Fiber optic pin photodiode



Overview

These photodiodes are particularly suitable for measurement of pulsed or CW fiber-coupled light sources by converting the optical power into an electric current.

Key Takeaways

A PIN photodiode is a semiconductor device that converts optical signals from fiber optics into electrical currents, enabling high-speed, low-noise data transmission.

Structure and Working Principle

A PI

N photodiode consists of three semiconductor layers: a P-type layer, an intrinsic (I) layer, and an N-type layer. The P-type layer collects holes, the N-type layer collects electrons, and the intrinsic layer serves as the light-absorbing region where photons generate electron-hole pairs. When a reverse-bias voltage is applied, these carriers are swept toward their respective electrodes, producing a photocurrent proportional to the incident light intensity.

This design ensures efficient light absorption, low capacitance, and fast response, which are critical for high-speed optical communication.

Key Characteristics

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

High Speed: PIN photodiodes can support bandwidths exceeding 10 GHz, suitable for 100G/400G Ethernet and other high-speed fiber-optic networks. Low Noise: Unlike avalanche photodiodes (APDs), PIN diodes do not rely on internal gain, resulting in lower dark current and thermal noise. Broad Wavelength Range: Silicon PIN diodes are effective in the visible to near-infrared range, while InGaAs diodes cover standard telecom wavelengths (850 nm, 1310 nm, 1550 nm),.

Cost-

Effectiveness: Simpler fabrication compared to APDs makes PIN photodiodes ideal for mass deployment in data centers and short-reach optical links. Applications in Optical Fiber SystemsPIN photodiodes are widely used in fiber-optic communication systems as the receiver component in optical transceivers. They convert modulated light pulses from optical fibers into electrical signals for further processing.

Typical applications include: Data Centers: Short-reach, high-speed links using QSFP28 or similar transceivers. Optical Monitoring: Measuring pulsed or continuous-wave fiber-coupled light sources in laboratory or industrial setups. Telecommunications: Supporting high-speed Ethernet and optical networks where low noise and fast response are essential.

Performance Considerations

The quantum efficiency and responsivity of a PIN photodiode determine how effectively it converts light into current. Noise sources include dark current, thermal noise, and leakage currents, which can affect signal quality. The junction capacitance and absorption coefficient influence the rise and fall times, impacting the overall bandwidth.

Designs may vary between front-illuminated vs rear-illuminated and diffused vs mesa-etched structures, optimizing performance for specific fiber-coupled applications. In summary, PIN photodiodes are essential for converting optical signals into electrical signals in fiber-optic systems, offering high-speed, low-noise, and cost-effective solutions for modern optical communication networks.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Article Content

Pigtailed Photodiodes

These photodiodes are particularly suitable for measurement of pulsed or CW fiber-coupled light sources by converting the optical power into an electric current.

Fiber Coupled InGaAs PIN Photodiodes

A series InGaAs PIN photodiodes are designed for optical network monitoring applications and assembled into a hermetically sealed package with an antireflective-coated lens or window.

Fiber Coupled Si PIN Photodiode High Efficiency

The Fiber Coupled Si PIN Photodiode is based on a unique package that features high optical coupling efficiency. The component integrates a fiber with a high sensitivity/large area photodiode for signal

PIN Photodiodes

PD-LD, Inc. offers a broad range of photodiodes and APDs with fiber connection or optical receptacle. High-Speed Photoreceivers for Optical High-Speed

Fiber Coupled Photodiodes | High-Speed Optical Receivers for

Lasermate offers a comprehensive range of fiber coupled photodiodes designed for high-speed optical communication, data transmission, and sensing applications.

Fiber Coupled InGaAs PIN/APD Photodiodes

High Speed Fiber Coupled InGaAs PIN Photodiode 10GHz, 25GHz 900 to 1600nm $192+ SKU: FCHD $ 192 –$ 420 Price range: $192 through $420

PIN Photodetector Characteristics for Optical Fiber

Semiconductor photodiodes are the most commonly used detectors in optical fiber systems since they provide good performance, being small in size, and are of

Design and Fabrication of High-Speed PIN Photodiodes for 50 Gb/s ...

INTRODUCTION mance computers drives the development of high-speed optical communication networks. Optical links based on energy-efficient directly mod lated 850 nm oxide-confined VCSELs

PDIN-Series InGaAs PIN Photodiode Pigtailed or Receptacled

PD-LD Inc. offers a variety of standard and custom PIN Photodiodes and APDs is fiber coupled packages. The semiconductors offered are of proven manufacture and design. InGaAs is optimal

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Transcend TO-46 InGaAs Photodetector Diode, 900-1700nm PIN Photodiode

Transcend TO-46 InGaAs photodetector diode operates in the 900-1700nm range for high-precision light detection in fiber optic and sensing applications.

Design and Fabrication of High Performance InGaAs near Infrared

InGaAs photodiodes have a wide range of important applications; for example, NIR imaging, fiber optical communication, and spectroscopy. In this paper, we studied InGaAs

What is PIN and APD Photodiodes in Optical Transceivers

In optical transceiver modules, it acts as the receiver, detecting incoming optical signals and transforming them back into electrical data. Photodiodes are essential for ensuring high-speed,

Products and Technology | onsemi

Explore onsemi"s diverse product portfolio, from high to low voltage power discrete devices, including IGBT, MOSFET, SiC, Diode, and Intelligent Power Modules (IPMs).

Chapter 6 PIN and APD Detectors

There are a wide variety of photodetectors that can be used for different pur-poses. In fiber optics, two types of photodetectors are of primary interest: PIN di-odes and APD diodes. Almost all practical

PIN Photodetector Characteristics for Optical Fiber Communication

PIN Photodetector Characteristics for Optical Fiber Communication :: What Is an Photodetector? An optical detector is a device that converts light signals into electrical signals, which can then be

P–i–n Photodiodes – PIN photodiode

Very fast rise time p–i–n photodiodes for measurement of optical waveforms with rise times starting from 10 ps and spectral coverage from 170 to 2600 nm (VUV

PIN Photo Diode (Basics, Structure, Working, Pros & Cons ...

Optical Fiber Communication by Engineering Funda PIN Photo Diode (Basics, Structure, Working, Pros & Cons) Explained in Optical Communication

DEVELOPMENT OF HIGH-SPEED PHOTODIODE MODULES FOR OPTICAL

This paper describes the structure and characteristics of photodiode modules developed for fiber-optic communications. The modules consist of a highly responsitive GaInAs PIN photodiode with high

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Related Video Reference

This video was associated with the source search result. Verify technical details against current product documentation and project requirements.

Contact Us

Continue your research online:

Website: https://fdsoluciones.es
Technical inquiry: https://fdsoluciones.es/project-enquiry.html

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

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved