

RIVO MULTITRADE OPTICAL SYSTEMS

The function of dual-fiber optical transceiver modules



Overview

An optical module is a typically hot-pluggable optical transceiver used in high-bandwidth data communications applications.

Key Takeaways

A dual-fiber transceiver optical module uses two separate fibers—one for transmitting and one for receiving data—providing high stability, reliability, and compatibility for high-bandwidth networks.

Overview
A dual-fiber optical transceiver is a device that converts electrical signals into optical signals for transmission over fiber optic cables and vice versa. Unlike single-fiber (BiDi) transceivers, which use one fiber for bidirectional communication, dual-fiber modules have two ports: one dedicated to transmitting (TX) and one to receiving (RX) data, requiring two fibers per link. This design ensures minimal signal interference, higher transmission stability, and robust performance, making it ideal for long-distance backbone networks, data centers, and high-bandwidth applications.

Key Features

- Interface Type: Typically uses a duplex LC connector, compatible with standard network designs.
- Wavelength: Commonly single-wavelength modules, e.g., 1310nm or 1550nm for single-mode fiber, supporting distances up to 10 km or more depending on the module.

- **Data Rate:** Available in various speeds, including 10G SFP+, 40G QSFP+, and higher, suitable for modern high-performance networks .
- **Plug-and-Play:** Dual-fiber modules do not require matched pairs like BiDi modules, allowing any two compatible modules to connect directly .
- **Reliability:** Provides stable, low-latency connections with minimal jitter, suitable for critical applications such as cloud computing, AI data centers, and enterprise networks .

Advantages

- **High Performance:** Supports high-bandwidth applications with consistent signal quality.
- **Scalability:** Ideal for large-scale deployments where fiber resources are abundant.
- **Ease of Deployment:** Standardized duplex interfaces simplify installation and maintenance.
- **Compatibility:** Works with a wide range of network equipment, including switches, routers, and servers .

Applications

- **Data Centers:** Connecting servers, storage, and switches over high-speed links.
- **Enterprise Networks:** Backbone connections requiring reliable, high-capacity transmission.
- **Telecommunications:** Long-distance fiber links in metro and wide-area networks.
- **High-Performance Computing:** AI/ML clusters and cloud infrastructure requiring low-latency, high-throughput connections .

Summary

Dual-fiber transceiver optical modules are essential for networks demanding high reliability, bandwidth, and long-distance connectivity. They are preferred in environments where fiber availability is sufficient, and performance and stability are critical. When choosing between single-fiber and dual-fiber modules, consider network scale, fiber availability, and required data rates to select the most suitable solution .

Article Content

Single-Fiber vs. Dual-Fiber Optical Modules: Understanding ...

Dual-fiber modules use two optical fibers: One fiber is dedicated to transmitting (TX). The other fiber is dedicated to

Duplex vs BiDi Optical Transceivers: Why Do Some Modules Use

Duplex and BiDi optical transceivers both provide reliable optical connectivity, but they are designed for different

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A fiber optic transceiver (also called an optical transceiver) is a compact module that both transmits and receives data

Understanding Optical Transceiver Modules: A Comprehensive Guide

An optical transceiver module, often simply called an optical module, acts as a signal conversion interface in fiber

Difference Between Single and Dual Fiber Optical Transceivers

Dual Fiber Optical Transceivers: These devices are the more frequently employed type. Employing two fibers strands

Optical module

These modules put the DSP on the module and use a conventional retimed digital interface. These modules can use the same

What Is A Single-Fiber BiDi Transceiver?--ETU-LINK

Single fiber module also called BiDi transceiver or WDM module. It uses WDM technology to realize the bidirectional transmission of

Cisco OSFP 800G Transceiver Modules Data Sheet

The Cisco OSFP-800G-VR8 module (Figure 1) supports 800GBASE-VR8 as well as 2x 400GBASE-VR4, 4x 200GBASE-VR2, and

QSFP-DD Optical Transceivers for High-Speed Connections

Thermal management is not limited by the design of the optical module but is a function of the overall system design and can be

Cisco 40/100Gb QSFP100 BiDi Pluggable Transceiver

The Cisco QSFP 40/100 Gb dual-rate BiDi transceiver can function as a 40Gb BiDi, matching its reach of 100m and 150m over OM3

Arista Optics Modules and Cables

Overview Arista's Optical Modules and Cable portfolio offer a wide variety of high-density and low-power 800G (dual 400G), 400G,

Cisco Optical Transceiver Handling Guide

The following figure shows the QSFP-DD transceiver, but the procedures outlined in this document apply to all pluggable

Coherent optical module

Coherent optical module refers to a typically hot-pluggable coherent optical transceiver that uses coherent modulation (BPSK / QPSK

What is the working principle of the optical transceiver?--ETU-LINK ...

Optical module introduction Optical module is a carrier for the transmission between the switch and the device, is the

Optical Transceiver vs. Fiber Optic Module: What's the Difference?

A transceiver is the basic conversion engine (electrical $\rightleftharpoons$ optical); an optical/fiber-optic module is a broader packaging term that may

Optical Transceivers-The Ultimate Guide for Beginners and Experts

What is an Optical Transceiver? An optical module is an electronic device that converts optical signals and electrical

Optical module

An optical module is a typically hot-pluggable optical transceiver used in high-bandwidth data communications applications. Optical

The Internal Components and Structure of The Optical Transceiver

This article will focus on the internals of the optical transceiver including the TOSA, ROSA and BOSA, and PCBA.

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