



Datasheet

FWPR-20-SI

**Femtowatt Photoreceiver
with Si Photodiode**



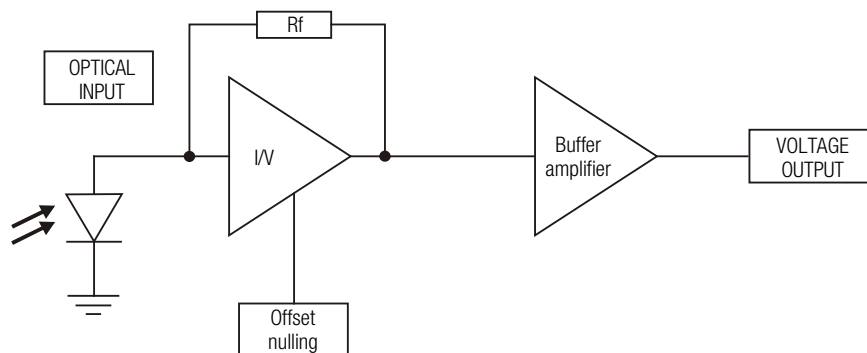
Features

- **Si photodiode, 1.1 × 1.1 mm² active area**
- **Ultra low noise, NEP 0.7 fW/√Hz**
- **Amplifier transimpedance gain 1 × 10¹² V/A**
- **Max. conversion gain 0.6 × 10¹² V/W @ 960 nm**
- **Wavelength range 320 – 1100 nm**
- **Free-space input 1.035"-40 threaded, 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





Intended Use

The FWPR-20-SI photoreceiver consists of an Si photodiode and a subsequent low-noise fixed gain transimpedance amplifier. It is designed for conversion of optical signals in the range from fW to pW into equivalent output voltages. Operation is mostly self-explanatory. If in doubt, consult this document or contact support@femto.de.

For safe operation, please refer to the damage thresholds specified in the "Absolute Maximum Ratings", "Temperature Range" and "Power Supply" sections of this document.

The operating environment must be free of smoke, dust, grease, oil, condensing moisture, and other contaminants that could affect the operation or performance.

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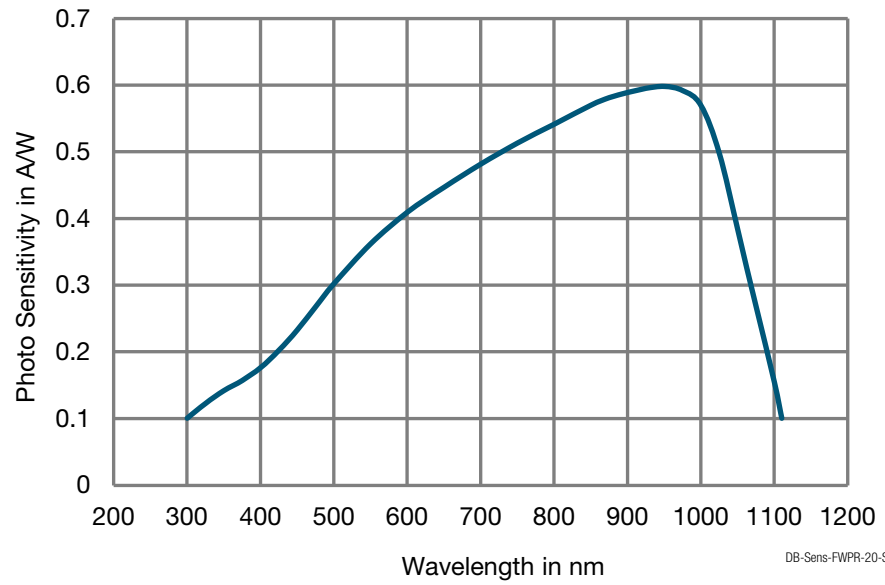
<p>Available Version</p>	<p>FWPR-20-SI-FST</p>  <p>Picture shows 1.035"-40 threaded flange with internally threaded coupler ring (outer diameter 30 mm)</p>	<p>1.035"-40 threaded flange for free space applications, compatible with many optical standard accessories and for use with various types of fiber connector adapters.</p> <p>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.</p>
<p>Related Model</p>	<p>FWPR-20-IN-FST</p>	<p>InGaAs-PIN, $\varnothing 500 \mu\text{m}$, 900 - 1700 nm free space input, 1.035"-40 threaded flange</p>
<p>Available Accessories</p>	<p>PRA-FC PRA-FCA PRA-FSMA</p>  <p>PRA-PAP</p>  <p>PS-15-25-L</p> 	<p>Fiber-adapter with external 1.035"-40 thread</p> <p>Alternative mounting option: Post adapter plate, easy to mount on FEMTO photoreceiver series OE, FWPR, PWPR, HCA-S and LCA-S</p> <p>Power Supply, Input: 100 – 240 VAC, Output: $\pm 15 \text{ VDC}$</p>
<p>Specifications</p>	<p>Test conditions</p> <p>Gain</p> <p>Frequency Response</p> <p>Time Response</p> <p>Input</p> <p>Detector</p>	<p>$V_s = \pm 15 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, output load impedance $1 \text{ M}\Omega$, warm-up 20 minutes (min. 10 minutes recommended)</p> <p>$1.0 \times 10^{12} \text{ V/A}$ (@ output load $\geq 100 \text{ k}\Omega$) $\pm 1 \%$ (electrical) $0.6 \times 10^{12} \text{ V/W typ.}$ (@ 960 nm, output load $\geq 100 \text{ k}\Omega$)</p> <p>DC 20 Hz ($\pm 20 \%$)</p> <p>18 ms ($\pm 20 \%$)</p> <p>$0.7 \text{ fW}/\sqrt{\text{Hz}}$ (@ 960 nm, 1 Hz) 18 pW (for linear amplification, @ 960 nm)</p> <p>Si photodiode $1.1 \times 1.1 \text{ mm}^2$ 320 – 1100 nm 0.6 A/W typ. (@ 960 nm)</p>

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<p>Specifications (continued)</p> <p>Output</p> <p>Optical Input Connector</p> <p>Power Supply</p> <p>Case</p> <p>Temperature Range</p>	<p>Output voltage range -1.6 V ... +10 V (@ $\geq 100\text{ k}\Omega$ output load)</p> <p>Offset voltage compensation $\pm 1.6\text{ V}$ typ. (adjustable by offset potentiometer)</p> <p>Output impedance $50\ \Omega$ (terminate with $\geq 100\text{ k}\Omega$ load)</p> <p>Max. output current 25 mA (short-circuit proof)</p> <p>Output noise 6 mV RMS (40 mV peak-peak) typ. (@ $\geq 100\text{ k}\Omega$ load, no signal on detector, measurement bandwidth 8 kHz)</p> <p>Material FST flange 1.4305 stainless steel, nickel-plated</p> <p>Material FST coupler ring 1.4305 stainless steel, glass bead blasted</p> <p>Supply voltage $\pm 15\text{ V}$ ($\pm 14.5\text{ V}$... $\pm 16.5\text{ V}$)</p> <p>Supply current $\pm 15\text{ mA}$ (depends on operating conditions, recommended power supply capability min. $\pm 50\text{ mA}$)</p> <p>Weight 203 g (0.45 lbs) incl. coupler ring</p> <p>Material AlMg3/4.5Mn, nickel-plated</p> <p>Storage temperature $-30\text{ }^\circ\text{C}$... $+85\text{ }^\circ\text{C}$</p> <p>Operating temperature $0\text{ }^\circ\text{C}$... $+60\text{ }^\circ\text{C}$</p>
<p>Absolute Maximum Ratings</p>	<p>Max. CW power (averaged) 10 mW</p> <p>Power supply voltage $\pm 20\text{ V}$</p>
<p>Connectors</p>	<p>Input 1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories</p> <p>Output BNC jack (female)</p> <p>Power supply LEMO® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)</p> <div data-bbox="873 1188 1307 1350" style="text-align: center;"> <p>PIN 1 +Vs Pin 1: +15 V PIN 2 -Vs Pin 2: -15 V PIN 3 GND Pin 3: GND</p> </div>
<p>Scope of Delivery</p>	<p>FWPR-20-SI-FST, internally threaded coupler ring, LEMO® 3-pin connector, datasheet, transport package</p>
<p>Ordering Information</p>	<p>FWPR-20-SI-FST 1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories.</p>

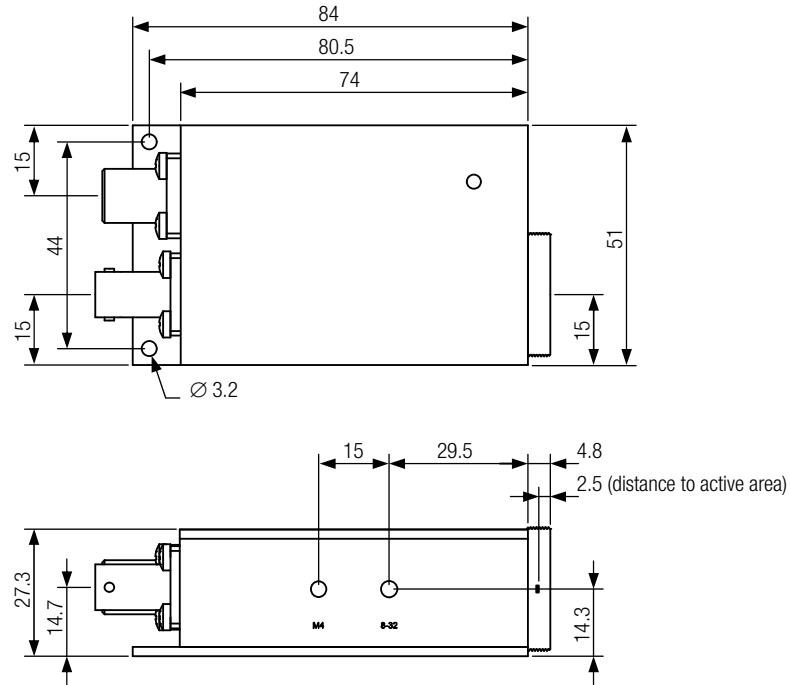
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Spectral Response



Dimensions

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



all dimensions in mm unless otherwise noted

FWPR-20-SI-FST_R2

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