Balanced Amplified Photodetectors with Fast Monitor Output (Page 1 of 2)

NEW design

PDB410A
(Fixed Gain)

PDB450C-AC
(Switchable Gain)

Features

- Total Wavelength Range for All Models: 320 - 1700 nm
- Available with a Si or InGaAs Detector
- Excellent Common Mode Rejection
- High Bandwidth: DC to 350 MHz
- Bandwidth Monitor Outputs: DC to 1 MHz
- Ultra Low Noise
- Free Space and Fiber Input Options
- Fixed and Switchable Gain Versions Available
- Switchable Power Supply Included

Applications

- Spectroscopy
- Heterodyne Detection
- Optical Coherence Tomography
- Optical Delay Measurements
- THz Detection

These balanced amplified photodetectors act as a balanced receiver by subtracting the two optical input signals from each other, resulting in the cancellation of common mode noise. This allows small changes in the signal path to be extracted from the interfering noise floor. The key feature is the fast monitor ports with reduced noise. Detectors with the following bandwidths are available: DC to 15 MHz, DC to 75 MHz, DC to 100 MHz, DC to 200 MHz, and DC to 350 MHz. Additionally, a switchable gain model with selectable transimpedance gain is offered. Each model is available with either a Si (-A) or InGaAs (-C) photodiode and can also be ordered with AC coupling (-AC) to block any DC offset.

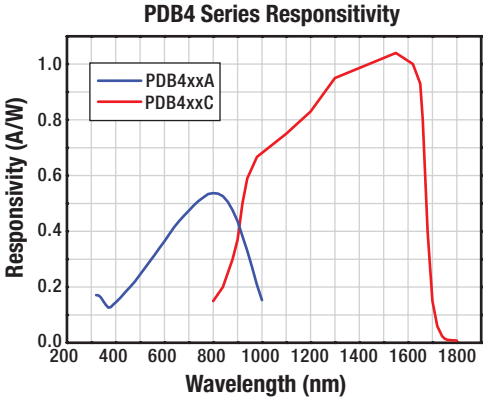
Noise Reduction

The detectors consist of two balanced photodetectors and an ultra-low noise, high-speed transimpedance amplifier. The two photodetectors are matched to achieve an excellent common mode rejection, leading to better noise reduction.

AC-Coupled Version (-AC)

An AC-coupled version of each detector is offered to block the CW component (the unmodulated part) of the optical input signal. This variant improves measurement capabilities in applications where it is desirable to measure a comparably weak, frequency-modulated signal over a strong CW background signal, which may saturate the amplifier.

PDB4 Series Responsivity



PDB430C

Connectors

Most of these balanced detectors come with two removable FC input connectors (please note that the FC adapters are not removable on the PDB430C and PDB460C), making them suitable for either free-space or fiber-coupled applications. Three SMA electrical connectors provide the balanced output signal plus a fast power monitor for each of the two input signals. These two monitors enable the control of the input power levels and can be used as an independent power meter for each channel.

Packaging and Power Supply

Housed in a shielded aluminum enclosure measuring 85 mm x 80 mm x 30 mm (3.3" x 3.1" x 1.2"), these detectors are post mountable using the included adapter plate, which can be attached to the bottom or side of the housing with the included 8-32 (M4) screws. The unit is powered by an included ±12 V DC power supply. The input voltage of 110 VAC or 230 VAC can be manually selected by a switch.

Balanced Amplified Photodetectors with Fast Monitor Output (Page 2 of 2)

Thorlabs' balanced amplified photodetectors consist of two well-matched photodiodes and an ultra-low noise, high-speed transimpedance amplifier (TIA) that generates an output voltage (RF Output) proportional to the difference between the photocurrents in the two photodiodes (i.e., the two optical input signals). Additionally, the unit has two fast monitor outputs (Monitor+ and Monitor-) to observe the optical input power levels on each photodiode separately.

ITEM #	PDB440A	PDB420A	PDB410A	PDB460A	PDB430A	PDB450A
Detector Type	Si/PIN					
Wavelength Range	320 - 1000 nm					
Peak Responsivity	0.53 A/W			0.50 A/W		0.53 A/W
Active Detector Diameter	0.8 mm			0.4 mm		0.8 mm
Bandwidth (3 dB)	DC - 15 MHz	DC - 75 MHz	DC - 100 MHz	DC - 200 MHz	DC - 350 MHz	DC - 150, 45, 4, 0.3, 0.1 MHz
Common Mode Rejection Ratio	>35 dB		>25 dB (>35 dB Typical)		>20 dB (>25 dB Typical)	>25 dB (>30 dB Typical)
Transimpedance Gain*	51 x 10^3 V/A	250 x 10^3 V/A	50 x 10^3 V/A	30 x 10^3 V/A	10 x 10^3 V/A	10^3, 10^4, 10^5, 10^6, 10^7,V/A
Conversion Gain RF-Output	27 x 10^3 V/W	133 x 10^3 V/W	26.5 x 10^3 V/W	16 x 10^3 V/W	5 x 10^3 V/W	0.53 x 10^3, 0.53 x 10^4, 0.53 x 10^5, 0.53 x 10^6, 0.53 x 10^7, V/W
Conversion Gain/Monitor Output	10 V/mW @ 820 nm					
CW Saturation Power RF-Output	130 µW @ 820 nm	27 µW @ 820 nm	130 µW @ 820 nm	225 µW @ 820 nm	720 µW @ 820 nm	9 mW @ 820 nm
NEP DC - 10 MHz (Min)	6.4 pW / √Hz	6.5 pW / √Hz	7 pW / √Hz	13.2 pW / √Hz	13.5 pW / √Hz	1.33 pW / √Hz
Optical Inputs	FC/PC or FC/APC (Removable)					
Photodiode Damage Threshold	20 mW					
RF Output Impedance	50 Ω					

*Transimpedance Gain is reduced by a factor of two for 50 Ω loads

ITEM #	PDB440C	PDB420C	PDB410C	PDB460C	PDB430C	PDB450C
Detector Type	InGaAs/PIN					
Wavelength Range	800 - 1700 nm					
Peak Responsivity	1.0 A/W					
Active Detector Diameter	0.3 mm			0.15 mm		0.3 mm
Bandwidth (3 dB)	DC - 15 MHz	DC - 75 MHz	DC - 100 MHz	DC - 200 MHz		DC - 150, 45, 4, 0.3, 0.1 MHz
Common Mode Rejection Ratio	>35 dB	>35 dB	>25 dB (>35 dB Typical)		>20 dB (>25 dB Typical)	>25 dB (>30 dB Typical)
Transimpedance Gain*	51 x 10^3 V/A	250 x 10^3 V/A	50 x 10^3 V/A	30 x 10^3 V/A	10 x 10^3 V/A	10^3, 10^4, 10^5, 10^6, 10^7,V/A
Conversion Gain RF-Output	51 x 10^3 V/W	250 x 10^3 V/W	50 x 10^3 V/W	30 x 10^3 V/W	10 x 10^3 V/W	10^3, 10^4, 10^5, 10^6, 10^7 V/W
Conversion Gain/Monitor Output	10 V/mW @ 1550 nm	10 V/mW @ 1300 nm	10 V/mW @ 1550 nm			
CW Saturation Power RF-Output	70 µW @ 1550 nm	15 µW @ 1300 nm	70 µW @ 1550 nm	120 µW @ 1550 nm	360 µW @ 1550 nm	4.5 mW @ 1550 nm
NEP DC - 10 MHz (Min)	3.3 pW / √Hz	3.5 pW / √Hz	3.8 pW / √Hz	6.0 pW / √Hz	7 pW / √Hz	0.68 pW / √Hz
Optical Inputs**	FC/PC or FC/APC (Removable)					
Photodiode Damage Threshold	20 mW					
RF Output Impedance	50 Ω					

*Transimpedance Gain is reduced by a factor of two for 50 Ω loads **For Model PDB430C and PDB460C, the FC adapter is not removable

ITEM #*	$	£	€	RMB	DESCRIPTION
PDB440A	$ 1,325.00	£ 954.00	€ 1.152,75	¥ 10,560.25	Balanced Amplified Photodetector, Fixed Gain, Si, 15 MHz
PDB420A	$ 1,225.30	£ 882.22	€ 1.066,01	¥ 9,765.64	Balanced Amplified Photodetector, Fixed Gain, Si, 75 MHz
PDB410A	$ 1,100.00	£ 792.00	€ 957,00	¥ 8,767.00	Balanced Amplified Photodetector, Fixed Gain, Si, 100 MHz
PDB460A	$ 1,345.00	£ 968.40	€ 1.170,15	¥ 10,719.65	Balanced Amplified Photodetector, Fixed Gain, Si, 200 MHz
PDB430A	$ 1,394.00	£ 1,003.68	€ 1.212,78	¥ 11,110.18	Balanced Amplified Photodetector, Fixed Gain, Si, 350 MHz
PDB450A	$ 1,394.00	£ 1,003.68	€ 1.212,78	¥ 11,110.18	Balanced Amplified Photodetector, Switchable Gain, Si
PDB440C	$ 1,410.00	£ 1,015.20	€ 1.226,70	¥ 11,237.70	Balanced Amplified Photodetector, Fixed Gain, InGaAs, 15 MHz
PDB420C	$ 1,310.00	£ 943.20	€ 1.139,70	¥ 10,440.70	Balanced Amplified Photodetector, Fixed Gain, InGaAs, 75 MHz
PDB410C	$ 1,150.00	£ 828.00	€ 1.000,50	¥ 9,165.50	Balanced Amplified Photodetector, Fixed Gain, InGaAs, 100 MHz
PDB460C	$ 1,332.65	£ 959.51	€ 1.159,41	¥ 10,621.22	Balanced Amplified Photodetector, Fixed Gain, InGaAs, 200 MHz
PDB430C	$ 1,490.00	£ 1,072.80	€ 1.296,30	¥ 11,875.30	Balanced Amplified Photodetector, Fixed Gain, InGaAs, 350 MHz
PDB450C	$ 1,490.00	£ 1,072.80	€ 1.296,30	¥ 11,875.30	Balanced Amplified Photodetector, Switchable Gain, InGaAs

*Add -AC to the item number for a version with AC-coupling