Fiber optic transceiver single-mode duplex

Article Overview

A single-mode duplex fiber optic transceiver is a hot-pluggable module that transmits and receives data over single-mode fiber using a duplex LC connector, supporting long-distance, high-speed communication.

Overview

A single-mode duplex transceiver is designed for long-distance optical communication over single-mode fiber (SMF) with a small core diameter of approximately 9/125 um. It uses laser-based transmission, typically at 1310nm or 1550nm wavelengths, to achieve low attenuation and reliable data transfer over distances ranging from 10 km to over 80 km depending on the module and optical power budget . Duplex refers to the use of two fibers--one for transmitting and one for receiving--allowing simultaneous bidirectional communication .

Key Specifications

o Connector Type: LC duplex, which ensures secure and low-loss connections
o Data Rate: Commonly supports 1.25 Gb/s for 1000Base-LX Ethernet applications
o Wavelength: Typically 1310nm for standard long-distance links; 1550nm is used for extended distances
o Distance: Ranges from 10 km to 80 km, with some modules like the Altronix P1SM10 supporting up to 20 km and Luminex modules up to 6.2 miles (~10 km),
o Compliance: IEEE 802.3 standards, SFP MSA, Class 1 laser safety, and SFF-8472 monitoring support
o Operating Conditions: Temperature ranges from 0oC to 70oC, with storage from -40oC to 85oC, and relative humidity around 85%

Applications

Single-mode duplex transceivers are widely used in:

o Campus backbones and metro networks for long-distance Ethernet links
o Telecom and carrier networks requiring high-speed, low-loss transmission
o Switches, routers, and media converters that support SFP modules
o Fiber optic network expansions where duplex LC connections are standard

Advantages

o Long-distance capability due to single-mode fiber and laser transmission
o Hot-swappable design allows easy installation and replacement without shutting down equipment
o High reliability with low signal attenuation and interference

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o Bidirectional communication using duplex fiber for simultaneous transmit and receive

Summary

A single-mode duplex fiber optic transceiver is an essential component for high-speed, long-distance optical networks. Its LC duplex connector, laser-based transmission, and compliance with industry standards make it suitable for Ethernet, telecom, and enterprise backbone applications. When selecting a module, consider wavelength, distance, data rate, and compatibility with your networking equipment to ensure optimal performance .

This series of fiber optic transceivers are supplied in the industry-standard 1×9 SIP package style with a duplex SC, a duplex ST, a

10Gtek 1.25G SFP Transceiver 1000Base-LX, 1310nm SMF SingleMode Fiber Optic Module, up to 10 km, for Cisco GLC-LH-SMD,

Fiber optic cables are divided into single-mode, multimode, simplex, and duplex. For information on single-mode and

Explore the differences between single-mode and multimode SFP transceivers. Find the

Perle SFP Optical Transceivers are hot-swappable, compact media connectors that provide instant fiber connectivity for your

Explore more about the BiDi transceiver"s working principles, types, applications, and how to choose the right BiDi

Small Form-Factor Pluggable (SFP) Single Mode Transceiver Altronix P1SM10 are hot-pluggable SFP fiber transceiver modules and

SC/APC fiber optic adapters, used for single-mode fiber applications, you"ll encounter two main configurations: simplex

Single-mode SFP and multimode SFP are the two main types of hot-pluggable optical transceivers used in fiber optic

BiDi SFP (Bidirectional Small Form-Factor Pluggable) transceivers have emerged as a powerful solution, enabling full

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The NS.SF-0001-ST is a high-performance, hot-swappable SFP transceiver designed to seamlessly work with Altai access points

10GBase-LR SFP+: 10 Gigabit Ethernet Single Mode SFP+ Module, 10 Gb/s, 1310nm wavelength, Duplex Dual LC,

Understanding Fiber Optics - Your Quick Guide to SFP Transceivers What is an SFP Transceiver? SFP (small form-factor

3-Application in data rate: Single fiber optical transceivers are normally used for short distance transmission from 100M to 10G and

Can a single-mode single optical fiber support full-duplex communication, or does it have to be two fibers, one for

Learn what a single mode SFP transceiver is, how it works, key specs, common types, and real-world use cases for long-distance

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