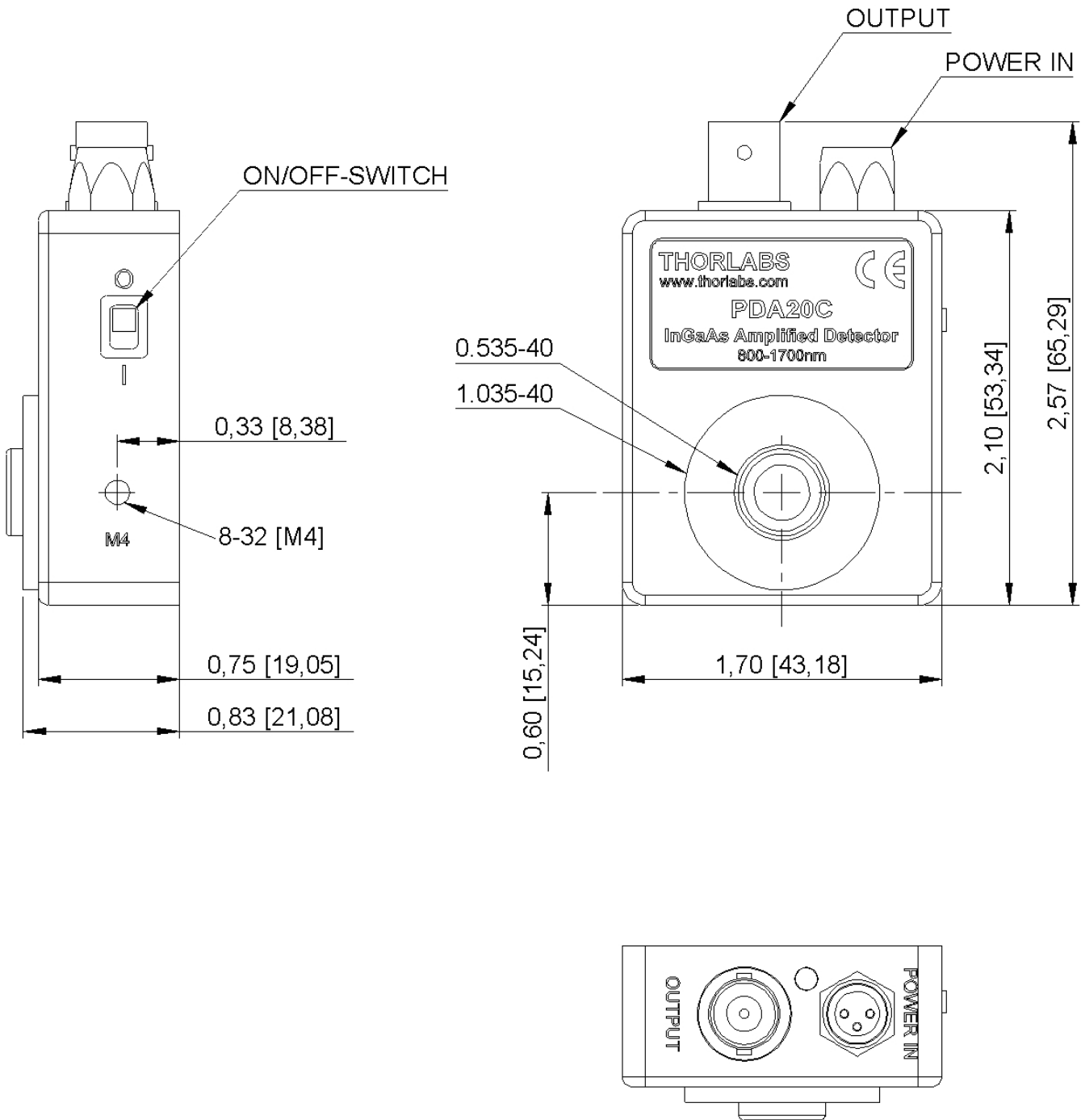*Spectral Resposivity*

Frequency Response

5.2 Technical Data

Electrical Specification	
Detector	InGaAs
Active Area	Ø 2.0mm
Wavelength Range	800 - 1700 nm
Peak Responsivity	1 A/W @ 1550 nm
Bandwidth	DC to (5.0 ± 0.2) MHz
NEP	22 pW / √Hz
Noise (RMS)	11 mV
Dark Offset (max.)	± 25 mV

Output Voltage
   Hi-Z
   50 Ω
	0 to 10.0 V
	0 to 3.5 V

Transimpedance Gain
   Hi-Z
   50 Ω
	500 kV/A
	175 kV/A

General	
On / Off Switch	slide
Output	BNC
Size (detector w/o power supply)	70 mm x 48 mm x 21 mm (2.8" x 1.9" x 0.83")
Weight (detector w/o power supply)	0.06 kg
Operating Temperature Range	10°C to 50°C
Storage Temperature Range	-25°C to 70°C [1]

Power Supply
   Input
   Output
	100VAC, 120 VAC, or 230 VAC, switchable 50-60 Hz, 5 VA
	+ 12 / -12 VDC

[1] non-condensing

All technical data are valid at 23 ± 5°C and 45 ± 15% rel. humidity (non condensing).
All measurements performed with 50 Ω load unless stated otherwise.

5.3 Dimensions

OUTPUT

POWER IN

ON/OFF-SWITCH

0,33 [8,38]

8-32 [M4]

M4

0,75 [19,05]

0,83 [21,08]

THORLABS
www.thorlabs.com

PDA20C
InGaAs Amplified Detector
800-1700nm

0.535-40

1.035-40

2,10 [53,34]

2,57 [65,29]

0,60 [15,24]

1,70 [43,18]

OUTPUT

POWER IN

5.4   Pin-out of the PDA20C DC Power Jack

Electrical Connections
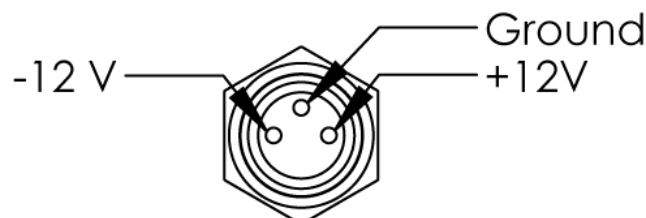
5.5   Certifications and Compliances

Category	Standards or description	
EC Declaration of Conformity - EMC	Meets intent of Directive 2004/108/EC [1] for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:	
	EN 61326-1:2006	Electrical equipment for measurement, control and laboratory use – EMC requirements - Part 1: General Requirements Immunity: complies with basic immunity test requirements [2]. Emission: complies with EN 55011 Class B Limits [2,3], IEC 610003-2 and IEC 61000-3-3.
	IEC 61000-4-2	Electrostatic Discharge Immunity (Performance Criterion A)
	IEC 61000-4-3	Radiated RF Electromagnetic Field Immunity (Performance Criterion A)
	IEC 61000-4-4	Electrical Fast Transient / Burst Immunity (Performance Criterion A)
FCC EMC Compliance	Emissions comply with the Class B Limits of FCC Code of Federal Regulations 47, Part 15, Subpart B [2,3].	
EC Declaration of Conformity - Low Voltage	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 2006/95/EC [4]	
	EN 61010-1:2001	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements
U.S. Nationally Recognized Testing Laboratory Listing	UL 61010-1 2nd ed. ISA-82.02.01 2nd ed.	
Canadian Certification	CAN/CSA C22.2 No. 61010-1 2nd ed.	
Additional Compliance	IEC 61010-1:2001	
Equipment Type	Test and Measuring	
Safety Class	Class II equipment according to IEC 60950-1:2001	

[1] Replaces 89/336/EEC.

[2] Compliance demonstrated using high-quality shielded interface cables shorter than or equal to 3 meters.

[3] Emissions, which exceed the levels required by these standards, may occur when this equipment is connected to a test object.

[4] Replaces 73/23/EEC, amended by 93/68/EEC

5.6 Warranty

Thorlabs GmbH warrants material and production of the PDA20C for a period of 24 months starting with the date of shipment. During this warranty period Thorlabs GmbH will see to defaults by repair or by exchange if these are entitled to warranty.

For warranty repairs or service the unit must be sent back to Thorlabs GmbH. The customer will carry the shipping costs to Thorlabs GmbH, in case of warranty repairs Thorlabs GmbH will carry the shipping costs back to the customer.

If no warranty repair is applicable the customer also has to carry the costs for back shipment.

In case of shipment from outside EU duties, taxes etc. which should arise have to be carried by the customer.

Thorlabs GmbH warrants the hard- and/or software determined by Thorlabs GmbH for this unit to operate fault-free provided that they are handled according to our requirements. However, Thorlabs GmbH does not warrant a fault free and uninterrupted operation of the unit, of the software or firmware for special applications nor this instruction manual to be error free. Thorlabs GmbH is not liable for consequential damages.

Restriction of Warranty

The warranty mentioned before does not cover errors and defects being the result of improper treatment, software or interface not supplied by us, modification, misuse or operation outside the defined ambient stated by us or unauthorized maintenance.

Further claims will not be consented to and will not be acknowledged. Thorlabs GmbH does explicitly not warrant the usability or the economical use for certain cases of application.

Thorlabs GmbH reserves the right to change this instruction manual or the technical data of the described unit at any time.

5.7 Copyright and Exclusion of Reliability

Thorlabs GmbH has taken every possible care in preparing this document. We however assume no liability for the content, completeness or quality of the information contained therein. The content of this document is regularly updated and adapted to reflect the current status of the hardware and/or software. We furthermore do not guarantee that this product will function without errors, even if the stated specifications are adhered to.

Under no circumstances can we guarantee that a particular objective can be achieved with the purchase of this product.

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5.8 Thorlabs 'End of Life' Policy

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs GmbH 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 GmbH electrical and electronic equipment

- sold after August 13th 2005
- marked correspondingly with the crossed out "wheelie bin" logo (see figure below)
- 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 GmbH 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.).

Waste treatment on your own responsibility

If you do not return an "end of life" unit to Thorlabs GmbH, 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.

WEEE Number (Germany) : DE97581288

Ecological background

It is well known that waste treatment 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-life products will thereby avoid negative impacts on the environment.

Crossed out
"Wheelie Bin" symbol

5.9 Thorlabs Worldwide Contacts

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