

Datasheet

HSPR-X-I-1G4-SI

Ultra High Speed Photoreceiver with Si-PIN Photodiode



The picture shows model HSPR-X-I-1G4-SI-FST.

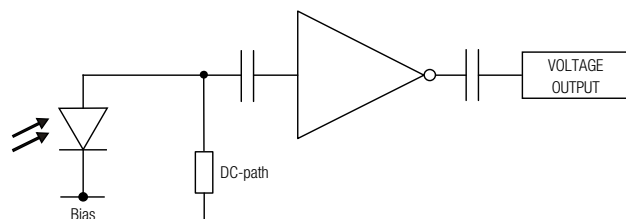
Features

- **Si-PIN photodiode**
- **Bandwidth 10 kHz – 1.4 GHz**
- **Amplifier transimpedance gain 5.0×10^3 V/A (inverting)**
- **Max. conversion gain 2.55×10^3 V/W @ 760 nm**
- **Spectral range 320 – 1000 nm**
- **Free-space input 1.035"-40 threaded, easily convertible to fiber optic input (FC and FSMA) with optionally available screw-on adapters**
- **Fiber optic input also 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-1G4-SI photoreceiver consists of an Si 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.

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

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HSPR-X-I-1G4-SI_R4/TH/JMa/06MAY2024

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Ultra High Speed Photoreceiver with Si-PIN Photodiode

Available Versions

HSPR-X-I-1G4-SI-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.

Optionally available:

Fiber adapters PRA-FC, PRA-FCA and PRA-FSMA. With the relative large 0.4 mm dia. photodiode installed in the HSPR-X-I-1G4-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.

HSPR-X-I-1G4-SI-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, Ø 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)

HSA-X-S-2G-IN-FST

InGaAs-PIN, Ø 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)

HSPR-X-I-2G-IN-FST

InGaAs-PIN, Ø 0.1 mm, 900 – 1700 nm, 2 GHz, inverting output, free space input, 1.035"-40 threaded flange

HSPR-X-I-2G-IN-FC

InGaAs-PIN, integrated ball lens, 900 – 1700 nm, 2 GHz, inverting output, FC fiber connector (fix/permanent)

Available Accessories

PRA-FC
PRA-FCA
PRA-FSMA



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

PS-15-25-L



Power Supply
Input: 100 – 240 VAC
Output: ±15 VDC

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Specifications	Test conditions	$V_s = +15\text{ V}$, $T_A = 25\text{ °C}$, output load impedance $50\ \Omega$, warm-up 20 minutes (min. 10 minutes recommended)
Gain	Transimpedance gain Conversion gain	$5.0 \times 10^3\text{ V/A}$ (inverting, @ output load $50\ \Omega$) $2.55 \times 10^3\text{ V/W typ.}$ (@ 760 nm, output load $50\ \Omega$)
Frequency Response	Lower cut-off frequency (-3 dB) Upper cut-off frequency (-3 dB)	10 kHz 1.4 GHz ($\pm 15\%$)
Time Response	Rise/fall time (10 % – 90 %)	250 ps ($\pm 15\%$)
Input	Noise equivalent power (NEP) Optical saturation power	19 pW/ $\sqrt{\text{Hz}}$ (@ 760 nm, 100 MHz) 390 $\mu\text{W AC}$ (for linear amplification, @ 760 nm) 10 mW CW (to prevent saturation, @ 760 nm)
Detector	Detector Active area (FST version) Active area (FC version) Spectral range Max. sensitivity	Si-PIN photodiode $\varnothing 400\ \mu\text{m}$ integrated ball lens suitable for fibers up to 400 μm core diameter 320 – 1000 nm 0.51 A/W typ. (@ 760 nm)
Output	Output voltage range Output reflection S22 Output impedance Output noise	2.0 V peak-peak (@ $50\ \Omega$ output load) for linear operation and low harmonic distortion -15.5 dB (@ $f < 2.5\text{ GHz}$) $50\ \Omega$ (terminate with $50\ \Omega$ load) 2.5 mV RMS (17 mV peak-peak) typ. (@ $50\ \Omega$ load, no signal on detector, measurement bandwidth 4 GHz)
Optical Input Connector	Material FST flange Material FST coupler ring Material FC receptacle	1.4305 stainless steel, nickel-plated 1.4305 stainless steel, glass bead blasted nickel silver
Power Supply	Supply voltage Supply current	+15 V 150 mA (depends on operating conditions, recommended power supply capability min. 200 mA)
Case	Weight Material	133 g (0.29 lbs) HSPR-X-I-1G4-SI-FST incl. coupler ring 110 g (0.24 lbs) HSPR-X-I-1G4-SI-FC AlMg4.5Mn, nickel-plated
Temperature Range	Storage temperature Operating temperature	$-30\text{ °C} \dots +85\text{ °C}$ $0\text{ °C} \dots +60\text{ °C}$
Absolute Maximum Ratings	Optical input power (CW) Power supply voltage	12 mW (averaged) 18.5 V

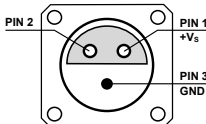
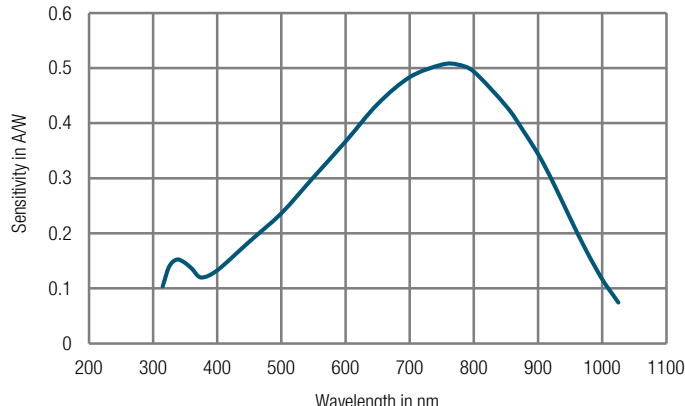
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Ultra High Speed Photoreceiver with Si-PIN Photodiode

Connectors	Input	HSPR-X-I-1G4-SI-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories
		HSPR-X-I-1G4-SI-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
Scope of Delivery	HSPR-X-I-1G4-SI, internally threaded coupler ring (FST version only), LEMO® 3-pin connector, datasheet, transport package		
Ordering Information	HSPR-X-I-1G4-SI-FST	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories.	
	HSPR-X-I-1G4-SI-FC	FC fiber optic connector (fix/permanent, FC/PC and FC/APC compatible).	
Spectral Response	 DB-Sens-HSPR-X-I-1G4-SI_R01		

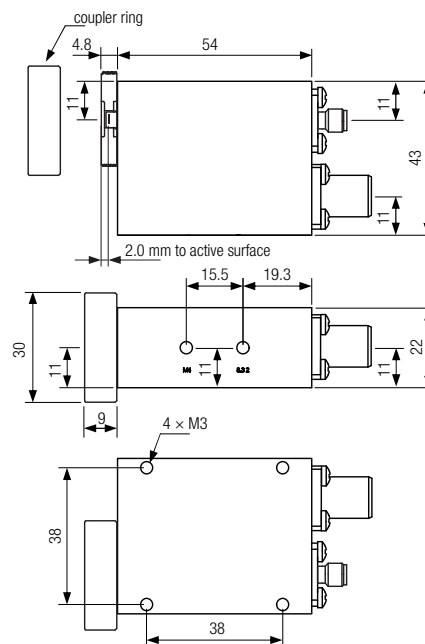
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Dimensions

HSPR-X-I-1G4-SI-FST (1.035"-40 threaded free space input)



DZ-HS-FST_R1

all dimensions in mm unless otherwise noted

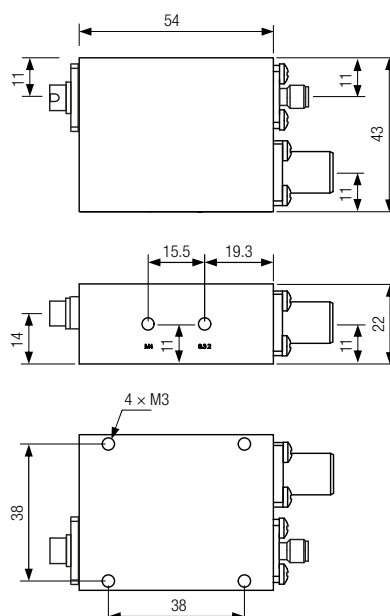
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Dimensions (continued)

HSPR-X-I-1G4-SI-FC (FC fiber optic connector)



DZ-HS_FC_R1

all dimensions in mm unless otherwise noted

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