

Article Overview

A single-fiber bidirectional (BiDi) optical module enables simultaneous transmit and receive over a single fiber using two wavelengths, reducing fiber usage and simplifying network deployment.

Overview

A BiDi optical module is a compact transceiver that allows full-duplex communication over a single fiber strand by using wavelength division multiplexing (WDM) technology. It transmits data in one direction on one wavelength (e.g., 1310 nm) and receives data on another wavelength (e.g., 1550 nm), effectively doubling the capacity of a single fiber without interference. This design is particularly useful in fiber-constrained environments, such as campus networks, metro rings, and data center interconnects.

Technical Design

The module typically integrates a transmitting optical assembly (TOSA) and a receiving optical assembly (ROSA) into a single housing, often referred to as a BOSA (BiDi Optical Sub-Assembly). Inside, an optical filter separates the transmit and receive wavelengths, preventing crosstalk and maintaining signal integrity. Some advanced designs include a circulator component on the carrier board to further improve integration and allow more components on the circuit board, enhancing performance and reducing module size.

Deployment and Compatibility

BiDi modules must be deployed in matched pairs, with each end using complementary wavelengths (e.g., one end transmits at 1310 nm and receives at 1550 nm, while the other end does the opposite) to ensure proper communication. They are available in multiple speed classes, including 155M, 1G, and 10G, making them suitable for legacy networks as well as modern high-bandwidth Ethernet deployments.

Benefits

- o Fiber savings: Reduces fiber usage by up to 50%, lowering infrastructure costs and simplifying cabling management.
- o Cost efficiency: Minimizes the need for additional fiber installation or leasing, reducing both capital and operational expenses.
- o Simplified deployment: Fewer physical connections reduce potential failure points and accelerate network upgrades.
- o High integration: Modern designs allow more components on the circuit board, improving performance and reliability.

Applications

BiDi optical modules are widely used in:

- o Enterprise networks for connecting buildings or floors with limited fiber availability.
- o Data centers for high-speed interconnects while minimizing fiber cabling.
- o Telecom networks for metro and long-haul links where fiber resources are constrained . In summary, single-fiber bidirectional optical modules provide a cost-effective, space-efficient, and high-performance solution for modern fiber optic networks, enabling full-duplex communication over a single fiber strand while maintaining signal integrity and reducing infrastructure complexity .

Explore a wide range of SFP QSFP fiber optic solutions at Fiber Optic Egypt, including cables and modules for all your

Things You Should Know About BiDi SFP Modules For the past few years, SFP transceiver modules have received

5G Mobile Fronthaul/Backhaul. In Conclusion BIDI optical modules are an efficient solution for single-fiber

Working principle of BiDi single fiber bidirectional optical module As shown in the figure below, a general

Discover BIDI SFP optical transceivers, the single-fiber bidirectional modules that optimize fiber usage. Learn how they

This mode is mainly used on the client side, implemented through the filtering function of a single-fiber bidirectional optical module.

As fiber optic networks continue to evolve, selecting the right optical transceiver becomes increasingly important.

Enter the 10G BiDi (bidirectional) SFP+ module --an elegant solution that enables full-duplex communication over a

What is a BiDi Transceiver? BiDi transceiver, or Bidirectional or simplex optical transceiver,

What Is BiDi Transceiver? BiDi transceivers have become synonymous with reliable and high-performance

TEG311SM is single-mode optical fiber module. Support optical fiber transmission to extend LAN area and bandwidth, good to

Explore the ultimate guide to optical modules. Learn types, functions, performance metrics

Bidi single fiber bidirectional optical module can be installed in switches, optical fiber transceivers, OEO converters

GAOTek SFP BIDI transceiver module is a hot - pluggable small-form-factor Bi-Directional transceiver is designed for 10-Gigabit

BiDi (Bidirectional) SFP - Single-fiber SFP modules for FTTH and fiber-efficient networking, allowing both

Single-fiber bidirectional Gigabit SFP modules with SC connector interface for legacy equipment

Web: <https://www.morwarreconst.co.za>

