Two-way bidirectional data optical transmitter



Overview

DE4243400A1 The receiver (OT1) provides bidirectional data transmission over a light wave guide (LW1) using a bending coupler (BK1). An optical transmitter.

Key Takeaways

A two-way bidirectional (BiDi) optical transmitter allows simultaneous sending and receiving of data over a single optical fiber using different wavelengths, optimizing fiber usage and reducing infrastructure costs.

Overview

A bidirectional optical transmitter, commonly referred to as a BiDi transceiver, enables full-duplex communication over a single strand of optical fiber. Unlike traditional duplex transceivers that require two fibers—one for transmitting (TX) and one for receiving (RX)—BiDi transceivers use wavelength division multiplexing (WDM) to separate the two directions of data flow, allowing simultaneous transmission and reception on the same fiber. How It WorksBiDi transceivers operate using two different wavelengths of light: One wavelength is used for transmitting data from point A to point B.

A second wavelength is used for receiving data from point B to point A. For example, a common setup uses 1310 nm for TX and 1490 nm for RX on the same fiber. Each transceiver contains two lasers: one for sending and one for receiving, with an internal WDM coupler or filter to separate the wavelengths and prevent interference.

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Types and SpecificationsBiDi transceivers are available in various form factors and speeds, including: SFP (Small Form-Factor Pluggable) for 1G networks.

GBI

C for legacy systems. Wavelength combinations such as 1310/1490 nm, 1310/1550 nm, and 1490/1550 nm depending on distance and application. Transmission distances range from short/medium (10–40 km) to long-haul (80–160 km) deployments.

Advantages

Using Bi

Di optical transmitters offers several benefits: Reduces fiber usage by 50%, which is critical in environments with limited fiber availability. Cuts infrastructure costs by minimizing cabling, trenching, and duct requirements. Simplifies network deployment and maintenance, reducing cable clutter and easing troubleshooting.

Maximizes existing hardware ports, allowing network expansion without additional fiber installations. Compatible with existing systems, as BiDi transceivers adhere to the SFP Multi-Source Agreement (MSA). ApplicationsBiDi transceivers are widely used in: Metropolitan area networks (MANs)Enterprise campus networksData centersAccess networks where fiber resources are limited and cost efficiency is important.

Summary

A two-way bidirectional optical transmitter is a compact, efficient solution for transmitting and receiving data over a single fiber. By leveraging WDM technology, it reduces fiber requirements, lowers costs, and simplifies network deployment while maintaining high-speed, full-duplex communication. This makes BiDi transceivers ideal for modern optical networks where space, cost, and fiber optimization are critical considerations.

Article Content

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The receiver (OT1) provides bidirectional data transmission over a light wave guide (LW1) using a bending coupler (BK1). An optical transmitter (S1) supplies a transmission signal (SS1).

One-Way vs Bidirectional Transmission in Optical Fiber

One-way transmission uses a dedicated optical path for a single direction of data flow. In contrast, bidirectional transmission enables simultaneous data exchange

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BiDi Transceiver: Utilizing WDM Technology for Dual-Direction Data ...

BiDi transceiver, a compact optical transceiver with WDM (wavelength division multiplexing) technology and SFP multi-source protocol (MSA) compliance, allows fast data

The Complete Guide to BiDi Transceiver

Unlike traditional optical modules that use separate fibers for transmitting and receiving data, BiDi modules accomplish this bidirectional data

Bidirectional optical signal transmission between two ...

In this article, we report the optical signal transmission between two identical dual-functional diodes based on high-efficiency 3D perovskite emitters.

Exploring WDM, DWDM, CWDM, and BiDi Transceiver

This bidirectional communication is achieved by sending and receiving information at different wavelengths for each direction, effectively

OptoIC Products Brochure

This transceiver product integrate two BiDi channels transmitting and receiving at different wavelengths in the same SFP package form factor. They are compliant with the CSFP MSA Option 2 and SFF-8472.

BiDi SFP: The Complete Guide to Bidirectional SFP Transceivers and ...

By using Wavelength Division Multiplexing (WDM), BiDi SFP modules transmit and receive data on two different wavelengths, cutting fiber usage in half without sacrificing performance.

Bidirectional (BiDi) WDM Transceivers

How Does BiDi Module Work? Bidirectional (BiDi) transceivers are designed to enable two – way communication over a single optical fiber. They operate based on the principle of

BIDI technology for Efficient Optical Communication

BIDI technology, short for Bidirectional Optical Fiber Communication, reshapes the way networks transmit data. It enables two-way communication

The Complete Guide to BiDi Transceiver

This bidirectional unit must be used with another transceiver or network appliance of complimenting wavelengths. It provides 25GBASE Ethernet connectivity option for 25G Ethernet,

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Understanding Bi-Directional Optical Transceiver Technology: BiDi ...

A new optical transceiver technology is now available that allows transceivers to both transmit and receive data to/from interconnected equipment through a single optical fiber. This

Bidirectional optical signal transmission between two ...

A solution-processed perovskite diode that functions as both optical transmitter and receiver can be used to build a monolithic pulse sensor and a bidirectional optical communication

Bidirectional wavelength-division multiplexing transmission over ...

Here, the authors describe a promising approach to achieve bidirectional transmission with bandwidth-efficient yet low-complexity coherent optical network unit transceiver.

Bidirectional System

A bidirectional system, in the context of computer science, refers to a system that uses only one fiber and divides the wavelengths to transmit data in both directions. It has half the total capacity

Single-fiber Bidirectional Transceivers

How Bidirectional Transceivers Work BiDi modules enable two-way communication over a single optical fiber by using a WDM (wavelength-division multiplexing)

Exploring WDM, DWDM, CWDM, and BiDi Transceiver Technology

Introducing a new fiber optic infrastructure, while beneficial, can incur substantial costs, prompting the need to explore alternative options. BiDirectional technology facilitates bidirectional

5G wavelength-division-multiplexing-based bidirectional optical ...

It shows a fifth-generation wavelength-division-multiplexing-based bidirectional optical wireless communication system using four wavelengths for communication.

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