Single-mode fiber optic photodiode



Overview

Pigtailed Photodiodes The FDSP Series Pigtailed Photodiodes are offered with a single or multimode fiber, actively aligned for optimum coupling efficiency.

Key Takeaways

A single-mode fiber optic photodiode converts light from a single-mode optical fiber into an electrical signal with high sensitivity, low noise, and minimal mode interference, making it ideal for high-speed optical communication and precise measurement applications. OverviewSingle-mode fiber optic photodiodes are high-speed photodetectors designed to interface with single-mode optical fibers, typically with core diameters around 9 µm. They convert optical signals into electrical currents while maintaining low dark current, low capacitance, and high linearity, which is essential for accurate signal detection in fiber optic systems (Thorlabs, Lasermate).

These photodiodes are often pigtailed, meaning the fiber is permanently attached and actively aligned to maximize coupling efficiency and minimize back reflections.

Key Features

Fiber Type: Single-mode fibers suppress multi-path interference (MPI), ensuring stable signal detection, especially in interferometric or high-precision applications. Wavelength Range: Commonly available for visible to near-infrared wavelengths, including 610–970 nm for Si PIN photodiodes and 1310–1550 nm for InGaAs photodiodes. Bandwidth: High-speed versions can exceed 5 GHz, suitable for broadband analog and digital optical networks.

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Responsivity and Noise: High responsivity with low dark current ensures accurate detection of weak optical signals, while low capacitance improves signal integrity. Connectors: Available with FC, ST, SC, or LC connectors for flexible integration into optical systems. ApplicationsSingle-mode fiber optic photodiodes are widely used in: Optical communications: High-speed data transmission over single-mode fiber networks.

Instrumentation: Precise measurement of pulsed or continuous-wave (CW) light sources. Sensing and monitoring: Fiber-based interferometers, CATV, and broadband analog optical links. Laser diode systems: Often integrated with fiber-pigtailed laser diodes for controlled light delivery and detection.

Design Considerations

Active Alignment: The fiber is actively aligned to the photodiode to maximize coupling efficiency and minimize losses. Back Reflection Minimization: Fibers are often cleaved at an angle (e.g., 8°) to reduce back reflections that can destabilize the signal. Housing and Protection: Stainless steel bushings and reinforced fiber jackets protect the photodiode and relieve bending stress on the fiber.

Example Products

Thorlabs FDS

P Series: Si PIN photodiodes with single-mode fiber for 660–780 nm and 780–970 nm ranges, designed for low back reflection and high stability. Lasermate R13A-5G-Pxx1: InGaAs PIN photodiode with >5 GHz bandwidth, single-mode fiber pigtail, and optional FC/ST/SC/LC connectors for broadband analog applications. Newport LD-1310-31B: Fiber-pigtailed laser diode with integrated back-facet photodiode, 1310 nm wavelength, and 9/125 µm single-mode fiber.

Single-mode fiber optic photodiodes are essential components for high-performance optical systems, providing precise, low-noise detection of light signals transmitted through single-mode fibers.

Article Content

Pigtailed Photodiodes

The FDSP Series Pigtailed Photodiodes are offered with a single or multimode fiber, actively aligned for optimum coupling efficiency, sensitivity, and stability.

Single Mode Fiber Pigtailed Laser Diodes

These laser diodes have a one-meter single-mode fiber pigtail. All fiber pigtails are terminated with FC/PC fiber optic connectors except LD-1310-31B with FC/APC.

Thorlabs

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Theory of OperationPhotodiode TerminologyCommon Operating CircuitsEffects of Chopping FrequencyA junction photodiode is an intrinsic device that behaves similarly to an ordinary signal diode, but it generates a photocurrent when light is absorbed in the depleted region of the junction semiconductor. A photodiode is a fast, highly linear device that exhibits high quantum efficiency and may be used in a variety of different applications. It is...See more on thorlabs Images of Single Mode Fiber Optic PhotodiodePhotodiode AmplifierInGaAs PhotodiodeFiber Optic ReceiverPIN PhotodiodePhotodiode DataSheetFiber Optic AccessoriesSilicon PhotodiodePhotodiode SensorPhotodiode DetectorOptical Transceiver PhysicsBot VerificationSingle Mode vs Multimode Fiber: What''s the Difference? - Gcabling ...Relation Between Optics And Photonics at Lindy Rossi blogSingle-Mode Fibers - Laser ScientistOptical Fiber 101: Understanding Single Mode Fiber – YBWUEWhat Is Single Mode Fiber and How Does It WorkSingle Mode vs Multimode Fiber, What is The Difference?See all imagesNewport

LD-1310-31B Laser Diode - Newport

The LD-1310-31B Fiber Coupled Laser Diode consists of Fabry-Perot lasers, having a fiber pigtail precisely attached for optimum coupling efficiency. This 1310 nm

R13A-5G-Pxx1 – >5GHz Analog InGaAs PIN Photodiode, SMF

High-speed >5GHz analog InGaAs PIN photodiode with single mode fiber pigtail and optional FC/ST/SC/LC connectors. Provides high responsivity, low dark current, and excellent linearity for

Fiber Coupled Photodiodes | High-Speed Optical Receivers for

1310nm and 1550nm fiber coupled InGaAs photodiodes for single-mode optical networks. High-speed, low dark current, and integrated TIA options for long-distance, high-performance communication.

DTS0195 Fiber to Photodiode Couplers with Removable Filters

The device can be configured with virtually any photodiode package supplied in a standard TO can and can be pigtailed with either singlemode, polarization maintaining or multimode fibers.

Single Mode vs Multimode SFP: Operational Reliability Guide

The transition from Single Mode vs Multimode SFP is no longer a matter of simple distance; it is a matter of operational survival. Technically speaking, the physical limitations of

Bundle Fiber-optic Patch Cord Market: $13.45B by 2025, 11.72% CAGR

Photodiode Position Sensor Market: $25.0B by 2034, 7.5% CAGR Key Insights for Bundle Fiber-optic Patch Cord Market The Global Bundle Fiber-optic Patch Cord Market is poised for

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BIDI Transceiver Technology And Applications

EXECUTIVE SUMMARYBidirectional (BIDI) optical transceiver technology represents a paradigm shift in fiber optic network infrastructure, enabling full-duplex communication over a single strand of

LD-PD PTE. LTD.

LD-PD'' s PL-DBR-1580-30-2-PA-14BF Distributed Bragg Reflector (DBR) laser is a single-frequency laser diode that is well -suited for low-noise pump applications, second harmonic generation and time

The Most Comprehensive Guide Of Optical Modules

Explore the ultimate guide to optical modules. Learn types, functions, performance metrics & how to choose the right module for your fiber network.

Radio and Microwave Over Fiber

RF over fiber converts radio or microwave signals into optical form for high-bandwidth transmission over long distances through fibers.

Fiber Optic Sensors: Fundamentals, Principles & Applications

Optical Fiber (Transmission Medium, Sensing Element) Light modulated due to interaction with parameter of interest (Measurand)

Optical Power Meter: A Tool for Measuring Fiber Optic Power

Optical Power Meters An optical power meter (OPM) is a type of electronic test device used to measure the power output of fiber optic equipment or the power or loss of an optical signal transmitted through

Eoguar EGLW-SMF Series Single-Mode Fiber-Coupled Laser Diode

Overview The Eoguar EGLW-SMF Series is a line of single-mode fiber-coupled laser diode modules engineered for precision optical integration in laboratory, industrial, and research environments.

Si Photodiode Detector Module EGSi-200M-A

The EGSi-200M-A is compatible with standard single-mode and multimode optical fibers (SMF-28, OM1–OM5), free-space collimated beams (with optional focusing lens adapter), and pigtailed laser

Glossary of fiber optic network terms

Find the definition of common phrases and keywords with Integra''s Glossary of fiber optic network terms.

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The Ultimate Guide to SFP Modules (2026): Types, Speeds

Confused by SFP vs SFP+? Read the definitive 2026 guide on SFP modules. We explain Single Mode vs Multimode, DDM diagnostics, and how to choose the right transceiver for Cisco, Juniper, and more.

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

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