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Datasheet HCA-S-200M-IN

200 MHz Photoreceiver with InGaAs-PIN Photodiode

The picture shows model HCA-S-200M-IN-FST

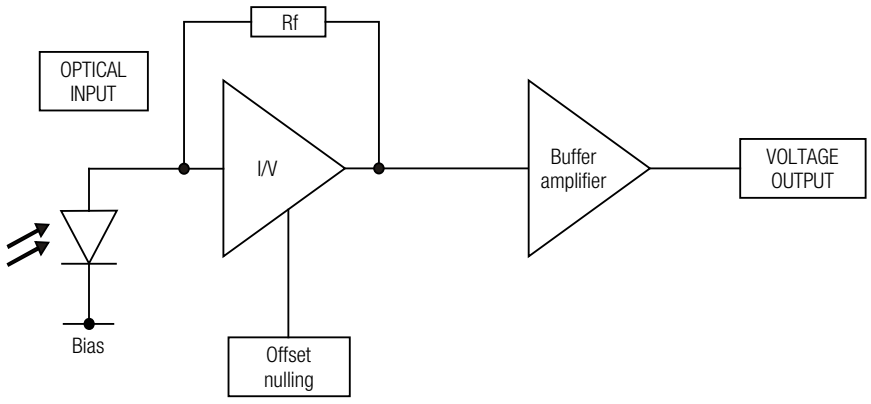
Features

- **InGaAs-PIN photodiode**
- **Bandwidth DC – 200 MHz**
- **Amplifier transimpedance gain 2.0 × 10^4 V/A**
- **Max. conversion gain 1.9 × 10^4 V/W @ 1550 nm**
- **Spectral range 900 – 1700 nm**
- **Free-space input 1.035"-40 threaded**
- **Fiber optic input available as permanently mounted FC-input**
- **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-200M-IN photoreceiver consists of an InGaAs 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.

200 MHz Photoreceiver with InGaAs-PIN Photodiode

Available Versions	HCA-S-200M-IN-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
		
	HCA-S-200M-IN-FC	Fix/permanent FC fiber connector for high coupling efficiency and excellent conversion gain accuracy
		
Related Models	HCA-S-200M-SI-FST	Si-PIN, ∅ 0.8 mm, 320 – 1000 nm free space input, 1.035"-40 threaded flange
	HCA-S-200M-SI-FC	Si-PIN,∅ 0.8 mm, 320 – 1000 nm FC fiber connector (fix/permanent)
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
		

Specifications	Test conditions	V_S = ±15 V, T_A = 25 °C, output load impedance 50 Ω, warm-up 20 minutes (min. 10 minutes recommended)
Gain	Transimpedance gain	2.0×10^4 V/A (@ output load 50 Ω)
	Gain accuracy	±1 % (electrical)
	Conversion gain	1.9×10^4 V/W typ. (@ 1550 nm, output load 50 Ω)
Frequency Response	Lower cut-off frequency	DC
	Upper cut-off frequency (–3 dB)	200 MHz (±15 %)
	Gain flatness	±1 dB
Time Response	Rise/fall time (10 % – 90 %)	1.8 ns
Input	Noise equivalent power (NEP)	5.2 pW/√Hz (@ 1550 nm, 10 MHz)
	Optical saturation power	60 µW (for linear amplification, @ 1550 nm)
	Input offset compensation range	±100 µA, adjustable by offset potentiometer

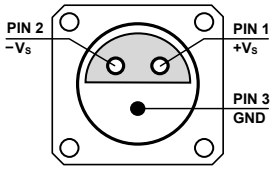
200 MHz Photoreceiver with InGaAs-PIN Photodiode

Specifications (continued)

Detector	Detector	InGaAs-PIN photodiode
	Active area (FST version)	∅ 0.3 mm
	Active area (FC version)	integrated ball lens suitable for fibers up to 62.5 µm core diameter
	Spectral range	900 – 1700 nm
	Max. sensitivity	0.95 A/W typ. (@ 1550 nm)
Output	Output voltage range	±1.2 V (@ 50 Ω output load) for linear operation and low harmonic distortion
	Max. output voltage range	±1.7 V (@ 50 Ω output load)
	Output impedance	50 Ω (terminate with 50 Ω load)
	Output noise	4.5 mV RMS (30 mV peak-peak) typ. (@ 50 Ω load, no signal on detector, measurement bandwidth 500 MHz)
Optical Input Connector	Material FST flange	1.4305 stainless steel, nickel-plated
	Material FST coupler ring	1.4305 stainless steel, glass bead blasted
	Material FC receptacle	nickel silver
Power Supply	Supply voltage	±15 V (±14.5 V ... ±16.5 V)
	Supply current	±60 mA (depends on operating conditions, recommended power supply capability min. ±150 mA)
Case	Weight	209 g (0.46 lbs) HCA-S-200M-IN-FST incl. coupler ring 188 g (0.41 lbs) HCA-S-200M-IN-FC
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage temperature	–30 °C ... +85 °C
	Operating temperature	0 °C ... +60 °C

Absolute Maximum Ratings	Optical input power (CW)	10 mW
	Power supply voltage	±20 V

Connectors	Input	HCA-S-200M-IN-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories
		HCA-S-200M-IN-FC	FC fiber optic connector (fix/permanent, FC/PC and FC/APC compatible)
	Output	BNC jack (female)	
	Power supply	LEMO® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)	



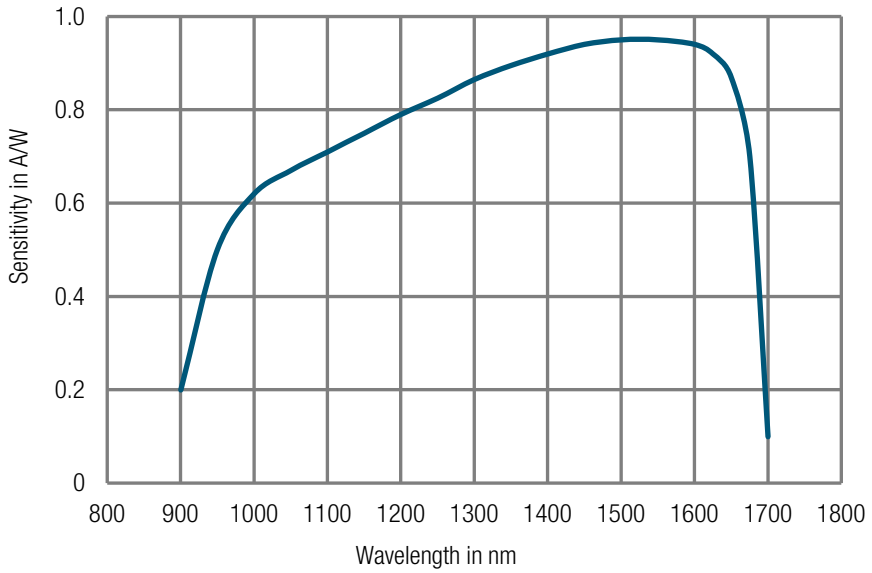
Pin 1: +15 V
Pin 2: –15 V
Pin 3: GND

Scope of Delivery: HCA-S-200M-IN, internally threaded coupler ring (FST version only), LEMO® 3-pin connector, datasheet, transport package

200 MHz Photoreceiver with InGaAs-PIN Photodiode

Ordering Information	HCA-S-200M-IN-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories.
	HCA-S-200M-IN-FC	FC fiber optic connector (fix/permanent, FC/PC and FC/APC compatible).

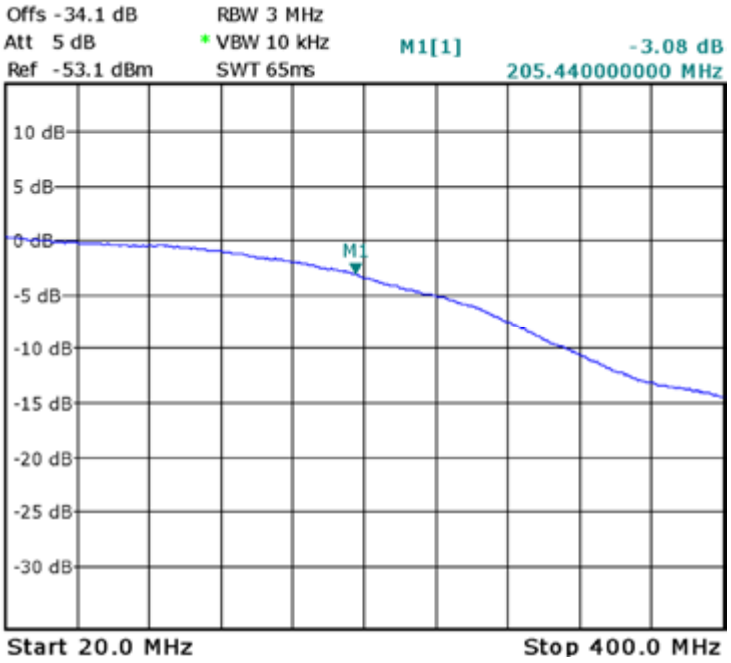
Spectral Response



DB-Sens-HCA-S-200M-IN_R01

Typical Performance Characteristics

Frequency response

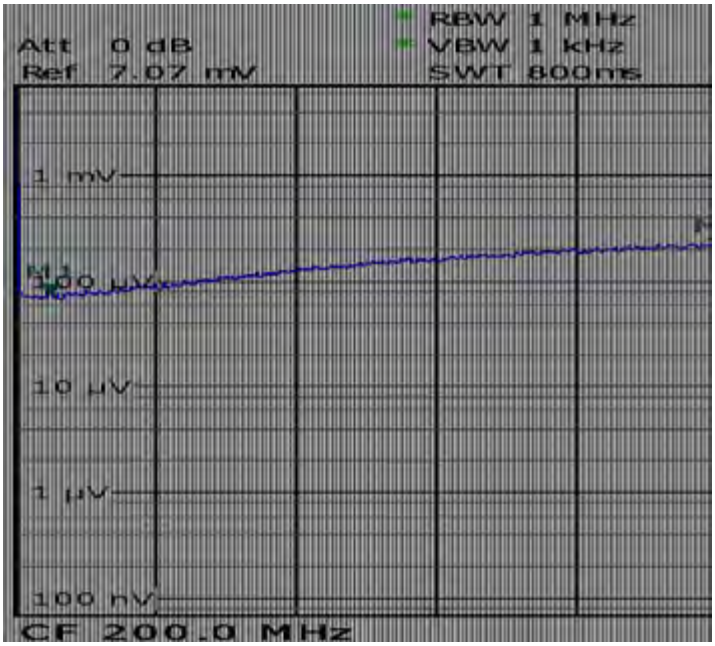


PD-HCA-S-200M-IN-bw_R01

200 MHz Photoreceiver with InGaAs-PIN Photodiode

Typical Performance Characteristics (continued)

Noise spectrum

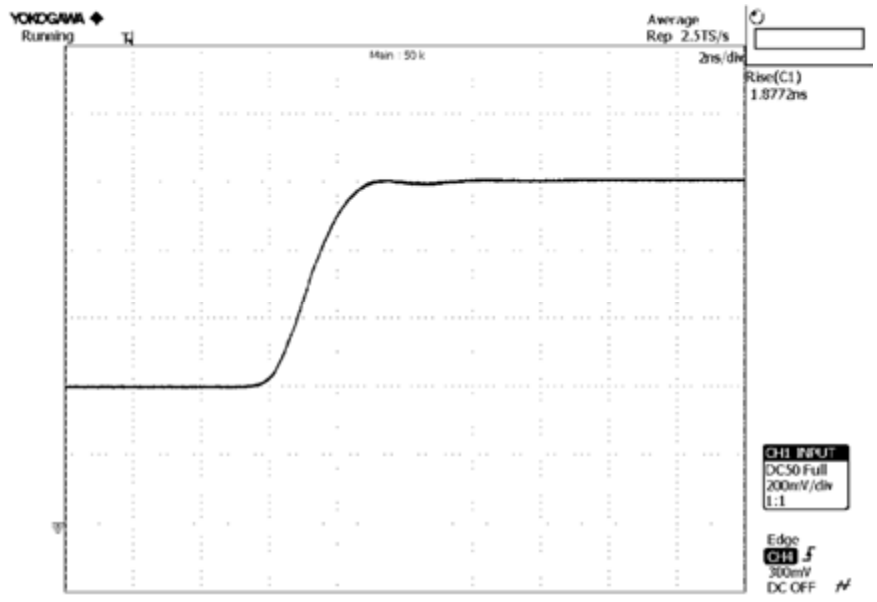


PD-HCA-S-200M-IN-noise_R01

Note: spectral noise data is measured at the amplifier output with no signal on the photodiode. To determine the spectral input noise divide the measured output noise by the amplifier conversion gain.
Conversion gain (V/W) = amplifier gain (V/A) × photo sensitivity (A/W).

Marker	frequency	output noise	resulting input noise (NEP)
1	10 MHz	93 nV/√Hz	4.9 pW/√Hz (@ 1550 nm)

Pulse response to square wave input signal
(with 16 times averaging)

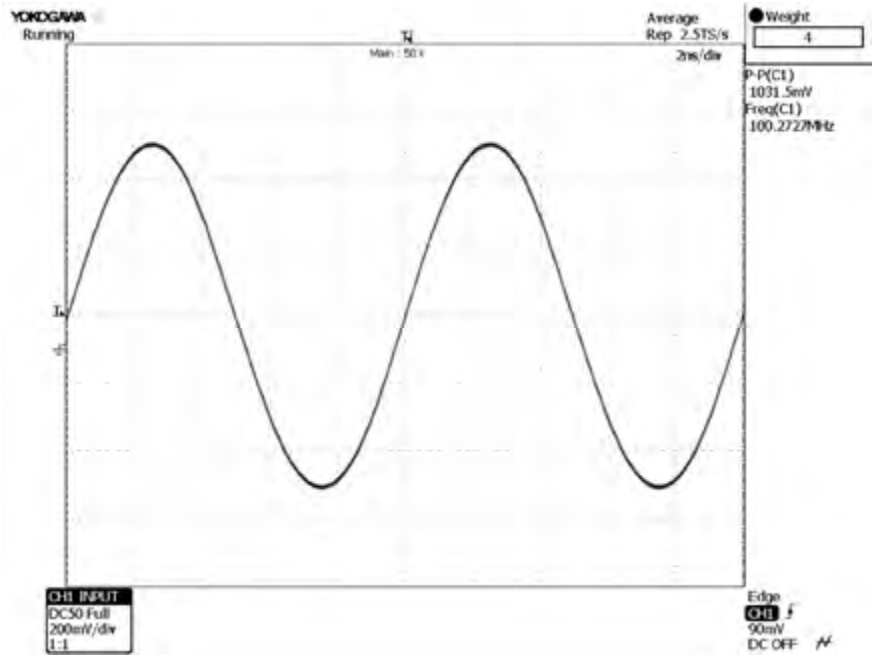


PD-HCA-S-200M-IN-pulse-2ns_R01

200 MHz Photoreceiver with InGaAs-PIN Photodiode

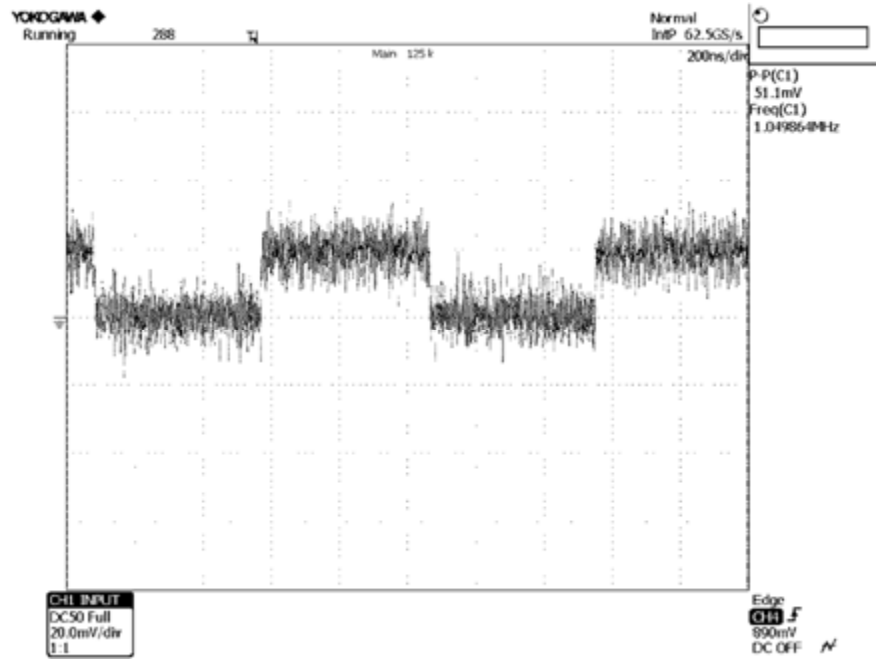
Typical Performance Characteristics (continued)

Large signal response
output signal for 100 MHz, 55 µW modulated optical input signal
(with 4 times averaging)



PD-HCA-S-200M-IN-large-sinus_R01

Small signal response
output signal for 1.2 µW modulated optical input signal, 1 MHz square wave, without averaging

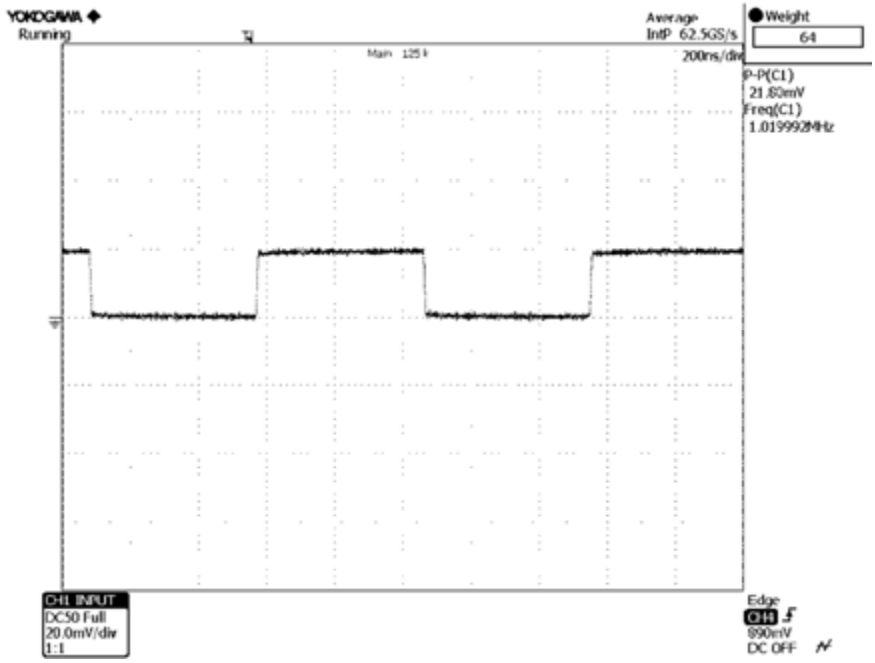


PD-HCA-S-200M-IN-noise-square_R01

200 MHz Photoreceiver with InGaAs-PIN Photodiode

Typical Performance Characteristics (continued)

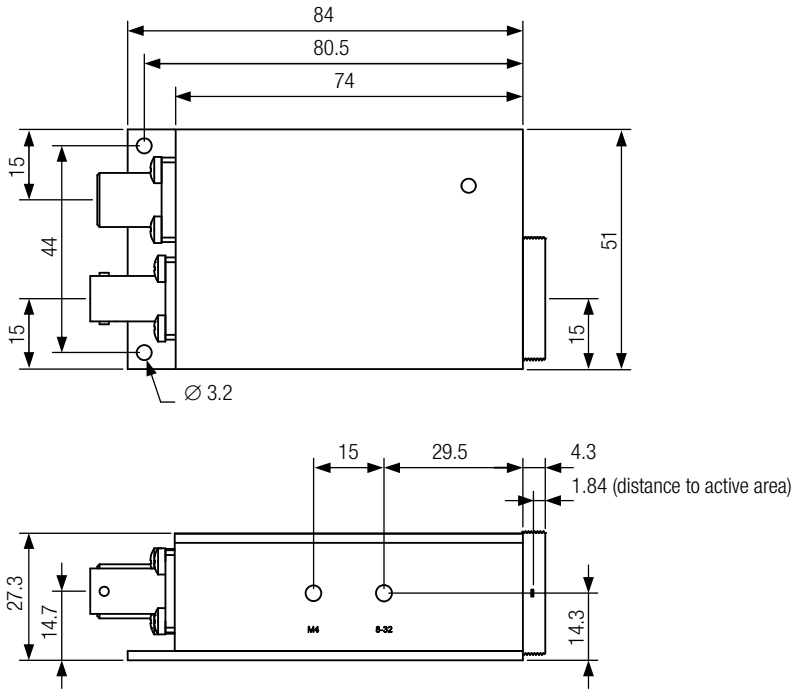
Small signal response
output signal for 1.2 µW modulated optical input signal, 1 MHz square wave, with 64 times averaging



PD-HCA-S-200M-IN-noise-square_average_R01

Dimensions

HCA-S-200M-IN-FST (1.035"-40 threaded free space input)



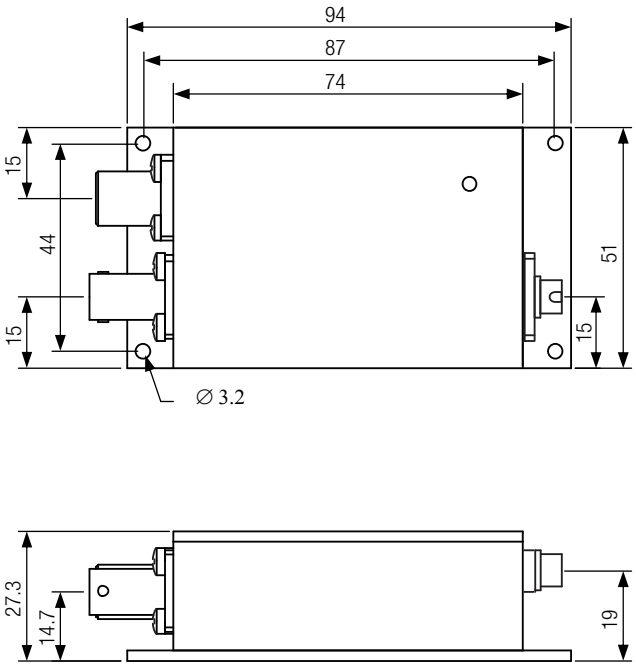
DZ-HCA-S_FST_R1

all dimensions in mm unless otherwise noted

200 MHz Photoreceiver with InGaAs-PIN Photodiode

Dimensions (continued)

HCA-S-200M-IN-FC (FC fiber optic connector)



DZ-HCA-S_FC_R1

all dimensions in mm unless otherwise noted