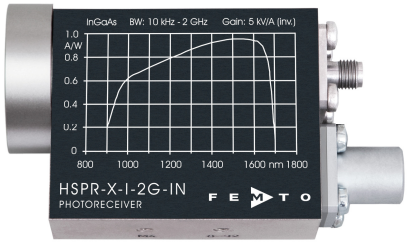
Ultra High Speed Photoreceiver with InGaAs-PIN Photodiode



The picture shows model HSPR-X-I-2G-IN-FST.

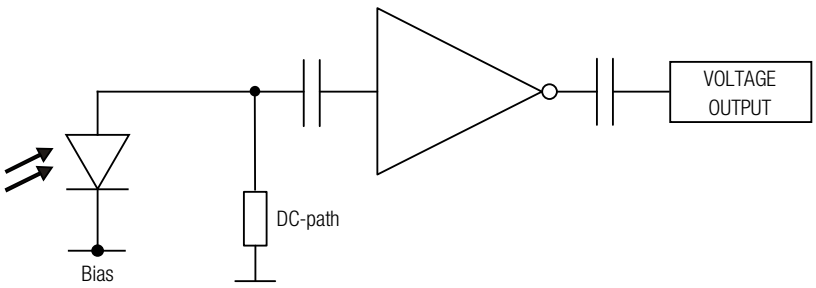
Features

- **InGaAs-PIN photodiode**
- **Bandwidth 10 kHz – 2 GHz**
- **Amplifier transimpedance gain 5.0 × 10^3 V/A (inverting)**
- **Max. conversion gain 4.75 × 10^3 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**
- **Ultra-fast pulse and transient measurements**
- **Optical triggering**
- **Optical front-end for oscilloscopes and ultra-fast A/D converters**

Block Diagram



BS01-HSPR-I_R01

Intended Use

The HSPR-X-I-2G-IN photoreceiver consists of an InGaAs photodiode and a subsequent low-noise fixed gain amplifier. It is designed for ultra-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.

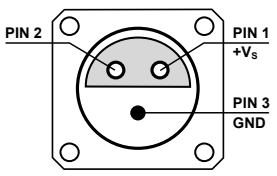
Ultra High Speed Photoreceiver with InGaAs-PIN Photodiode

Available Versions	HSPR-X-I-2G-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 and for use with various types of fiber connector adapters.
		
	HSPR-X-I-2G-IN-FC	Fix/permanent FC fiber connector for high coupling efficiency and excellent conversion gain accuracy.
		
Related Models	HSA-X-S-1G4-SI-FST	Si-PIN, ∅ 0.4 mm, 320 – 1000 nm, 1.4 GHz, free space input, 1.035"-40 threaded flange
	HSA-X-S-1G4-SI-FC	Si-PIN, integrated ball lens, 320 – 1000 nm, 1.4 GHz, FC fiber connector (fix/permanent)
	HSPR-X-I-1G4-SI-FST	Si-PIN, ∅ 0.4 mm, 320 – 1000 nm, 1.4 GHz, inverting output, free space input, 1.035"-40 threaded flange
	HSPR-X-I-1G4-SI-FC	Si-PIN, integrated ball lens, 320 – 1000 nm, 1.4 GHz, inverting output, FC fiber connector (fix/permanent)
	HSA-X-S-2G-IN-FST	InGaAs-PIN, ∅ 0.1 mm, 900 – 1700 nm, 2 GHz, free space input, 1.035"-40 threaded flange
	HSA-X-S-2G-IN-FC	InGaAs-PIN, integrated ball lens, 900 – 1700 nm, 2 GHz, FC fiber connector (fix/permanent)
Available Accessories	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	5.0×10^3 V/A (inverting, @ output load 50 Ω)
	Conversion gain	4.75×10^3 V/W typ. (@ 1550 nm, output load 50 Ω)
Frequency Response	Lower cut-off frequency (–3 dB)	10 kHz
	Upper cut-off frequency (–3 dB)	2 GHz (±15%)

Ultra High Speed Photoreceiver with InGaAs-PIN Photodiode

Specifications (continued)			
Time Response	Rise/fall time (10 % – 90 %)	180 ps (±15%)	
Input	Noise equivalent power (NEP)	11 pW/√Hz (@ 1550 nm, 100 MHz)	
	Optical saturation power	210 µW AC (for linear amplification, @ 1550 nm) 10 mW CW (to prevent saturation, @ 1550 nm)	
Detector	Detector	InGaAs-PIN photodiode	
	Active area (FST version)	∅ 100 µm	
	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	2.0 V peak-peak (@ 50 Ω output load) for linear operation and low harmonic distortion	
	Output reflection S22	-15.5 dB (@ f < 2.5 GHz)	
	Output impedance	50 Ω (terminate with 50 Ω load)	
	Output noise	2.5 mV RMS (17 mV peak-peak) typ. (@ 50 Ω load, no signal on detector, measurement bandwidth 4 GHz)	
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	
	Supply current	150 mA (depends on operating conditions, recommended power supply capability min. 200 mA)	
Case	Weight	133 g (0.29 lbs) HSPR-X-I-2G-IN-FST incl. coupler ring 110 g (0.24 lbs) HSPR-X-I-2G-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)	12 mW (averaged)	
	Power supply voltage	18.5 V	
Connectors	Input	HSPR-X-I-2G-IN-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories
		HSPR-X-I-2G-IN-FC	FC fiber optic connector (fix/permanent, FC/PC and FC/APC compatible)
	Output	SMA jack (female)	
	Power supply	LEMO® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)	

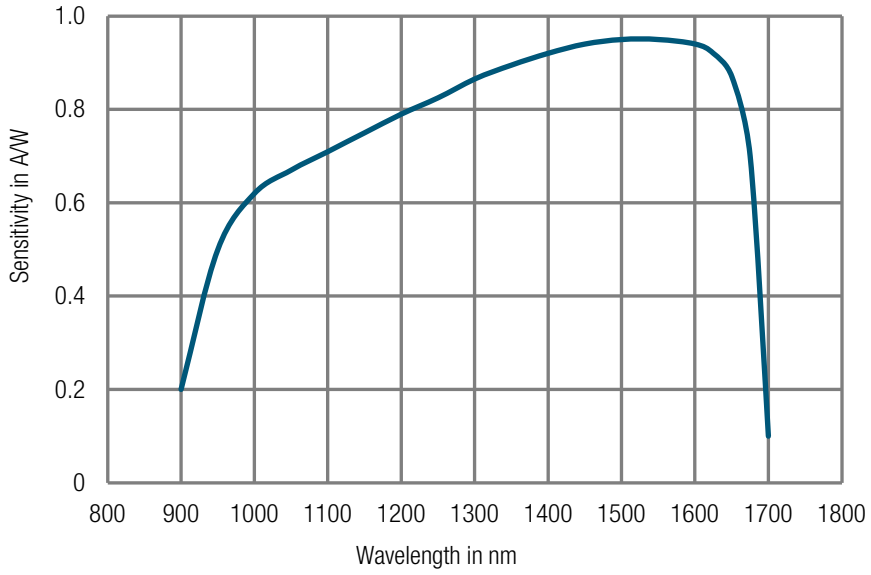


Pin 1: +15 V
Pin 2: NC
Pin 3: GND

Ultra High Speed Photoreceiver with InGaAs-PIN Photodiode

Scope of Delivery	HSPR-X-I-2G-IN, internally threaded coupler ring (FST version only), LEMO® 3-pin connector, datasheet, transport package	
Ordering Information	HSPR-X-I-2G-IN-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories.
	HSPR-X-I-2G-IN-FC	FC fiber optic connector (fix/permanent, FC/PC and FC/APC compatible).

Spectral Response

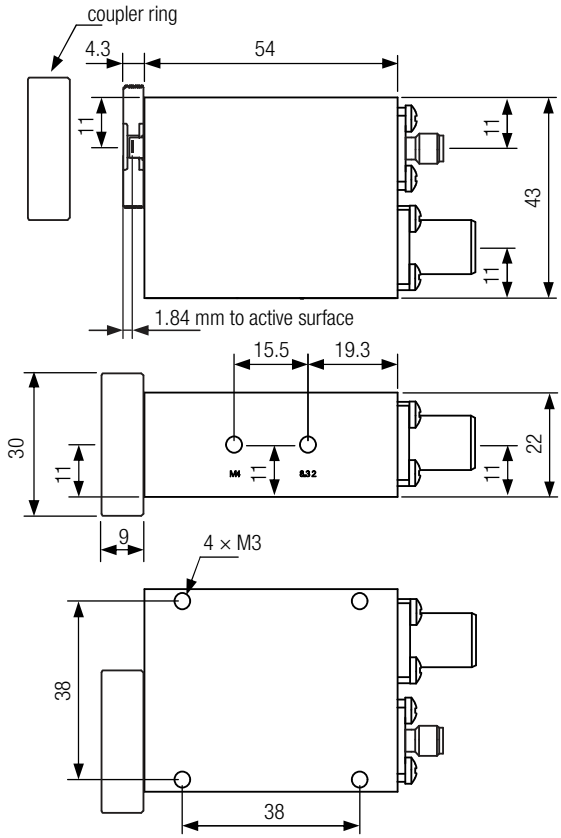


DB-Sens-HSPR-X-I-2G-IN_R01

Ultra High Speed Photoreceiver with InGaAs-PIN Photodiode

Dimensions

HSPR-X-I-2G-IN-FST (1.035"-40 threaded free space input)



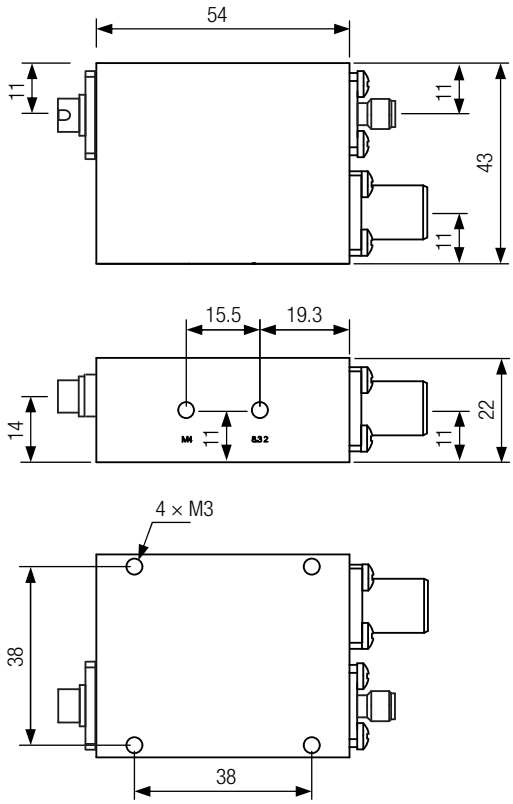
DZ-HS-FST_R1

all dimensions in mm unless otherwise noted

Ultra High Speed Photoreceiver with InGaAs-PIN Photodiode

Dimensions (continued)

HSPR-X-I-2G-IN-FC (FC fiber optic connector)



DZ-HS_FC_R1

all dimensions in mm unless otherwise noted

FEMTO Messtechnik GmbH
Klosterstr. 64
10179 Berlin · Germany
Phone: +49 30 280 4711-0
Fax: +49 30 280 4711-11
Email: info@femto.de
www.femto.de