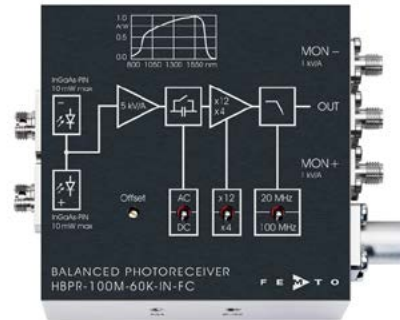


Datasheet

HBPR-100M-60K-IN-FC

High-Speed Balanced Photoreceiver



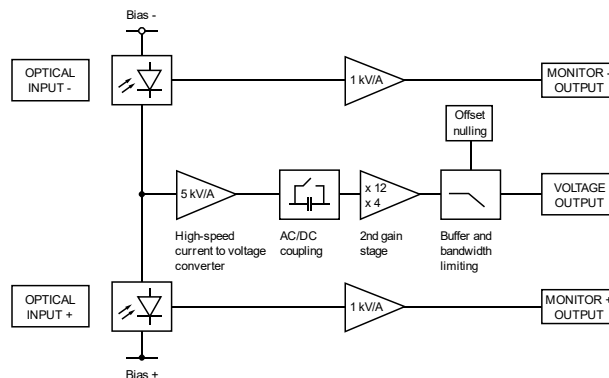
Features

- Bandwidth DC to 100 MHz
- Common-Mode Rejection Ratio (CMRR) 55 dB typ.
- InGaAs-PIN photodiodes
- FC fiber optic inputs
- Spectral range 900 - 1700 nm
- Very low NEP, down to 3.7 pW/√Hz
- Transimpedance gain switchable 20 x 10³ V/A, 60 x 10³ V/A
- High dynamic input range up to 2 x 10 mW balanced optical power
- Fast monitor outputs with 10 MHz bandwidth and 1 x 10³ V/A gain
- Switchable low pass filter for minimizing wideband noise
- UNC 8-32 and M4 tapped holes for mounting on standard posts with metric and imperial thread

Applications

- Spectroscopy
- Heterodyne detection
- Optical coherence tomography (OCT)
- Optical delay measurement
- Differential optical front-end for oscilloscopes, spectrum analyzers, A/D converters and RF lock-in amplifiers

Block Diagram



SOPHISTICATED TOOLS FOR SIGNAL RECOVERY






HBPR-100M-60K-IN-FC_R2/TH/08APR2021

06/22 / V3 / CHHW / femto/balanced-photoreceiver-series-hbpr-100m-60k-in-fc

Datasheet

HBPR-100M-60K-IN-FC

High-Speed Balanced Photoreceiver

<p>Available Input Version</p>	<p>HBPR-100M-60K-IN-FC</p>  <p>fix/permanent FC fiber connector for high coupling efficiency, excellent conversion gain accuracy and common mode rejection ratio (CMRR).</p>																												
<p>Related Models</p>	<p>Various free space or fiber coupled HBPR models, with bandwidth up to 500 MHz, in the spectral range from 320 nm to 1700 nm are available.</p> <p>Example: FST input</p>  <p>1.035"-40 threaded flange for free space applications, compatible with many optical standard accessories.</p> <p>See further information and separate datasheets on www.femto.de</p>																												
<p>Available Accessory</p>	<p>PS-15</p>  <p>power supply, input: 100 - 240 VAC, output: ± 15 VDC, +400/-250 mA</p>																												
<p>Specifications</p>	<table border="0"> <tr> <td>Test conditions</td> <td>$V_S = \pm 15$ V, $T_A = 25$ °C, signal output terminated with 50 Ω, Monitor outputs terminated with 1 MΩ</td> </tr> <tr> <td rowspan="4">Gain</td> <td>Transimpedance gain</td> <td>20 x 10³ V/A (2nd gain x4), 60 x 10³ V/A (2nd gain x12) switchable (@ 50 Ω load)</td> </tr> <tr> <td>Gain accuracy</td> <td>± 1 % electrical</td> </tr> <tr> <td>Conversion gain</td> <td>19 x 10³ V/W typ. (@ 2nd gain x4, 1550 nm) 57 x 10³ V/W typ. (@ 2nd gain x12, 1550 nm)</td> </tr> <tr> <td>Common mode rejection ratio (CMRR)</td> <td>55 dB typ. (f \leq 100 MHz)</td> </tr> <tr> <td rowspan="2">Frequency Response</td> <td>Lower cut-off frequency</td> <td>DC / 10 Hz, switchable</td> </tr> <tr> <td>Upper cut-off frequency</td> <td>100 MHz, switchable to 20 MHz</td> </tr> <tr> <td rowspan="2">Time Response</td> <td>Rise/fall time (10 % - 90 %)</td> <td>3.2 ns 17.5 ns (low pass filter 20 MHz)</td> </tr> <tr> <td rowspan="5">Input</td> <td>Noise equivalent power (NEP)</td> <td>minimum 3.7 pW/$\sqrt{\text{Hz}}$ (@ 1550 nm) 4.0 pW/$\sqrt{\text{Hz}}$ (@ 1550 nm, 20 MHz) 5.8 pW/$\sqrt{\text{Hz}}$ (@ 1550 nm, 50 MHz) 8.6 pW/$\sqrt{\text{Hz}}$ (@ 1550 nm, 100 MHz)</td> </tr> <tr> <td>Maximum differential CW power for linear amplification</td> <td>53 μW (@ 2nd gain x4, DC-coupled, 1550 nm) 18 μW (@ 2nd gain x12, DC-coupled, 1550 nm) 275 μW (@ AC-coupled, 1550 nm)</td> </tr> <tr> <td>Max. optical CW balanced power (common mode power)</td> <td>10 mW (on each photodiode, @ 1550 nm)</td> </tr> <tr> <td>Monitor optical saturation power (limited for linear amplification)</td> <td>10.5 mW (@ 1550 nm)</td> </tr> </table>	Test conditions	$V_S = \pm 15$ V, $T_A = 25$ °C, signal output terminated with 50 Ω , Monitor outputs terminated with 1 M Ω	Gain	Transimpedance gain	20 x 10 ³ V/A (2 nd gain x4), 60 x 10 ³ V/A (2 nd gain x12) switchable (@ 50 Ω load)	Gain accuracy	± 1 % electrical	Conversion gain	19 x 10 ³ V/W typ. (@ 2 nd gain x4, 1550 nm) 57 x 10 ³ V/W typ. (@ 2 nd gain x12, 1550 nm)	Common mode rejection ratio (CMRR)	55 dB typ. (f \leq 100 MHz)	Frequency Response	Lower cut-off frequency	DC / 10 Hz, switchable	Upper cut-off frequency	100 MHz, switchable to 20 MHz	Time Response	Rise/fall time (10 % - 90 %)	3.2 ns 17.5 ns (low pass filter 20 MHz)	Input	Noise equivalent power (NEP)	minimum 3.7 pW/ $\sqrt{\text{Hz}}$ (@ 1550 nm) 4.0 pW/ $\sqrt{\text{Hz}}$ (@ 1550 nm, 20 MHz) 5.8 pW/ $\sqrt{\text{Hz}}$ (@ 1550 nm, 50 MHz) 8.6 pW/ $\sqrt{\text{Hz}}$ (@ 1550 nm, 100 MHz)	Maximum differential CW power for linear amplification	53 μ W (@ 2 nd gain x4, DC-coupled, 1550 nm) 18 μ W (@ 2 nd gain x12, DC-coupled, 1550 nm) 275 μ W (@ AC-coupled, 1550 nm)	Max. optical CW balanced power (common mode power)	10 mW (on each photodiode, @ 1550 nm)	Monitor optical saturation power (limited for linear amplification)	10.5 mW (@ 1550 nm)
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SOPHISTICATED TOOLS FOR SIGNAL RECOVERY



Datasheet

HBPR-100M-60K-IN-FC

High-Speed Balanced Photoreceiver

Specifications (continued)

Detector	Detector	InGaAs-PIN photodiode FC fiber connector	
	Active area	Ø 80 µm, integrated ball lens suitable for fibers up to 50 µm core diameter	
	Spectral range	900 - 1700 nm	
	Sensitivity	0.95 A/W typ. (@ 1550 nm)	
Signal Output	Output voltage range	±1.0 V (@ 50 Ω load) for linear operation and low harmonic distortion	
	Max. output voltage	±2.0 V (@ 50 Ω load)	
	Offset voltage compensation	±100 mV typ., adjustable by offset potentiometer	
	Output impedance	50 Ω (terminate with 50 Ω load)	
	Slew rate	2000 V/µs	
	Max. output current	70 mA	
	Output return loss S22	-30 dB @ < 100 MHz -20 dB @ < 800 MHz	
	Output noise	1.9 mV _{RMS} (13 mV _{PP}) (@ 2 nd gain x4) 5.4 mV _{RMS} (36 mV _{PP}) (@ 2 nd gain x12) 0.5 mV _{RMS} (3.1 mV _{PP}) typ. (@ 2 nd gain x4, BW: 20 MHz) 1.3 mV _{RMS} (8.6 mV _{PP}) typ. (@ 2 nd gain x12, BW: 20 MHz) (@ 50 Ω load, no signal on detectors, measurement bandwidth 2 GHz)	
	Monitor Outputs	Monitor output gain	1 x 10 ³ V/A (@ ≥ 100 kΩ load)
		Monitor output voltage range	0 ... +10 V (@ ≥ 100 kΩ load)
Monitor output impedance		50 Ω (terminate with ≥ 100 kΩ load)	
Monitor output max. output current		30 mA typ.	
Monitor output bandwidth		DC ... 10 MHz	
Monitor output noise		0.6 mV _{RMS} (4 mV _{PP}) (@ 100 kΩ load, no signal on detectors, measurement bandwidth 200 MHz)	
Power Supply	Supply voltage	±15 V (±14.5 V ... ±16.5 V)	
	Supply current	-90 / +120 mA (depends on operating conditions, recommended power supply capability min. ±200 mA)	
Case	Weight	350 g (0.77 lbs)	
	Material	AlMg3Mn, nickel-plated	
Temperature Range	Storage temperature	-40 ... +85 °C	
	Operating temperature	0 ... +60 °C	
Absolute Maximum Ratings	Max. CW power (averaged)	12 mW (on each photodiode)	
	Power supply voltage	±20 V	

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

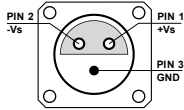


Datasheet

HBPR-100M-60K-IN-FC

High-Speed Balanced Photoreceiver

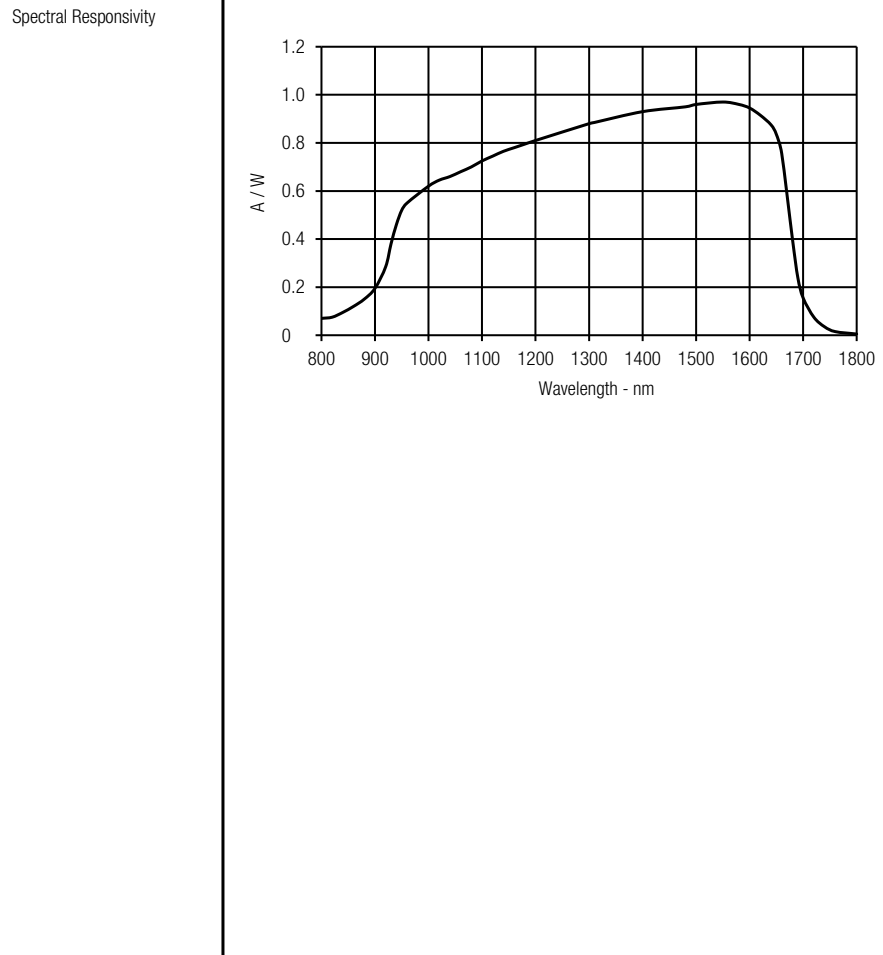
Connectors	Input	FC fiber optic connector (FC/PC and FC/APC compatible)
	Output	SMA jack (female)
	Power supply	Lemo® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)



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

Scope of Delivery	HBPR-100M-60K-IN-FC, Lemo® 3-pin connector, 3 x adapter SMA (male) to BNC (female), datasheet	
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Ordering Information	HBPR-100M-60K-IN-FC	FC fiber optic connector (FC/PC and FC/APC compatible)
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SOPHISTICATED TOOLS FOR SIGNAL RECOVERY



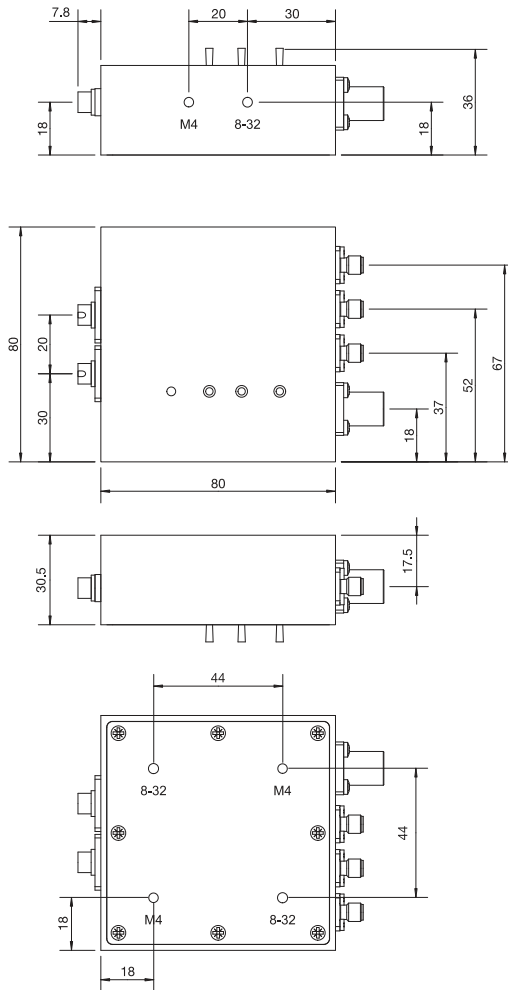
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HBPR-100M-60K-IN-FC

High-Speed Balanced Photoreceiver

Dimensions

Case dimensions for HBPR-100M-60K-IN-FC:



All measures in mm unless otherwise noted.

The bottom plate may be rotated to match the appropriate mounting thread to the optical axis by unscrewing the 8 screws.

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