

Datasheet

FWPR-20-SI

Femtowatt Photoreceiver  
with Si Photodiode



The picture shows model FWPR-20-SI-FS.  
The photoreceiver will be delivered without post holder and post.

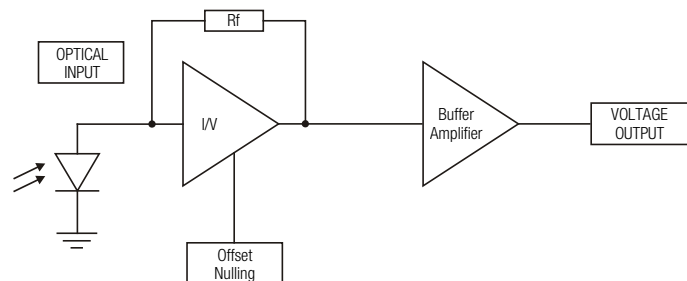
Features

- Si photodiode, 1.1 × 1.1 mm<sup>2</sup> active area
- Ultra low noise, NEP 0.7 fW/√Hz
- Amplifier transimpedance gain 1 × 10<sup>12</sup> V/A
- Max. conversion gain 0.6 × 10<sup>12</sup> V/W @ 960 nm
- Wavelength range 320 – 1100 nm
- 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

- Fluorescence measurements
- Spectroscopy
- Electrophoresis
- Replacement for photomultiplier tubes (PMTs) and avalanche photodiodes (APDs)

Block Diagram



BS01-FWPR\_R03

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

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Available Versions

FWPR-20-SI-FST



Picture shows 1.035"-40 threaded flange with internally threaded coupler ring (outer diameter 30 mm)

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, PRA-FCA and PRA-FSMA. Coupling efficiency will depend on fiber type.

With the relative large  $1.1 \times 1.1 \text{ mm}^2$  photodiode installed in the FWPR-20-SI 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.

FWPR-20-SI-FS



Picture shows round flange with 25 mm diameter

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

Related Models

FWPR-20-IN-FST

InGaAs-PIN,  $\varnothing 500 \mu\text{m}$ , 900 - 1700 nm free space input, 1.035"-40 threaded flange

FWPR-20-IN-FS

InGaAs-PIN,  $\varnothing 500 \mu\text{m}$ , 900 - 1700 nm free space input, 25 mm dia. unthreaded flange

Available Accessories

PRA-FC  
PRA-FCA  
PRA-FSMA



Fiber-adapter with external 1.035"-40 thread (suitable for FST models only).

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:  $\pm 15 \text{ VDC}$

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Specifications	Test conditions	$V_S = \pm 15\text{ V}$ , $T_A = 25\text{ }^\circ\text{C}$ , output load impedance $1\text{ M}\Omega$ , warm-up 20 minutes (min. 10 minutes recommended)
Gain	Transimpedance gain Gain accuracy Conversion gain	$1.0 \times 10^{12}\text{ V/A}$ (@ output load $\geq 100\text{ k}\Omega$ ) $\pm 1\%$ (electrical) $0.6 \times 10^{12}\text{ V/W typ.}$ (@ $960\text{ nm}$ , output load $\geq 100\text{ k}\Omega$ )
Frequency Response	Lower cut-off frequency Upper cut-off frequency ( $-3\text{ dB}$ )	DC $20\text{ Hz}$ ( $\pm 20\%$ )
Time Response	Rise/fall time ( $10\% - 90\%$ )	$18\text{ ms}$ ( $\pm 20\%$ )
Input	Noise equivalent power (NEP) Optical saturation power	$0.7\text{ fW}/\sqrt{\text{Hz}}$ (@ $960\text{ nm}$ , $1\text{ Hz}$ ) $18\text{ pW}$ (for linear amplification, @ $960\text{ nm}$ )
Detector	Detector Active area Spectral range Sensitivity	Si photodiode $1.1 \times 1.1\text{ mm}^2$ $320 - 1100\text{ nm}$ $0.6\text{ A/W typ.}$ (@ $960\text{ nm}$ )
Output	Output voltage range Offset voltage compensation Output impedance Max. output current Output noise	$-1.6\text{ V} \dots +10\text{ V}$ (@ $\geq 100\text{ k}\Omega$ output load) $\pm 1.6\text{ V typ.}$ (adjustable by offset potentiometer) $50\ \Omega$ (terminate with $\geq 100\text{ k}\Omega$ load) $25\text{ mA}$ (short-circuit proof) $6\text{ mV}_{\text{RMS}}$ ( $40\text{ mV}_{\text{PP}}$ ) typ. (@ $\geq 100\text{ k}\Omega$ load, no signal on detector, measurement bandwidth $8\text{ kHz}$ )
Input Flange	Material	$1.4305$ stainless steel, nickel-plated (FST flange) AlMg4.5Mn, nickel-plated (FS flange)
Coupler Ring (FST version only)	Material	$1.4305$ stainless steel, glass bead blasted
Power Supply	Supply voltage Supply current	$\pm 15\text{ V}$ ( $\pm 14.5\text{ V} \dots \pm 16.5\text{ V}$ ) $\pm 15\text{ mA}$ (depends on operating conditions, recommended power supply capability min. $\pm 50\text{ mA}$ )
Case	Weight Material	$203\text{ g}$ ( $0.45\text{ lbs}$ ) FWPR-20-SI-FST incl. coupler ring $190\text{ g}$ ( $0.42\text{ lbs}$ ) FWPR-20-SI-FS AlMg3/4.5Mn, nickel-plated
Temperature Range	Storage temperature Operating temperature	$-30\text{ }^\circ\text{C} \dots +85\text{ }^\circ\text{C}$ $0\text{ }^\circ\text{C} \dots +60\text{ }^\circ\text{C}$
Absolute Maximum Ratings	Max. CW power (averaged) Power supply voltage	$10\text{ mW}$ $\pm 20\text{ V}$

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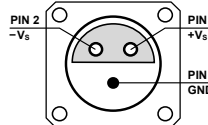
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Connectors	Input	FWPR-20-SI-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories
	Output	FWPR-20-SI-FS	25 mm dia. unthreaded flange for free space applications
	Power supply	BNC jack (female) LEMO® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)	

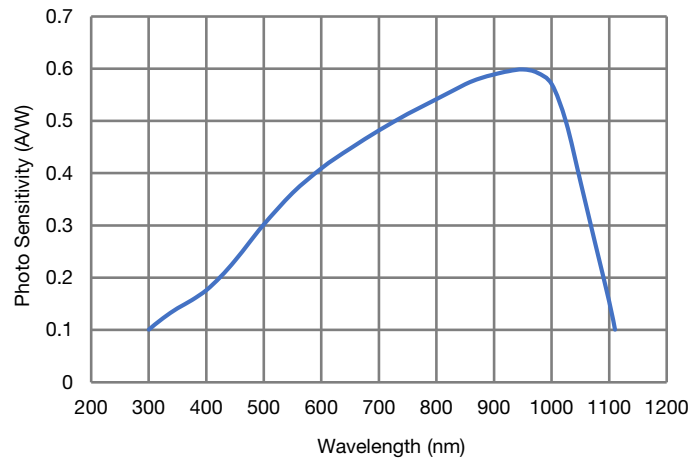


Pin 1: +15 V  
Pin 2: -15 V  
Pin 3: GND

Scope of Delivery FWPR-20-SI, internally threaded coupler ring (FST version only), LEMO® 3-pin connector, datasheet, transport package

Ordering Information FWPR-20-SI-FST 1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories.  
FWPR-20-SI-FS 25 mm dia. unthreaded flange for free space applications.

Spectral Responsivity



DB-Sens-FWPR-20-SI\_R01

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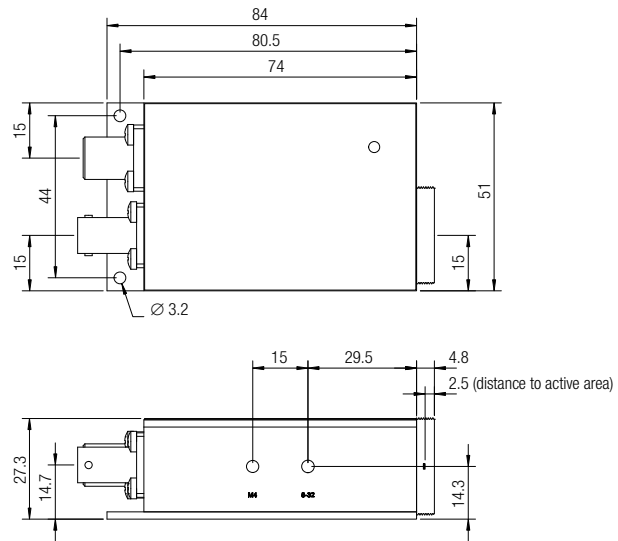
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Dimensions

FWPR-20-SI-FST (1.035"-40 threaded free space input)



FWPR-20-SI-FST\_R1

all dimensions in mm unless otherwise noted

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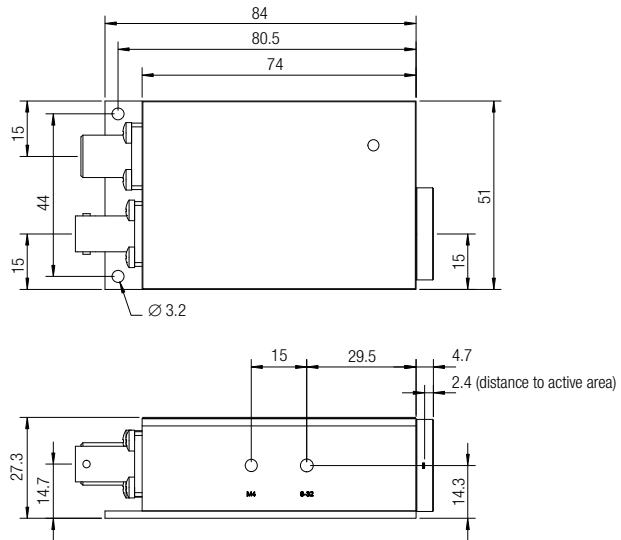
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Dimensions (continued)

FWPR-20-SI-FS (25 mm dia. unthreaded free space input)



FWPR-20-SI-FS\_R1

all dimensions in mm unless otherwise noted

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