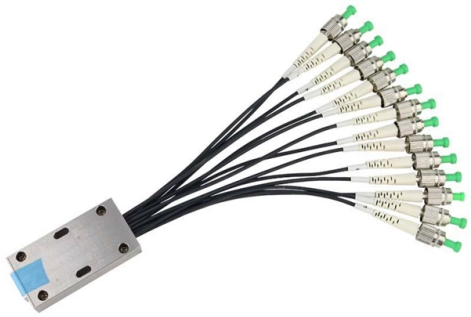
Single-mode fiber optic interface module



Overview

This data sheet describes the benefits, specifications, and ordering information for the Cisco SFP Modules for Gigabit Ethernet Applications.

Key Takeaways

A single-mode SFP (Small Form-factor Pluggable) module is a hot-swappable optical transceiver designed to transmit and receive data over single-mode fiber for long-distance, high-speed communication. OverviewSingle-mode SFP transceivers serve as the interface between networking devices and single-mode fiber (SMF), converting electrical signals into optical signals for transmission and vice versa for reception. They are widely used in switches, routers, servers, and media converters, providing flexibility and scalability in enterprise, data center, and telecom networks.

Unlike multimode SFPs, single-mode modules are optimized for long-distance links due to their narrow fiber core (approximately 9/125 µm) and laser-based transmission.

Key Specifications

Wavelengths: Typically operate at 1310 nm or 1550 nm, chosen to minimize signal loss over long distances. Distance Capability: Depending on the module type and optical power budget, single-mode SFPs can support distances from 10 km up to 70 km or more. Connector Type: Most single-mode SFPs use LC connectors, compatible with standard SMF cabling.

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Hot-

Swappable: Modules can be inserted or removed without powering down the device, allowing flexible network upgrades. Optical Power Budget: Inline optical attenuators may be required for short distances to prevent receiver overload, especially when the fiber span loss is low.

Types and Standards

Common single-mode SFP types include: 1000BASE-LX/LH: Supports up to 10 km on standard SMF; can operate on multimode fiber with a mode-conditioning patch cable. 1000BASE-EX: Supports up to 40 km on SMF, often requiring inline attenuators for short links. 1000BASE-ZX: Supports up to approximately 70 km on SMF, with optical link budgets around 21 dB.

1000BASE-BX: Uses a single strand of SMF with separate wavelengths for transmit and receive, supporting 10–40 km depending on the model.

Deployment Considerations

Fiber Type Matching: Both ends of the link must use SFPs compatible with single-mode fiber to ensure proper signal transmission. Wavelength Selection: Using the correct wavelength (1310 nm or 1550 nm) is critical; mismatched wavelengths can cause link failure. Distance and Power Budget: Ensure the SFP module's rated distance matches the fiber span and consider inline attenuators for short links to avoid overloading receivers.

Digital Optical Monitoring (DOM): Many single-mode SFPs support DOM, allowing real-time monitoring of optical power, temperature, and voltage for network reliability. ApplicationsSingle-mode SFP modules are ideal for: Campus backbones and metro networks where long-distance connectivity is required.

Telecom and FT

Tx deployments connecting customer premises equipment over single-mode fiber. Data center uplinks where high-speed, low-loss transmission is critical. By selecting the appropriate single-mode SFP module, network engineers can achieve reliable, scalable, and high-performance optical links across long distances.

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Article Content

Cisco SFP Modules for Gigabit Ethernet Applications

This data sheet describes the benefits, specifications, and ordering information for the Cisco SFP Modules for Gigabit Ethernet Applications.

Small Form-factor Pluggable

OverviewQSFPSFP typesApplicationsStandardizationMechanical dimensionsDigital diagnostics monitoring

Quad Small Form-factor Pluggable (QSFP) transceivers are available with a variety of transmitter and receiver types, allowing users to select the appropriate transceiver for each link to provide the required optical reach over multi-mode or single-mode fiber. 4 Gbit/s The original QSFP document specified four channels carrying Gigabit Ethernet, 4GFC (FiberChannel), or DDR InfiniBand. 40 Gbit/s (QSFP+) QSFP+ is a

100G QSFP28 Single Fiber (BiDi) Modules: Technology, Benefits ...

Single fiber QSFP28 modules (commonly called BiDi transceivers) enable full-duplex 100G communication over a single optical strand. They do this by using Wavelength Division

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

SFP (Small Form-factor Pluggable) is a compact, hot-pluggable network interface module used to connect network devices (switches, routers, firewalls) to fiber

Selecting the Right SFP Module for Single-Mode and Multimode Fiber

Learn how to select the right SFP module for single-mode and multimode fiber by understanding wavelength, distance, compatibility, and industrial network requirements.

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

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

Optical fiber connector

Field-mountable optical fiber connectors are used to join optical fiber jumper cables that contain one single-mode fiber. Field-mountable optical fiber connectors are

Fibre optic connector systems | singlemode and multimode

Fibre optic connector systems for almost every aspect of fibre optic cabling. Standard, individual and robust connectors.

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SFP Modules: Types, Selection Guide & Applications

Fiber Optic SFP Modules These modules use light signals to transmit data over fiber optic cables, offering high bandwidth and long reach. They are further divided into: Single-Mode SFP

Single Mode Fiber SFP – SFP Single Mode LC Module (20km)

TRENDnet''s single mode fiber SFP, model TEG-MGBS20, features a duplex LC fiber interface, supporting high-speed data rates for long distance networking applications (up to 20km).

SFP Optical Transceiver | SFP Optical Module | Perle

Multimode and single-mode fiber Gigabit Ethernet, Fast Ethernet, Fiber channel, ATM/SONET, SDH Hot-pluggable with durable metal enclosure Can be installed in any Cisco or MSA SFF-8472

Single Mode vs. Multimode Fiber: Core Differences and Selection Guide

How do you choose between single mode and multimode fiber? Compare their differences in core size, light source, bandwidth, transmission distance, and cost to identify the right application.

Amazon : 10Pcs 1.25G Single Mode SFP Fiber Module Network ...

10Pcs 1.25G Single Mode SFP Fiber Module Network Transceiver, LX SM 1310nm 20km, Duplex LC Interface for Switch, Router, Firewall, Network Card, Media Converter etc

Multi-mode optical fiber

Multi-mode optical fiber is a type of optical fiber mostly used for communication over short distances, such as within a building or on a campus. Multi-mode links can be used for data rates up to 800 Gbit/s.

Single Mode Fiber: Types and Applications

Single mode fiber (SMF) is a type of fiber optic cable that only allows one light mode to transmit at a time. Generally, single mode cable has a narrow core diameter of 8 to 10μm

Single Mode vs Multimode SFP Modules: Which One to

Single Mode vs Multimode SFP Modules: Compare fiber types, wavelengths, cost, and transmission distance to select the right optical

What is SFP Module and How to Choose it□

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On the optical fiber side of things, SFP modules come in single-mode and multimode variants, allowing for the selection of an appropriate transceiver based on the optical range required

SFP Gigabit Transceivers Singlemode Single-Strand BiDi

Discover SFP Gigabit single-strand BiDi modules for 20Km with SC connector. Cisco compatible - buy now for efficient fiber links!

Related Video Reference

This video was associated with the source search result. Verify technical details against current product documentation and project requirements.

Additional source notes

Quad Small Form-factor Pluggable (QSFP) transceivers are available with a variety of transmitter and receiver types, allowing users to select the appropriate transceiver for each link to provide the required optical reach over or .
4 Gbit/s The original QSFP document specified four channels carrying Gigabit Ethernet, 4GFC (FiberChannel), or DDR InfiniBand. 40 Gbit/s (QSFP+) QSFP+ is a...

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North American project location: Research Triangle Park, North Carolina, United States

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

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