
THORLABS

Femtowatt Photoreceiver

PDF10A2 Operation Manual



2020

Version: 1.0
Date: 10-Mar-2020

Contents

Foreword

1	General Information	1
1.1	Ordering Codes and Accessories _____	1
2	Getting Started	2
2.1	Parts List _____	2
2.2	Preparation _____	2
3	Operating Instruction	3
3.1	Operating Elements _____	3
3.2	Mounting _____	3
3.3	Operation _____	4
3.4	Recommendations _____	5
3.5	Operating Principle _____	6
3.5.1	Optical Input _____	6
3.5.2	Electrical Output _____	6
4	Maintenance and Service	7
5	Appendix	8
5.1	Technical Data _____	8
5.2	Typical Responsivity _____	9
5.3	Typical Frequency Response _____	9
5.4	Typical Spectral Noise _____	10
5.5	Typical Output Time Response _____	10
5.6	Drawings _____	11
5.7	Safety _____	11
5.8	Return of Devices _____	12
5.9	Manufacturer Address _____	12
5.10	Certifications and Compliances _____	13
5.11	Warranty _____	14
5.12	Exclusion of Reliability and Copyright _____	14
5.13	Thorlabs Worldwide Contacts and WEEE poilicy _____	15

We aim to develop and produce the best solutions for your applications in the field of optical measurement techniques. To help us to live up to your expectations and constantly improve our products, we need your ideas and suggestions. 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

This Thorlabs PDF10A2 Femtowatt Photoreceiver combines a low-noise silicon photodiode with a specially designed ultra-low-noise, fixed-gain transimpedance amplifier with extremely high gain of up to 10^{12} V/A. This combination results in a photoreceiver with femtowatt sensitivity and an exceptionally low NEP, making it ideal for low-light level detection applications, such as spectroscopy and fluorescence measurements. Direct detection of optical power down to ~ 10 fW is possible. In combination with an optional lock-in amplifier, sub-femtowatt sensitivity can be achieved.

Due to a very high sensitivity, the PDF10A2 Femtowatt Photoreceiver can replace photomultiplier tubes (PMTs), avalanche photodiodes (APDs), and liquid-nitrogen-cooled germanium photodiodes in many applications. No expensive high-voltage power supply or cooling is required. Another advantage is that the PDF10A2 cannot be damaged by unwanted ambient light, which is critical for many photomultiplier tubes.

The PDF10A2 detector housing can be integrated in optical setups using convenient 8-32 and M4 combi-thread mounting holes that are compatible with both imperial and metric threading. Please see the chapter [Mounting](#)^[3] for details.

The housing accommodates Thorlabs' SM05 (0.535"-40) and SM1 (1.035"-40) threaded adapters and accessories. This allows convenient mounting of external optics, light filters, and apertures. The product includes an SM1 Coupler Body ([SM1T1](#)), which adapts the external thread to an internal thread and holds the [SM1RR](#) Retaining Ring, and a reusable protective plastic cover cap. For accessories, please visit our [website](#) or contact [Thorlabs](#)^[15].

A ± 12 VDC power supply is included with each amplified photodetector. The appropriate input voltage (100 VAC, 120 VAC, 230 VAC) can be selected with a switch on the [power supply](#)^[2].

Attention

Please find all safety information and warnings concerning this product in the chapter [Safety](#)^[11] in the Appendix.

1.1 Ordering Codes and Accessories

PDF10A2 Femtowatt Photoreceiver, Silicon detector, 320 - 1100nm, Bandwidth DC-20Hz, Square Active Area 1.2 mm² (1.1 mm x 1.1 mm), Combi-Thread Mounting Holes Compatible with 8-32 and M4 Threads

Included Accessories

- [LDS12B](#) Power Supply (± 12 V, 0.2A), 100 VAC, 120 VAC or 230 VAC Line Voltage
- [Plastic Cover Cap](#) (Item # SM1EC2B) on an included [SM1T1 SM1 Coupler](#) with a [SM1RR SM1 Retaining Ring](#).

Optional Accessories

- All Thorlabs internal SM1 (1.035"-40) and external SM05 (0.535"-40) threaded accessories are compatible with the PDF10A2.
- Fiber adapter of the Thorlabs [S120-xx](#). These fiber adapter can be mounted on the optical input for fiber coupled applications.
- [PDA-C-72](#) DC power supply cable to PDF10A2: This cable has a connector on one end and open wires at the other. The pin-out of the PDF10A2 DC power jack is shown in the [appendix](#)^[11].

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

2.1 Parts List

Please inspect the shipping container for damage. Do not cut through the cardboard. You might need the box for storage or returns.

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

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

1. PDF10A2 Amplified Photodetector
2. [Plastic Cover Cap](#) (Item # SM1EC2B) on [SM1T1-SM1 Coupler](#) with an [SM1RR-SM1 Retaining Ring](#)
3. [LDS12B](#) Power Supply ($\pm 12V$, 0.2A), 100 VAC, 120 VAC or 230 VAC Line Voltage
4. Quick Reference

2.2 Preparation

Carefully unpack the unit and accessories. If any damage is noticed, do not use the unit. Contact [Thorlabs](#) ^[15] and have us replace the defective unit.

Note

Prior to operation, please check if the indicated line voltage range on the power supply matches with your local mains voltage! Adjust the power supply accordingly to 100 VAC, 120 VAC or 230 VAC.



Voltage Selector Switch

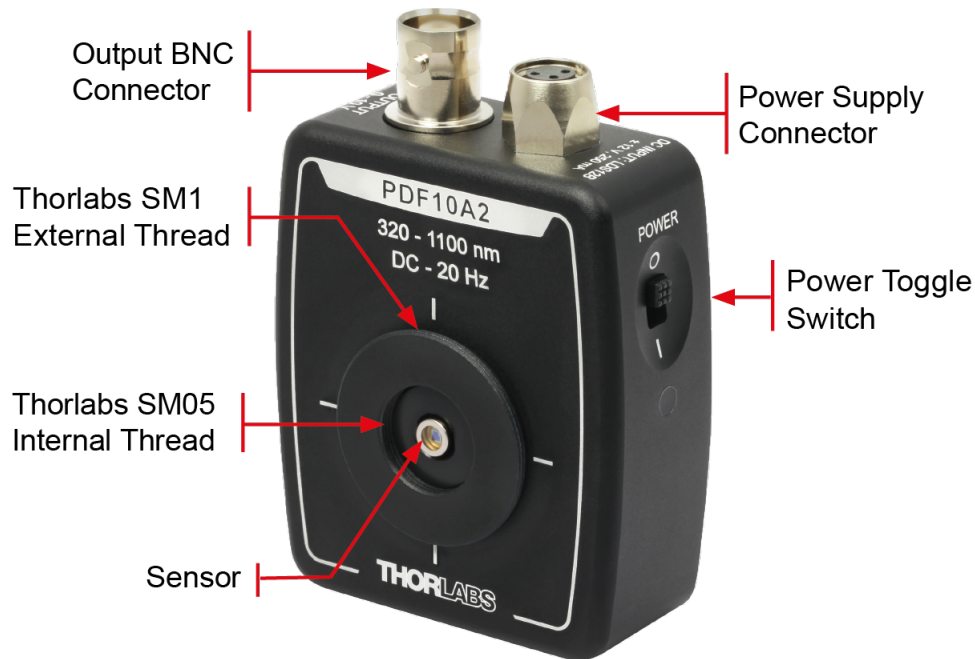
Note

If you prefer to use your own power supply, please ask [Thorlabs](#) ^[15] for an appropriate [power connector cable](#) ^[1].

3 Operating Instruction

3.1 Operating Elements

PDF10A2



3.2 Mounting

Housing

The PDF10A2 is housed in a rugged, shielded, 70.9 mm x 49.9 mm x 22.5 mm aluminum enclosure.

Mounting PDF10A2 on an Optical Table

Mount the PDF10A2 on an optical post by using either of the two tapped mounting holes on the side and bottom. The combi-thread tapped holes accept both 8-32 and M4 threads, such that using either imperial or metric TR posts is possible.

Mounting External Optics

The PDF10A2 housing accommodates Thorlabs' SM05-threaded (0.535"-40) and SM1-threaded (1.035"-40) adapters that are compatible with any number of Thorlabs 1" and ½" threaded accessories. This allows to mount external optics, filters, apertures, fiber adapters, lens tubes, or cage systems. For accessories, please visit our website or contact [Thorlabs](https://www.thorlabs.com)¹⁵. The PDF10A2 comes with an SM1T1 SM1 coupler that adapts the external thread to an SM1 internal thread. A retaining ring in the coupler holds the protective cover cap. Please unscrew the coupler if needed.

3.3 Operation

Attention

Ensure that the correct mains voltage is selected on the [power supply](#)^[2] prior to connecting the power supply to the mains power. Wrong settings for the mains voltage may damage the power supply. The ± 12 V, 250 mA power supply is included; no high voltage power supply is required for operation.

Attention

Refer to the [Technical Data](#)^[8] and pay attention to the optical damage threshold of 10 mW! Exceeding this value will permanently destroy the detectors!

Attention

Due to limitations in the IC, the high-speed amplifier used in these devices may become unstable, exhibiting oscillations or negative output, if the power supply voltage is applied when the module is on. Therefore, please make sure the power-on switch on your PDF10A2 is in OFF position **0** (see [Operating Elements](#)^[3]) prior to connecting the external power supply.

Electrical Setup

- [Mount](#)^[3] the detector using the combi-thread mounting holes on the side and bottom of the device.
- Make sure the PDF10A2 is switched off.
- Plug the power connector cable into the DC INPUT LDS12B connector of the PDF10A2.
- Plug the power supply into an outlet.
- Connect OUTPUT to your data acquisition device with a coaxial cable. The PDF10A2 with femtowatt sensitivity is a low-frequency device that should only be terminated into high impedance (Hi-Z) loads.
- Switch on the power supply.
- Switch on the PDF10A2 by moving the power slider to **I** while the optical input is protected by the cover cap.
- The maximum OUTPUT voltage swing is ± 10 V for high impedance loads (>10 k Ω). The OUTPUT signal should stay below this maximum output voltage to avoid amplifier saturation.

Optical Setup

- Ensure that OUTPUT offset voltage is within the range listed in [Technical Data](#)^[8]. A small drift during the warm up period (~5 min) is typical.
- Check whether the noise level is below 5 mV_{RMS}. If the noise level is significantly higher, please refer to [recommendations](#)^[5] and optimize your setup.
- Remove the plastic cover cap that protects the optical input.
- [Mount](#)^[3] external optics if needed.
- Align the light source with the optical input.
- It is [recommended](#)^[5] to focus the optical signal out of the fiber onto the detector.
- To prevent saturation of the amplifier keep the optical input powers below the CW saturation power listed in [Technical Data](#)^[8]. External neutral density filters or attenuators are recommended to reduce the input light level in critical cases.
- For maximum linearity performance and to prevent damage to the detector when measuring focused beams, fiber outputs, or small diameter beams, do not exceed a maximum input power of 10 mW/cm².

Turning off the PDF10A2

Move the power slider to **0** after finishing the measurements.

3.4 Recommendations

• Optical Alignment

- An open beam should always be carefully aligned with the detector. Due to the small active area of the PDF10A2 photodiodes, it is recommended to focus the optical signal out of a fiber onto the detector. For this and other fiber-coupled applications, fiber adapters like Thorlabs [S120-xx](#) series can be mounted on the optical input. The fiber adapters accommodate multi-mode or single-mode fibers.
- Please note that coupling losses may occur due to the small detector size. This will result in a reduced output signal. If angled connectors are used, an FC adapter can be rotated from its original position to improve the alignment. For this process apply an input signal with power below the saturation level while observing the output voltage using a digital voltmeter or other low-frequency measurement device.

• Ambient or stray light

- PDF10A2 photodetectors are extremely sensitive devices. To reduce the noise level, careful shielding of the PDF10A2 from any unwanted light sources is essential. Common techniques are baffling or other opaque barriers like black cloths or beam tubes. Even a small power-on indicator LED far away from the PDF10A2 can affect power measurements at femtowatt levels.
- It is not necessary to switch off the PDF10A2 when it is exposed to ambient light. The amplifier will saturate but, unlike photomultiplier tubes, it will not be damaged or saturated for a long period of time.
- It is highly recommended to use appropriate bandpass filters in front of the detector to minimize the influence of stray light.

• High Optical Input Power

- To avoid permanent damage to the detector, do not exceed the specified optical damage threshold of 10 mW as specified in section [Technical Data](#)^[8].
- Keep the optical input power below the CW saturation power listed in the [Technical Data](#)^[8] to avoid electrical saturation.

• Amplifier Saturation

To avoid electrical saturation of the amplifier keep the output voltage V_{out} below the maximum listed in [Technical Data](#)^[8]. External neutral density filters or attenuators are recommended to reduce the input light level in critical cases.

• Electrostatic Coupling

Electrostatic coupling of electrical noise associated with ground loops can be critical. In most cases an electrically isolated post (e.g. Thorlabs item# TRE or TRE/M) will suppress electrical noise coupling. Always try to identify electrical noise sources and increase the distance to the PDF10A2. If possible, rotate the PDF10A2 input away from the noise source. Different common ground points can also be tested.

• Impact of Temperature

- The amplifier offset voltage is factory set to zero at 23 °C ambient temperature. Due to the very high transimpedance gain, even small temperature changes or even humidity changes may affect the offset voltage. Therefore it is recommended for precise DC light level measurements to use the PDF10A2 in an environment with constant temperature after a short warm up period (~5 min).

3.5 Operating Principle

The Thorlabs PDF10A2 Femtowatt Photoreceiver combines a low noise Silicon photodiode with a specially designed ultra low noise transimpedance amplifier with extremely high gain. This unique combination results in a photoreceiver with femtowatt sensitivity due to the exceptional low NEP and makes it ideal for low-light level detection applications, such as spectroscopy and fluorescence measurements. Direct detection of optical power down to ~10 fW is possible.

3.5.1 Optical Input

Optical Beam Alignment

The PDF10A2 uses a Silicon Photodiode with a square detector active area of 1.2² (1.1 mm x 1.1 mm).

Due to this small active area of the PDF10A2 photodiodes, it is recommended to focus the optical signal out of the fiber onto the detector.

Because the housing is compatible with any number of Thorlabs 1" and ½" threaded accessories, external optics, filters or apertures can be easily attached to the PDF10A2.

Detector Sensitivity

The PDF10A2 and PDF10C2 are specified for determined [wavelength ranges](#)^[8]. The typical responsivity curves can be found in the [appendix](#)^[9]. Please note that these femtowatt photoreceivers are extremely sensitive to unwanted stray light.

3.5.2 Electrical Output

Responsivity

The Thorlabs PDF10A2 detectors deliver an output voltage, which is a function of incident light power P_{OPT} , detector responsivity $\mathfrak{R}(\lambda)$ and transimpedance gain G given by:

$$V_{OUT} = P_{OPT} \cdot \mathfrak{R}(\lambda) \cdot G$$

The responsivity $\mathfrak{R}(\lambda)$ for a given wavelength can be read from the diagrams [Typical Responsivity](#)^[9] to estimate the output voltage. Please note that transimpedance gain tolerance is $\pm 10\%$ for an individual unit due to extremely high feedback resistors used for the transimpedance amplifier. Temperature changes or even humidity changes may affect transimpedance gain.

Output Voltage

The maximum output voltage is 10 V for high impedance loads (>10 k Ω). The output signal should stay below the maximum output voltage to avoid saturation. Depending on wavelength responsivity $\mathfrak{R}(\lambda)$ of the detector, the amplifier will reach saturation at optical input power greater than CW Saturation Power listed in [Technical Data](#)^[8].

Note

Typical curves for the [Frequency Response](#)^[9], [Spectral Noise Distribution](#)^[10] and [Output Time Response](#)^[10] can be found in the appendix.

4 Maintenance and Service

Protect the PDF10A2 from adverse weather conditions. The PDF10A2 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. If a malfunction occurs, please contact [Thorlabs](#) ¹⁵ for return instructions.

Do not remove covers!

Do not open the power supply unit!

Cleaning

To clean the PDF10A2 housing, use a mild detergent and damp cloth. Do not soak the unit in water or use solvent based cleaners.

When cleaning the window of the photodetector, please remember that is a sensitive optical device. Gently blow off any dust using compressed air and wipe gently with an optic tissue wetted with isopropanol.

5 Appendix

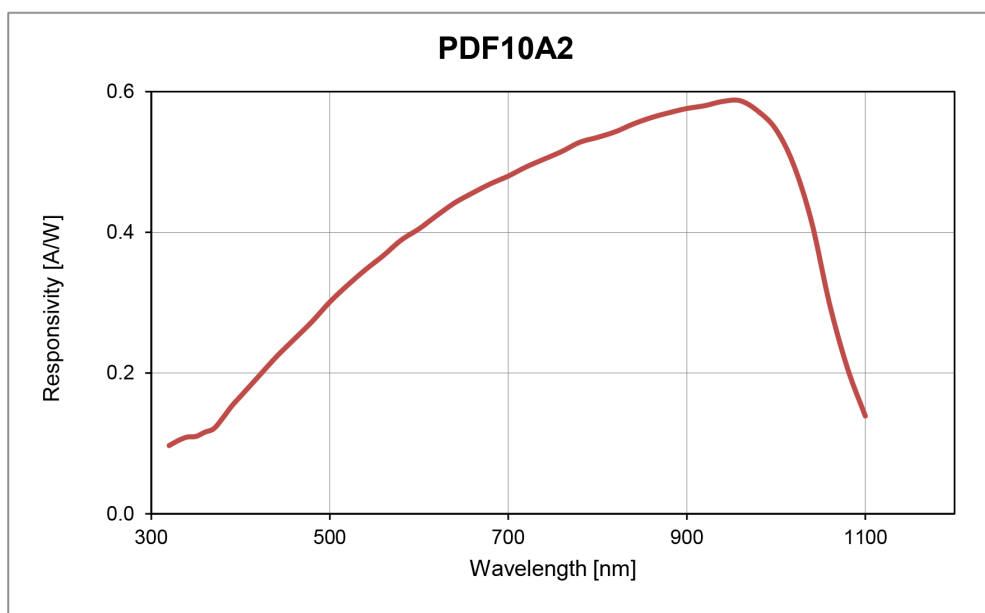
5.1 Technical Data

Specification	PDF10A2
Detector Material	Silicon
Detector Wavelength Range	320 - 1100 nm
Typical Max. Responsivity	0.6 A/W @ 960 nm
Detector Active Area	1.2 mm ² (1.1 mm x 1.1 mm)
Transimpedance Gain	1 x 10 ¹² V/A ±10%
Max. Conversion Gain	0.6 x 10 ¹² V/W ±10%
Output Bandwidth (3dB)	DC - 20 Hz
Rise/Fall Time (10% -90%)	22 ms
CW Saturation Power	16 pW
Max. Input Power (Photodiode Damage Threshold))	10 mW
Minimum NEP (DC - 3dB bandwidth)	3.0 fW/√Hz
Electrical Output, Impedance	BNC, 200
Maximum Output Voltage	10 V
DC-Offset Electrical Output	< ±75 mV
Size	70.9 mm x 49.9 mm x 22.5 mm
Power Supply	±12V, 250 mA
Operating Temperature Range	10°C to 50°C
Storage Temperature Range	-25°C to 70°C ²⁾

All technical data are valid at 23 ± 5°C and 45 ± 15% rel. humidity

²⁾ non condensing

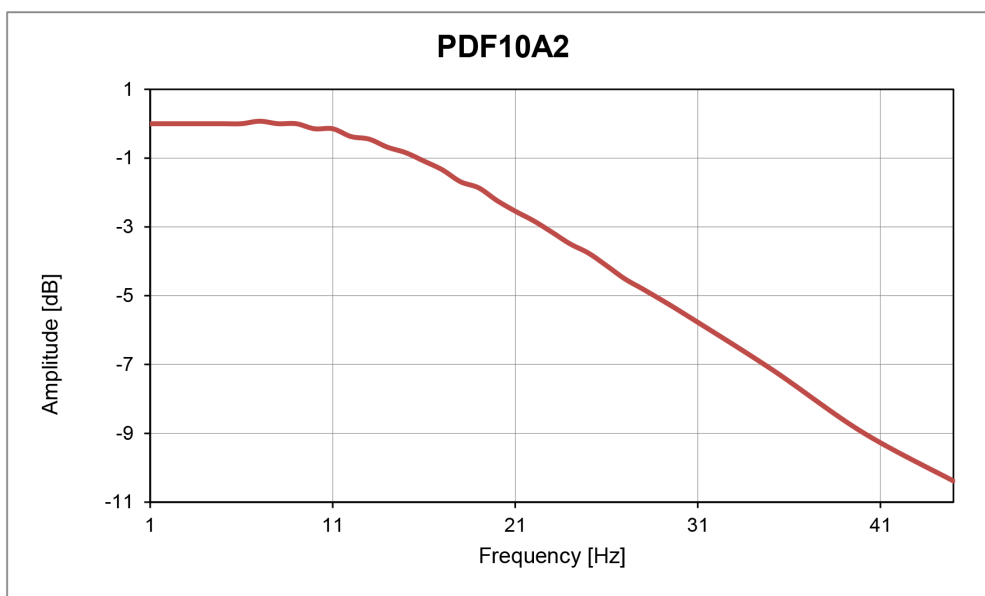
5.2 Typical Responsivity



PDF10A2 Typical Detector Responsivity

5.3 Typical Frequency Response

For the measurement of the frequency response, a test signal was fed through an optical chopper and fiber-coupled to the PDF10A2 input. The output voltage amplitude was measured with an oscilloscope.

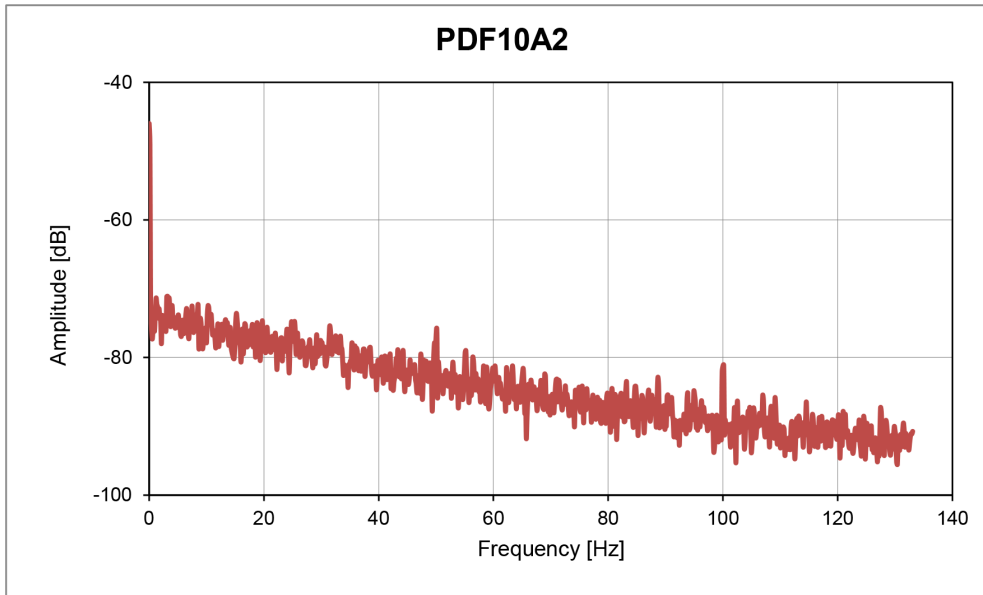


PDF10A2 Typical Frequency Response

5.4 Typical Spectral Noise

Noise is being characterized by different specifications. The spectral noise of PDF10A2 was measured using a 200 kSample/s A/D converter. The power density spectrum was calculated from the sampled values with respect to transimpedance gain and detector responsivity. The optical input of the PDF10A2 was blocked.

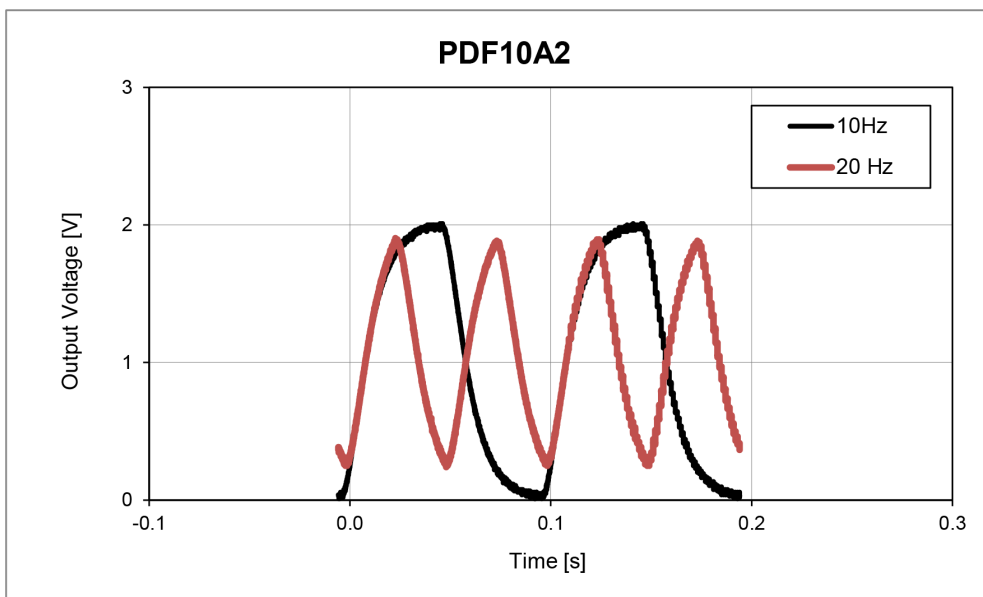
Other noise specifications are the NEP (Noise Equivalent Power) and the overall RMS output noise, specified for a defined bandwidth. These parameters are stated in [Technical Data](#)^[8].



PDF10A2 Typical Spectral Noise

5.5 Typical Output Time Response

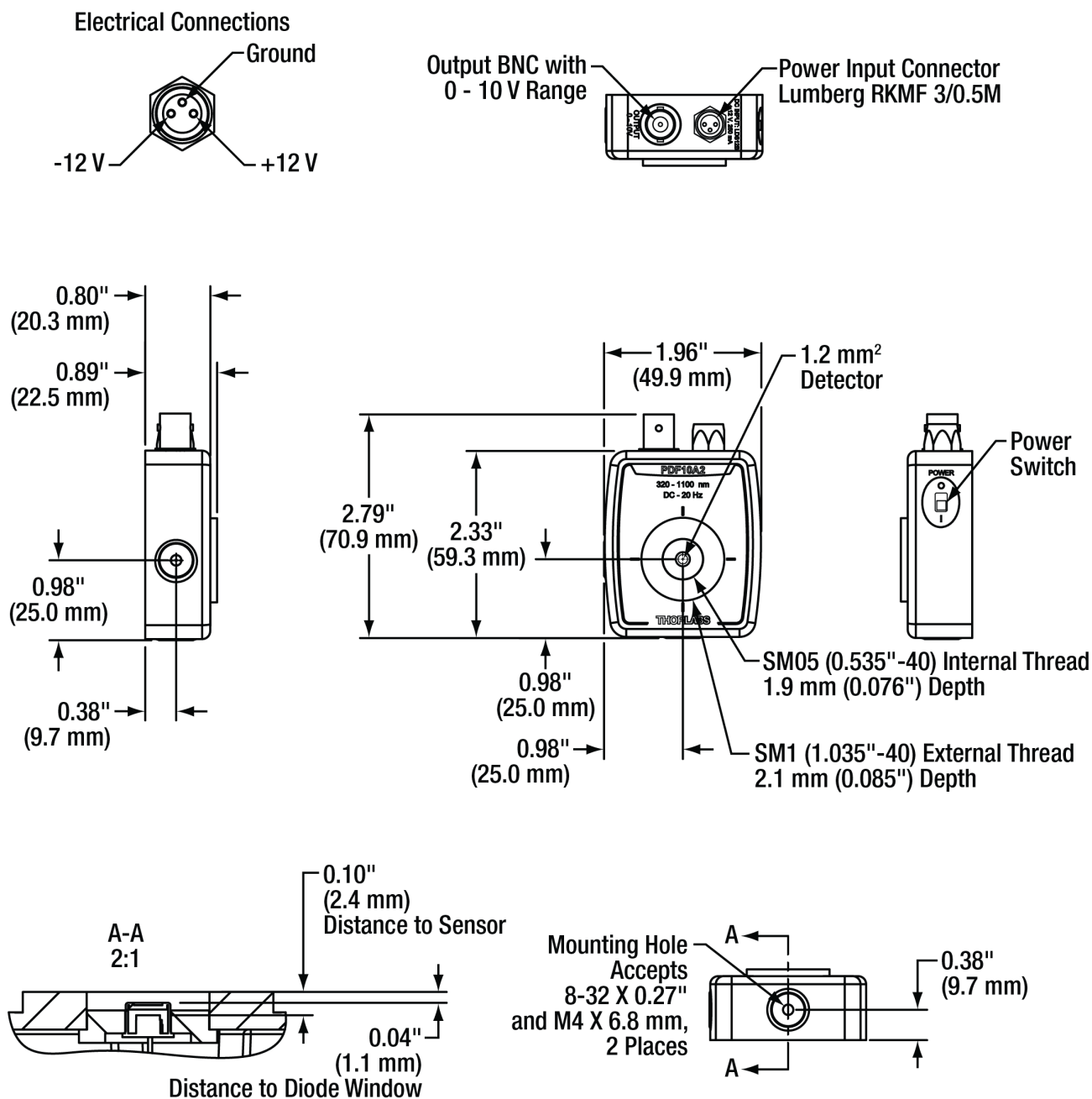
Rise/fall time measurements were carried out with the same setup described in the typical frequency response.



PDF10A2 Typical Output Time Response

5.6 Drawings

Dimensions of PDF10A2



5.7 Safety

Attention

The safety of any system incorporating the equipment is the responsibility of the assembler of the system.

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 PDF10A2 must not be operated in explosion endangered environments.

Do not remove covers. There are no user-serviceable parts inside.

This precision device is only serviceable if returned and properly packed into the complete original packaging including the cardboard insert that holds the enclosed devices. If necessary, ask for replacement packaging. Refer servicing to qualified personnel.

Changes to this device cannot be made nor may components not supplied by Thorlabs be used without written consent from Thorlabs.

Attention

Prior to applying power to the PDF10A2, make sure that the protective conductor of the 3 conductor mains power cord is correctly connected to the protective earth ground contact of the socket outlet! Improper grounding can cause electric shock resulting in damage to your health or even death!

Ensure that the line voltage setting of the power supply agrees with your local supply and that the corresponding fuses are inserted. If not, please change the line voltage setting (see section [Preparation](#) ⁽²⁾).

To avoid risk of fire, only the appropriate fuses for the corresponding line voltage must be used. All modules must only be operated with duly shielded connection cables.

Users that change or modify the product described in this manual in a way not expressly approved by Thorlabs (party responsible for compliance) could void the user's authority to operate the equipment.

Thorlabs GmbH is not responsible for any radio television interference caused by modifications of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Thorlabs. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.

The use of shielded I/O cables is required when connecting this equipment to any and all optional peripheral or host devices. Failure to do so may violate FCC and ICES rules.

Attention

Mobile telephones, cellular phones or other radio transmitters are not to be used within the range of three meters of this unit since the electromagnetic field intensity may then exceed the maximum allowed disturbance values according to IEC 61326-1.

5.8 Return of Devices

This precision device is only serviceable if returned and properly packed into the complete original packaging including the complete shipment plus the cardboard insert that holds the enclosed devices. If necessary, ask for replacement packaging. Refer servicing to qualified personnel.

5.9 Manufacturer Address



Manufacturer Address Europe

Thorlabs GmbH
Münchner Weg 1
D-85232 Bergkirchen
Germany
Tel: +49-8131-5956-0
Fax: +49-8131-5956-99
www.thorlabs.de
Email: europe@thorlabs.com

EU-Importer Address

Thorlabs GmbH
Münchner Weg 1
D-85232 Bergkirchen
Germany
Tel: +49-8131-5956-0
Fax: +49-8131-5956-99
www.thorlabs.de
Email: europe@thorlabs.com

5.10 Certifications and Compliances

<i>EU Declaration of Conformity</i>		
<i>in accordance with EN ISO 17050-1:2010</i>		
We:	Thorlabs GmbH	
Of:	Münchner Weg 1, 85232 Bergkirchen, Deutschland	
<i>in accordance with the following Directive(s):</i>		
2014/35/EU	Low Voltage Directive (LVD)	
2014/30/EU	Electromagnetic Compatibility (EMC) Directive	
2011/65/EU	Restriction of Use of Certain Hazardous Substances (RoHS)	
 <i>hereby declare that:</i>		
Model:	PDF10A2	
Equipment:	Variable-/ Fixed Gain Amplified Detector	
<i>is in conformity with the applicable requirements of the following documents:</i>		
EN 61010-1	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.	2010
EN 61326-1	Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements	2013
 <i>and which, issued under the sole responsibility of Thorlabs, is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8th June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, for the reason stated below:</i>		
does not contain substances in excess of the maximum concentration values tolerated by weight in homogenous materials as listed in Annex II of the Directive		
 <i>I hereby declare that the equipment named has been designed to comply with the relevant sections of the above referenced specifications, and complies with all applicable Essential Requirements of the Directives.</i>		
Signed:		On: 20 November 2019
Name:	Bruno Gross	
Position:	General Manager	EDC - PDAVJ5/8/10, PDA20C2, PDA8A2, P...
		

5.11 Warranty

Thorlabs warrants material and production of the PDF10A2 for a period of 24 months starting with the date of shipment. During this warranty period Thorlabs 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. The customer will carry the shipping costs to Thorlabs, in case of warranty repairs Thorlabs 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 warrants the hard- and/or software determined by Thorlabs for this unit to operate fault-free provided that they are handled according to our requirements. However, Thorlabs 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 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 does explicitly not warrant the usability or the economical use for certain cases of application.

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

5.12 Exclusion of Reliability and Copyright

Thorlabs 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.

Insofar as permitted under statutory regulations, we assume no liability for direct damage, indirect damage or damages suffered by third parties resulting from the purchase of this product. In no event shall any liability exceed the purchase price of the product.

Please note that the content of this document is neither part of any previous or existing agreement, promise, representation or legal relationship, nor an alteration or amendment thereof. All obligations of *Thorlabs* result from the respective contract of sale, which also includes the complete and exclusively applicable warranty regulations. These contractual warranty regulations are neither extended nor limited by the information contained in this document. Should you require further information on this product, or encounter specific problems that are not discussed in sufficient detail in the document, please contact your local *Thorlabs* dealer or system installer.

All rights reserved. This document may not be reproduced, transmitted or translated to another language, either as a whole or in parts, without the prior written permission of *Thorlabs*.

Copyright © Thorlabs 2020. All rights reserved.

5.13 Thorlabs Worldwide Contacts and WEEE policy

For technical support or sales inquiries, please visit us at www.thorlabs.com/contact for our most up-to-date contact information.



USA, Canada, and South America

Thorlabs, Inc.
sales@thorlabs.com
techsupport@thorlabs.com

UK and Ireland

Thorlabs Ltd.
sales.uk@thorlabs.com
techsupport.uk@thorlabs.com

Europe

Thorlabs GmbH
europe@thorlabs.com

Scandinavia

Thorlabs Sweden AB
scandinavia@thorlabs.com

France

Thorlabs SAS
sales.fr@thorlabs.com

Brazil

Thorlabs Vendas de Fotônicos Ltda.
brasil@thorlabs.com

Japan

Thorlabs Japan, Inc.
sales@thorlabs.jp

China

Thorlabs China
chinasales@thorlabs.com

Thorlabs 'End of Life' Policy (WEEE)

Thorlabs verifies our compliance with the WEEE (Waste Electrical and Electronic Equipment) directive of the European Community and the corresponding national laws. Accordingly, all end users in the EC may return “end of life” Annex I category electrical and electronic equipment sold after August 13, 2005 to Thorlabs, without incurring disposal charges. Eligible units are marked with the crossed out “wheelie bin” logo (see right), were sold to and are currently owned by a company or institute within the EC, and are not disassembled or contaminated. Contact Thorlabs for more information. Waste treatment is your own responsibility. “End of life” units must be returned to Thorlabs or handed to a company specializing in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.





THORLABS

www.thorlabs.com
