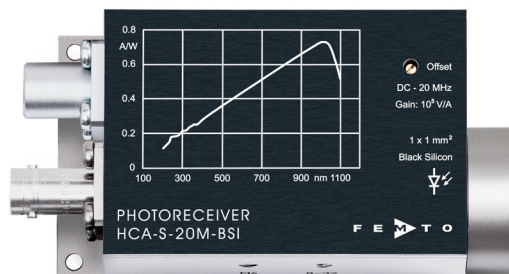


20 MHz Photoreceiver with Black Silicon Photodiode



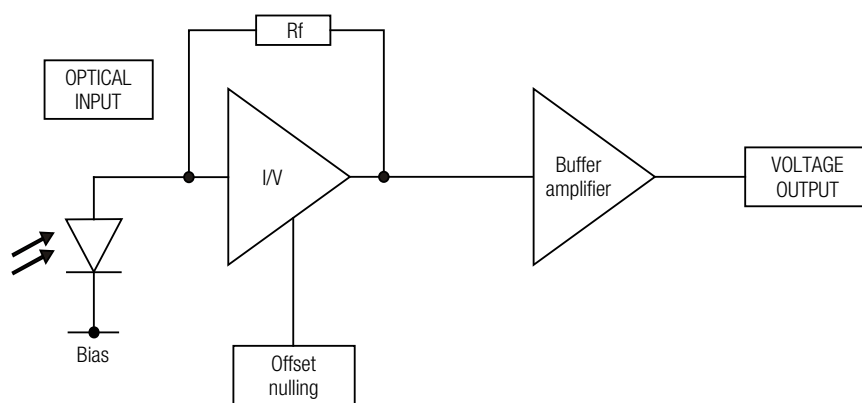
Features

- **Black silicon photodiode**
- **Bandwidth DC – 20 MHz**
- **Amplifier transimpedance gain 1.0×10^5 V/A**
- **Max. conversion gain 7.3×10^4 V/W @ 1010 nm**
- **Spectral range 200 – 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

- **Spectroscopy**
- **Fast pulse and transient measurements**
- **Optical triggering**
- **Optical front-end for oscilloscopes, A/D converters and HF lock-in amplifiers**

Block Diagram



BS01-HCA-S_R02

Intended Use

The HCA-S-20M-BSI photoreceiver consists of an black silicon photodiode and a subsequent low-noise fixed gain transimpedance amplifier. It is designed for fast conversion of small optical signals 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.

20 MHz Photoreceiver with Black Silicon Photodiode

Available Version	HCA-S-20M-BSI-FST  1.035"-40 threaded flange with internally threaded coupler ring (outer diameter 30 mm) for free space applications, compatible with many optical standard accessories												
Related Models	HCA-S-20M-SI-FST Si-PIN, Ø 3 mm, 320 - 1060 nm free space input, 1.035"-40 threaded flange HCA-S-20M-IN-FST InGaAs-PIN, Ø 0.5 mm, 900 - 1700 nm free space input, 1.035"-40 threaded flange												
Available Accessories	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 CAB-HF1  Double shielded high performance cables, minimizes ground related noise, designed for precise measurement of small signals												
Specifications	<table><tr><td>Test conditions</td><td>$V_S = \pm 15\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, output load impedance $50\text{ }\Omega$, warm-up 20 minutes (min. 10 minutes recommended)</td></tr><tr><td>Gain</td><td> Transimpedance gain Gain accuracy Conversion gain $1.0 \times 10^5\text{ V/A}$ (@ output load $50\text{ }\Omega$) $\pm 1\text{ }\%$ (electrical) $7.3 \times 10^4\text{ V/W typ.}$ (@ 1010 nm, output load $50\text{ }\Omega$) </td></tr><tr><td>Frequency Response</td><td> Lower cut-off frequency Upper cut-off frequency (–3 dB) DC 20 MHz ($\pm 15\text{ }\%$) </td></tr><tr><td>Time Response</td><td> Rise/fall time (10 % – 90 %) 18 ns ($\pm 15\text{ }\%$) </td></tr><tr><td>Input</td><td> Noise equivalent power (NEP) Optical saturation power Input offset compensation range $3.3\text{ pW}/\sqrt{\text{Hz}}$ (@ 1010 nm, 1 MHz) 22 μW (for linear amplification, @ 1010 nm) $\pm 8\text{ }\mu\text{A}$, adjustable by offset potentiometer </td></tr><tr><td>Detector</td><td> Detector Active area Spectral range Max. sensitivity black silicon photodiode $1 \times 1\text{ mm}$ 200 – 1100 nm 0.73 A/W typ. (@ 1010 nm) </td></tr></table>	Test conditions	$V_S = \pm 15\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, output load impedance $50\text{ }\Omega$, warm-up 20 minutes (min. 10 minutes recommended)	Gain	Transimpedance gain Gain accuracy Conversion gain $1.0 \times 10^5\text{ V/A}$ (@ output load $50\text{ }\Omega$) $\pm 1\text{ }\%$ (electrical) $7.3 \times 10^4\text{ V/W typ.}$ (@ 1010 nm, output load $50\text{ }\Omega$)	Frequency Response	Lower cut-off frequency Upper cut-off frequency (–3 dB) DC 20 MHz ($\pm 15\text{ }\%$)	Time Response	Rise/fall time (10 % – 90 %) 18 ns ($\pm 15\text{ }\%$)	Input	Noise equivalent power (NEP) Optical saturation power Input offset compensation range $3.3\text{ pW}/\sqrt{\text{Hz}}$ (@ 1010 nm, 1 MHz) 22 μW (for linear amplification, @ 1010 nm) $\pm 8\text{ }\mu\text{A}$, adjustable by offset potentiometer	Detector	Detector Active area Spectral range Max. sensitivity black silicon photodiode $1 \times 1\text{ mm}$ 200 – 1100 nm 0.73 A/W typ. (@ 1010 nm)
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20 MHz Photoreceiver with Black Silicon Photodiode

Specifications (continued)

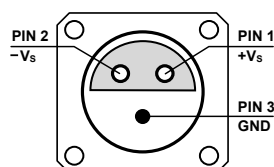
Output	Output voltage range	$\pm 1.5 \text{ V}$ (@ 50Ω output load) for linear operation and low harmonic distortion
	Max. output voltage range	$\pm 2 \text{ V}$ (@ 50Ω output load)
	Output impedance	50Ω (terminate with 50Ω load)
	Output noise	2.9 mV RMS (19 mV peak-peak) typ. (@ 50Ω load, no signal on detector, measurement bandwidth 200 MHz)
Optical Input Connector	Material FST flange	1.4305 stainless steel, nickel-plated
	Material FST coupler ring	1.4305 stainless steel, glass bead blasted
Power Supply	Supply voltage	$\pm 15 \text{ V}$ ($\pm 14.5 \text{ V} \dots \pm 16.5 \text{ V}$)
	Supply current	$\pm 50 \text{ mA}$ (depends on operating conditions, recommended power supply capability min. $\pm 150 \text{ mA}$)
Case	Weight	209 g (0.46 lbs) including coupler ring
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage temperature	$-30 \text{ }^{\circ}\text{C} \dots +85 \text{ }^{\circ}\text{C}$
	Operating temperature	$0 \text{ }^{\circ}\text{C} \dots +60 \text{ }^{\circ}\text{C}$

Absolute Maximum Ratings

Optical input power (CW)	80 mW/mm ²
Power supply voltage	$\pm 20 \text{ V}$

Connectors

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



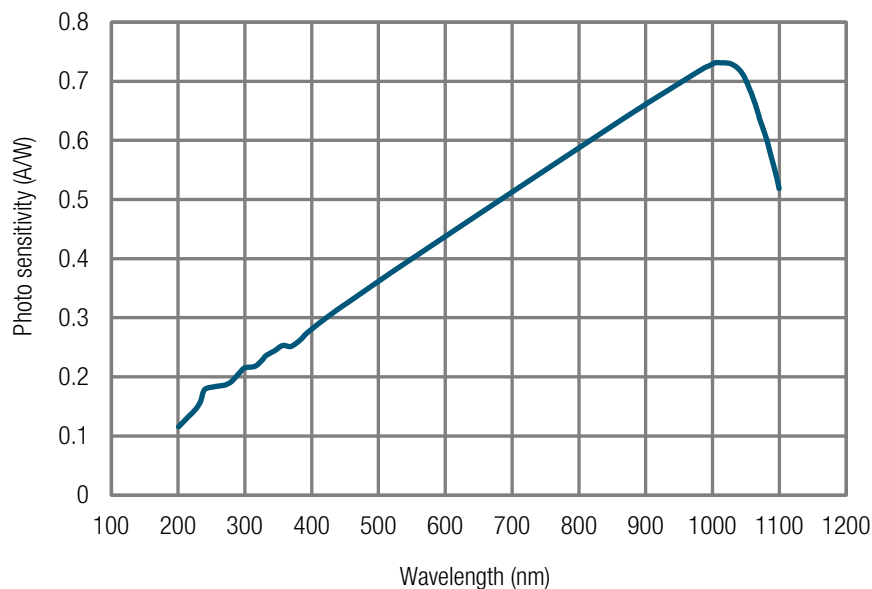
Pin 1: +15 V
Pin 2: -15 V
Pin 3: GND

Scope of Delivery

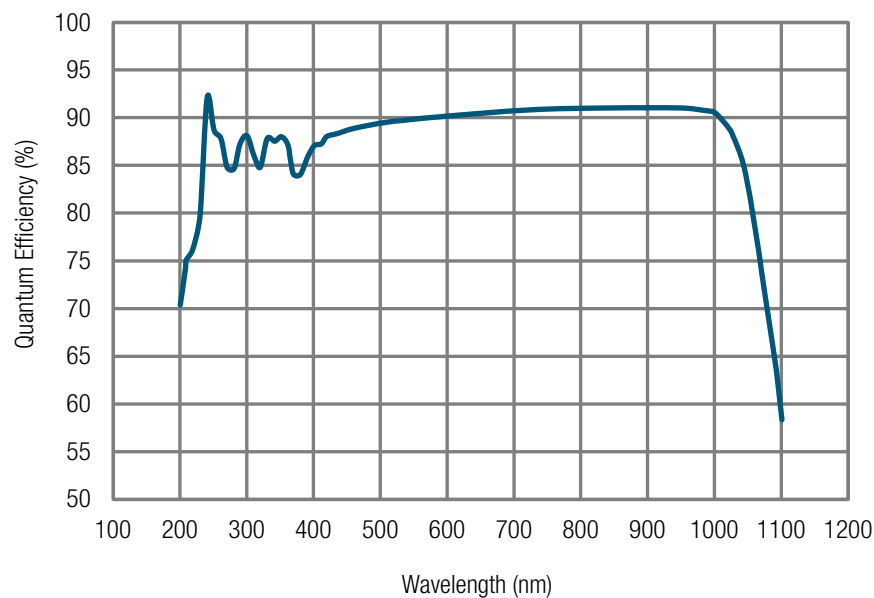
HCA-S-20M-BSI, internally threaded coupler ring, LEMO® 3-pin connector, datasheet, transport package

20 MHz Photoreceiver with Black Silicon Photodiode

Spectral Response



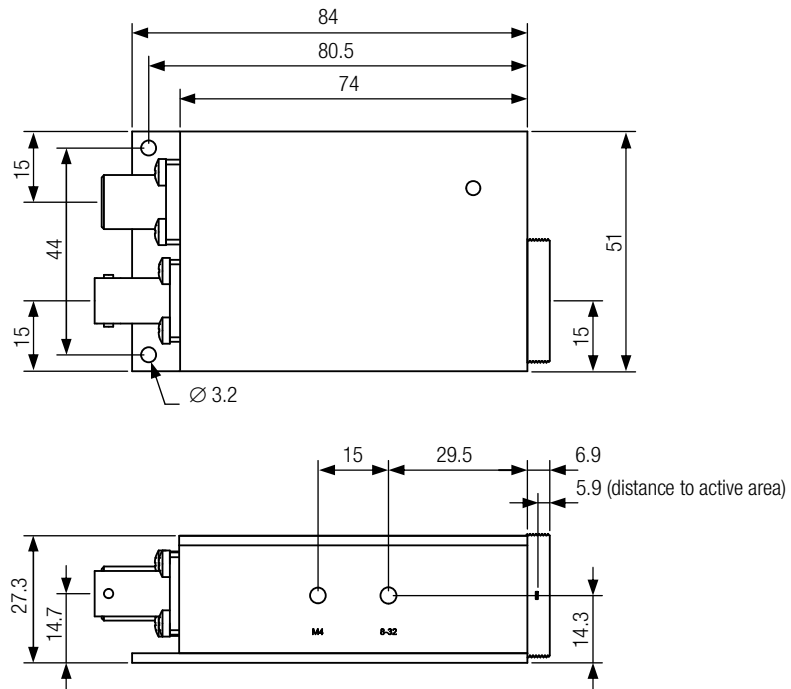
Spectral Quantum Efficiency



20 MHz Photoreceiver with Black Silicon Photodiode

Dimensions

HCA-S-20M-BSI-FST



all dimensions in mm unless otherwise noted

DZ-HCA-S_FST_R1

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