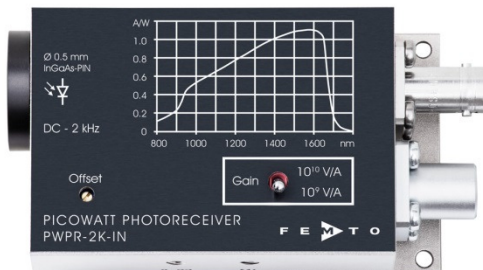


**Datasheet**

**PWPR-2K-IN**

**Ultra-Low Noise 2 kHz Photoreceiver with InGaAs-PIN Photodiode**



The picture shows model PWPR-2K-IN-FS.

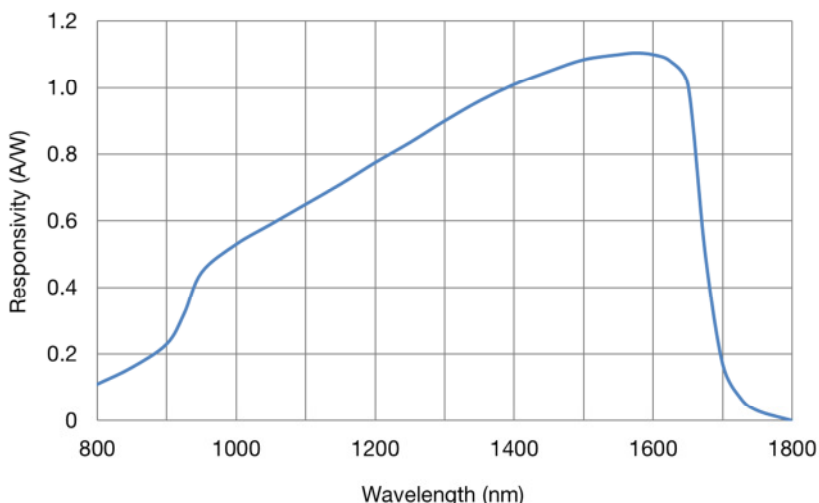
Features

- InGaAs-PIN detector, 0.5 mm active diameter
- Spectral range 900 - 1700 nm
- Ultra-low noise, NEP 10 fW/√Hz
- Bandwidth DC to 2 kHz
- Transimpedance gain switchable  $1.0 \times 10^9$  V/A,  $1.0 \times 10^{10}$  V/A
- Free-space input 1.035"-40 threaded, alternatively 25 mm diameter unthreaded
- Easily convertible to fiber optic input (FC and FSMA) with optionally available screw-on adapters
- UNC 8-32 and M4 tapped holes for mounting on standard posts with metric and imperial thread

Applications

- Spectroscopy, reflection and transmission measurements
- Highly sensitive optoelectronic measurements
- Applications utilizing optical chopper modulation
- Optical front-end for oscilloscopes, A/D converters and lock-in amplifiers

Spectral Response



# Ultra-Low Noise 2 kHz Photoreceiver with InGaAs-PIN Photodiode

Available Versions

PWPR-2K-IN-FST



Internal threaded coupler ring with 30 mm outer diameter (included)

1.035"-40 threaded flange for free space applications, compatible with many optical standard accessories and for use with various types of fiber connector adapters

Optionally available:  
Fiber adapters PRA-FC and PRA-FSMA  
(Coupling efficiency will depend on fiber type.  
With the relative large 0.5 mm dia. photodiode installed in the PWPR-2K-IN input coupling is not critical. However, standard SM 9/125 fibers (PC or APC) with low numerical aperture (NA) are recommended for ensuring near 100% coupling efficiency.)

PWPR-2K-IN-FS



Round flange 25 mm diameter

25 mm dia. unthreaded flange for free space applications, compatible with many optical standard accessories.

PWPR-S

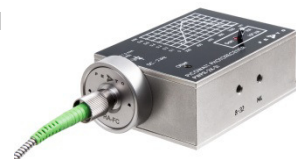
Customized versions available on request

Available Accessories

PRA-FSMA  
PRA-FC



Fiber-adapter with external 1.035"-40 thread



PRA-PAP



Alternative mounting option:  
Post adapter plate, easy to mount on FEMTO photoreceiver series OE, FWPR, PWPR, HCA-S and LCA-S



PS-15-25-L



Power supply  
Input: 100 - 240 VAC  
Output: ±15 VDC

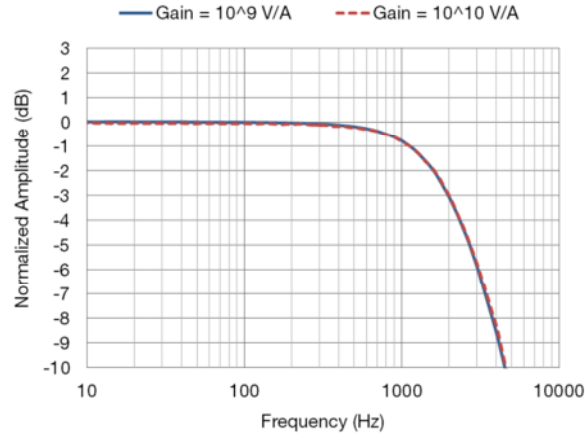
## Ultra-Low Noise 2 kHz Photoreceiver with InGaAs-PIN Photodiode

Specifications	<p>Test conditions <math>V_s = \pm 15\text{ V}</math>, <math>T_A = 25\text{ }^\circ\text{C}</math>, output load impedance <math>1\text{ M}\Omega</math>, warm-up 20 minutes (min. 10 minutes recommended)</p>
Gain	<p>Transimpedance gain <math>1.0 \times 10^9\text{ V/A}</math>, <math>1.0 \times 10^{10}\text{ V/A}</math> (switchable) (@ output load <math>\geq 100\text{ k}\Omega</math>)</p> <p>Gain accuracy <math>\pm 1\%</math> (electrical)</p> <p>Conversion gain <math>1.1 \times 10^9\text{ V/W}</math>, <math>1.1 \times 10^{10}\text{ V/W}</math> typ. (switchable) (@ <math>1580\text{ nm}</math>, output load <math>\geq 100\text{ k}\Omega</math>)</p>
Frequency Response	<p>Lower cut-off frequency DC</p> <p>Upper cut-off frequency (<math>-3\text{ dB}</math>) <math>2\text{ kHz}</math></p> <p>Rise/fall time (10% - 90%) <math>165\text{ }\mu\text{s}</math></p>
Detector	<p>Detector type InGaAs-PIN photodiode</p> <p>Active area <math>\varnothing 0.5\text{ mm}</math></p> <p>Spectral range <math>900 - 1700\text{ nm}</math></p> <p>Max. sensitivity <math>1.1\text{ A/W}</math> @ <math>1580\text{ nm}</math> typ.</p>
Input	<p>Input offset current (dark current) <math>0.6\text{ pA}</math> typ.</p> <p>Input offset current drift factor <math>2 / 10\text{ }^\circ\text{C}</math></p> <p>Input offset compensation range <math>\pm 120\text{ pA}</math> (adjustable by offset potentiometer)</p> <p>Optical saturation power <math>9.1\text{ nW}</math> (@ <math>10^9\text{ V/A}</math>, <math>1580\text{ nm}</math>) <math>0.91\text{ nW}</math> (@ <math>10^{10}\text{ V/A}</math>, <math>1580\text{ nm}</math>)</p> <p>NEP <math>10\text{ fW}/\sqrt{\text{Hz}}</math> (@ <math>1580\text{ nm}</math>, <math>100\text{ Hz}</math>)</p>
Output	<p>Output voltage range <math>-1.2\text{ V} \dots +10\text{ V}</math> (@ <math>\geq 100\text{ k}\Omega</math> output load)</p> <p>Max. output current <math>30\text{ mA}</math> (short-circuit proof)</p> <p>Output impedance <math>50\text{ }\Omega</math> (terminate with <math>\geq 100\text{ k}\Omega</math>)</p> <p>Output noise <math>0.75\text{ mV}_{\text{RMS}}</math> (<math>5\text{ mV}_{\text{pp}}</math>) typ. @ <math>10^9\text{ V/A}</math>, no signal on detector</p>
Power Supply	<p>Supply voltage <math>\pm 15\text{ V}</math> (<math>\pm 14.5 \dots 16.5\text{ V}</math>)</p> <p>Supply current <math>+32\text{ mA} / -25\text{ mA}</math> (depends on operating conditions, recommended power supply capability minimum <math>\pm 100\text{ mA}</math>)</p>
Case	<p>Weight <math>207\text{ g}</math> (0.46 lbs) PWPR-2K-IN-FS <math>220\text{ g}</math> (0.49 lbs) PWPR-2K-IN-FST incl. coupler ring</p> <p>Material AlMg4.5Mn, nickel-plated</p>
Temperature Range	<p>Storage temperature <math>-30\text{ }^\circ\text{C} \dots +85\text{ }^\circ\text{C}</math></p> <p>Operating temperature <math>0\text{ }^\circ\text{C} \dots +50\text{ }^\circ\text{C}</math></p>
Absolute Maximum Ratings	<p>Optical input power (CW) <math>10\text{ mW}</math></p> <p>Power supply voltage <math>\pm 20\text{ V}</math></p>

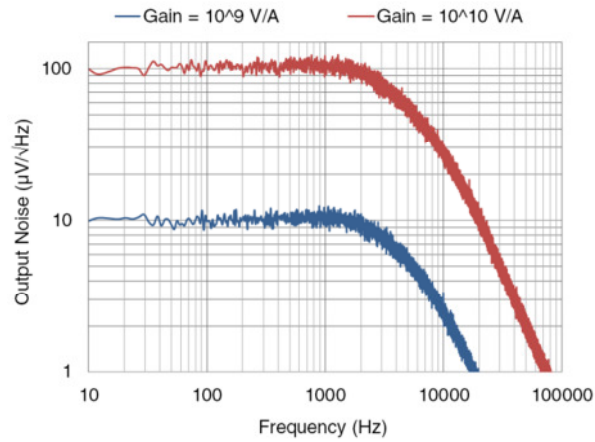
# Ultra-Low Noise 2 kHz Photoreceiver with InGaAs-PIN Photodiode

Typical Performance Characteristics

Frequency Response



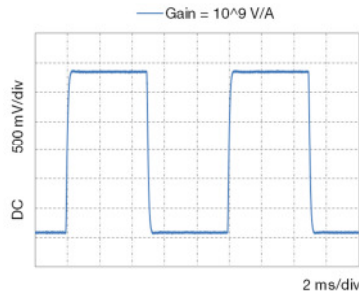
Output Noise



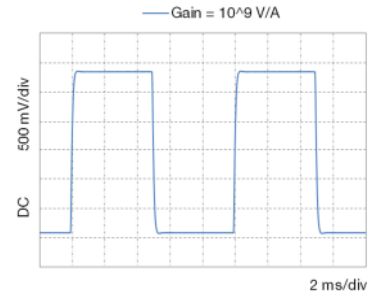
# Ultra-Low Noise 2 kHz Photoreceiver with InGaAs-PIN Photodiode

Typical Performance Characteristics (continued)

Step Signal Response @ 2500 pW (p-p, 1550 nm)

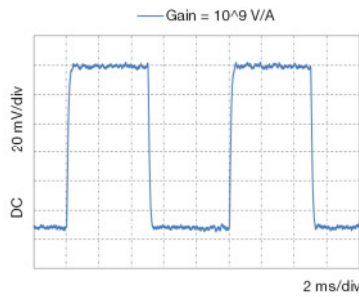


acquisition without averaging

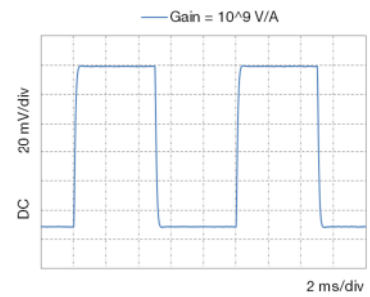


acquisition with 64x averaging

Step Signal Response @ 100 pW (p-p, 1550 nm)

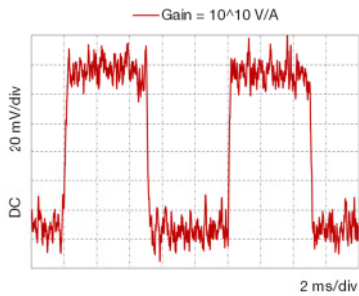


acquisition without averaging

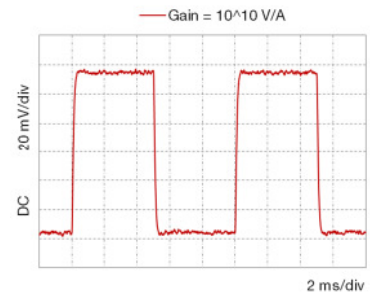


acquisition with 64x averaging

Step Signal Response @ 10 pW (p-p, 1550 nm)

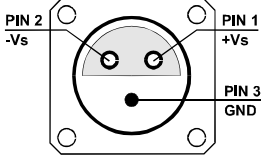


acquisition without averaging



acquisition with 64x averaging

## Ultra-Low Noise 2 kHz Photoreceiver with InGaAs-PIN Photodiode

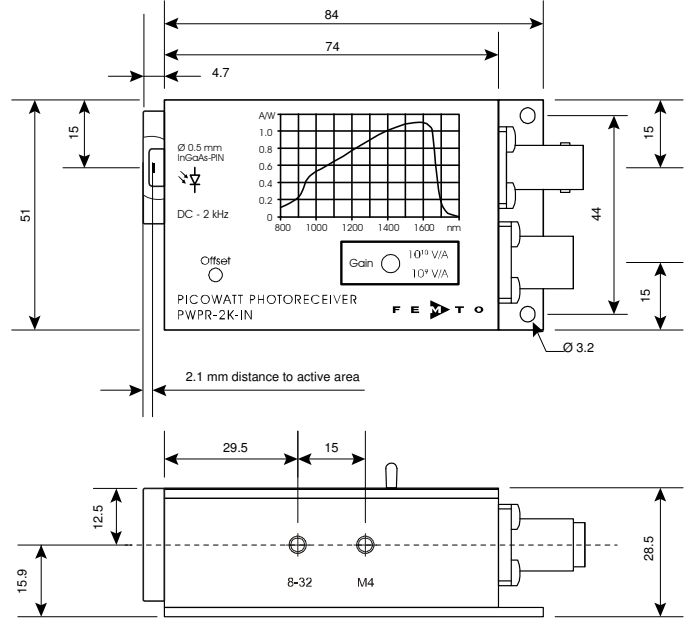
Connectors	<p>Input</p> <p style="margin-left: 20px;">PWPR-2K-IN-FS     25 mm dia. unthreaded flange for free space applications</p> <p style="margin-left: 20px;">PWPR-2K-IN-FST     1.035"-40 threaded flange for free space applications and for use with fiber connector adapters PRA-FC and PRA-FSMA</p> <p style="margin-left: 20px;">fixed fiber optic input     available as customized unit</p> <p>Output</p> <p style="margin-left: 20px;">BNC jack (female)</p> <p>Power supply</p> <p style="margin-left: 20px;">Lemo® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)</p> <p style="margin-left: 20px;">Pin 1:     +15 V</p> <p style="margin-left: 20px;">Pin 2:     -15 V</p> <p style="margin-left: 20px;">Pin 3:     GND</p> <div style="text-align: center; margin-top: 10px;">  </div>
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Scope of Delivery	PWPR-2K-IN, internally threaded coupler ring ("FST" version only), Lemo® 3-pin connector, datasheet, transport package
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# Ultra-Low Noise 2 kHz Photoreceiver with InGaAs-PIN Photodiode

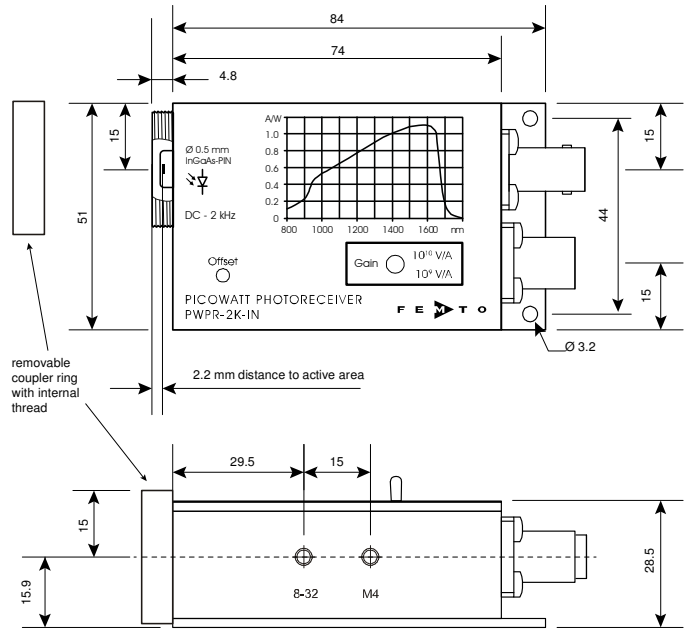
Dimensions

PWPR-2K-IN-FS (25 mm dia. unthreaded free space input)



all measures in mm unless otherwise noted DZ-PWPR-2K-IN-FS\_R0

PWPR-2K-IN-FST (1.035"-40 threaded free space input)



all measures in mm unless otherwise noted DZ-PWPR-2K-IN-FST\_R0

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