Balanced Optical Detector Module



Overview

100 GHz Balanced Photodetector Module In combination with a 90° optical hybrid, the balanced photodetectors provide the functionality of a coherent receive.

Key Takeaways

A balanced optical detector module is a photodetection system that measures the differential optical signal between two inputs, suppressing common-mode noise and enhancing sensitivity for precise optical measurements.

Overview

A balanced optical detector module typically contains two photodiodes with matched characteristics connected in a configuration that cancels out the photocurrent common to both inputs. This design allows the module to detect minute differences in optical signals while rejecting noise from ambient light or laser intensity fluctuations, improving the signal-to-noise ratio in sensitive optical measurements.

Key Components and Features

Photodiodes: Modules may use silicon for visible to near-infrared detection or InGaAs for near-infrared to mid-infrared applications. Differential Amplification: Converts the small difference in photocurrents into an electrical signal while suppressing common-mode noise. Bandwidth: Varies by model, from tens of MHz (e.g., 100 MHz for Koheron PD100B) to hundreds of MHz or even GHz for high-speed telecom applications.

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved

Common-

Mode Rejection Ratio (CMRR): Indicates the module's ability to reject noise common to both inputs, typically ranging from 30 dB to 35 dB or higher. Connectivity: Often includes fiber-coupled inputs (e.g., FC connectors) and standard electrical outputs (e.g., SMA connectors) for integration into optical systems.

Applications

Balanced optical detector modules are widely used in: Optical Coherence Tomography (OCT): Detects interference between reference and sample light to generate high-resolution images in medical diagnostics.

Fiber-

Optic Sensing: Measures differential signals in fiber sensors for strain, temperature, or polarization monitoring. Coherent Optical Communication: High-speed modules (>100 GHz) are used in coherent receivers for dual-polarization QAM signals in next-generation telecom systems. Lidar and Research Applications: Provides sensitive detection of weak optical signals in laboratory and R&D setups.

Advantages

Noise Reduction: Cancels common-mode noise from laser intensity fluctuations or environmental light. High Sensitivity: Detects small optical signal differences, critical for interferometry and coherent detection. Versatility: Available in various bandwidths and photodiode materials to suit different wavelength ranges and applications.

In summary, a balanced optical detector module is an essential component in precision optical measurement systems, offering high sensitivity, noise suppression, and adaptability for applications ranging from medical imaging to high-speed optical communications.

Article Content

100 GHz Balanced Photodetector Module

In combination with a 90° optical hybrid, the balanced photodetectors provide the functionality of a coherent receiver for detecting dual-polarization higher order QAM signals.

Technical note / Balanced detectors

The balanced detector can be used in various measurement and analytical instruments that use optical interference signals. It is also used for medical equipment such as an optical coherence tomography

Balanced detector C12668-03 | Hamamatsu Photonics

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved

C12668-03 is a differential amplification type photoelectric conversion module containing two Hamamatsu photodiodes with balanced characteristics. The photodiodes are connected in a

Compact Balanced Amplified Photodetectors

To act as a balanced receiver, the compact detector subtracts the two optical input signals from each other, which results in the cancellation of common mode

Balanced Photodetectors

Symmetrical InGaAs photodetectors, also referred to as balanced detectors, are used in fiber-optic applications in optical coherence tomography and fiber sensor

A Survey of Methods Using Balanced Photodetection

This balanced optical receiver allows detection of a small signal upon a large background. Again, the receiver works by subtracting the photocurrents from two well-matched photodetectors.

100 GHz BALANCED PHOTODETECTOR

The BPDV412xRv balanced photodetector is a compact, non-hermetic module consisting of two optimized 100 GHz waveguide-integrated photodiodes on a single chip. As a single device, this

100 GH z BALANCED PHOTODETECTOR MODULE

Technical Background High-speed balanced photodetector modules are of interest for the develop-ment of next-generation telecom coher-ent optical communication links. Since these R&D links are always

High Performance Balanced Photodetector (BPD-1)

The BPD-1 is configured as a dual-balanced receiver by subtracting the two optical input signals from each other, resulting in the cancellation of common mode noise. Dual balanced detection allows

Balanced Photodetectors in Optical Systems: Principle, Features, and ...

Balanced photodetectors are critical components in modern optical systems, offering high sensitivity and precision in detecting light signals. These devices are widely used in applications

BPD570 APD Balanced Photodetector M Adjustable

The balanced detector uses two matched avalanche photodiodes (APDs) and an ultra-low noise, ultra-low distortion, high-speed transimpedance amplifier ideal

Balanced Photoreceiver HBPR

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved

It opens up a broad compatibility with optical accessories from various manufacturers, such as lenses, tubes, cage systems, optical adapters etc. The relatively large-area detectors facilitate optical

What is a balanced photodetector? | YB Photonics

Balanced detector product introduction and application scenarios, can be applied to OCT, distributed fiber optic fiber sensing, LIDAR and other fields.

High bandwidth fixed gain balanced optical detection module

High-gain balanced detection module optimized for third-generation OCT (SS-OCT) systems, with high gain and low mmon-mode rejection ratio through wavelength optimization, high outpu Monitor

High-CMRR Balanced Detection Module Based on Complementary

A balanced photodetector module combined with two complementary photodetectors is proposed and demonstrated. Key factors influencing common-mode rejection ratio are analyzed, and excellent

Distributed balanced photodetectors for high-performance

Discrete balanced photodetectors with high saturation power have been reported, however, they have limited bandwidth.5 It is also more difficult to match the electrical and optical characteristics of the

Balanced Photodetection – principle of balanced

Our balanced detectors are engineered for quantum optics applications with low electronic noise and high quantum efficiencies. The on-board demodulation

43 GHz BALANCED PHOTODETECTOR

The BPDV21x0R consists of two optimized 43 GHz waveguide-integrated photodiodes on a single chip that show an extremely flat frequency response, both in power and in phase.

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved

Contact Us

Continue your research online:

Website: https://kenhardtprimary.co.za
Technical inquiry: https://kenhardtprimary.co.za/project-desk.html
African project coordination: Century City, Cape Town, Western Cape, South Africa

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved