

Complete List of Optical Module Interfaces



Overview

An optical module is a typically hot-pluggable optical transceiver used in high-bandwidth data communications applications. Optical modules typically have an electrical interface on the side that connects to the inside of the system and an optical interface on the side that connects to the outside world through a fiber optic cable. The form factor and electrical interface are often specified by an interested group using a multi-source agreement (MSA).

Key Takeaways

Optical module interfaces include a wide range of form factors and standards such as SFP, SFP+, SFP28, XFP, QSFP, QSFP28, CFP, CFP2, CFP4, and their corresponding optical connectors like LC, SC, and FC.

- SFP (Small Form-factor Pluggable): Supports 1Gb/s to 28Gb/s single-channel transmission, compact size, hot-swappable, commonly used in enterprise networks and data centers .
- SFP+: Mainstream 10G module, supports 850nm, 1310nm, or 1550nm wavelengths, compatible with Ethernet, Fibre Channel, and SONET/SDH .
- SFP28: 25G module, supports SR, LR, ER, CWDM, and DWDM applications, backward compatible with 10G SFP networks .
- XFP: 10G hot-swappable module, protocol-independent, used for Ethernet, Fibre Channel, and SONET/SDH .

- QSFP (Quad SFP): Four parallel 10G channels, total 40G transmission, high-density solution for aggregation layers .
- QSFP+: Enhanced 40G module, supports higher performance and density .
- QSFP28: 100G module with four 25G channels, compatible with 100G Ethernet standards, upgradeable from 25G to 100G .
- CFP, CFP2, CFP4: High-speed modules for 100G and 400G networks, supporting coherent optics and analog/digital interfaces .
- QSFP-DD: 400G module, double density QSFP form factor, designed for ultra-high-speed networking .

Optical Interfaces (Connectors)

- LC (Lucent Connector): Small form factor, widely used in SFP and SFP+ modules.
- SC (Subscriber Connector): Larger connector, common in older networks and some DWDM applications.
- FC (Ferrule Connector): Threaded connector, often used in high-reliability or legacy systems.
- MPO/MTP: Multi-fiber connectors used in QSFP and high-density 40G/100G/400G modules.

Electrical and Digital Interfaces

- CEI (Common Electrical Interface): Standardized by the Optical Internetworking Forum (OIF) for high-speed electrical signaling .
- ACO (Analog Coherent Optics): Used in CFP2 modules for coherent optics, allowing DSP to reside on the main board while the module handles analog optical signals .
- Retimed Digital Interfaces: Used in modern modules to improve signal integrity and support higher data rates.

Wavelength Division Multiplexing Modules

- CWDM (Coarse Wavelength Division Multiplexing): 18 channels, 20nm spacing, cost-effective for short to medium distances .
- DWDM (Dense Wavelength Division Multiplexing): Narrow spacing (0.4–1.6nm), high channel density, suitable for long-distance backbone networks .

Summary

Optical modules are classified by form factor, data rate, transmission distance, fiber type, and connector interface. Modern networks use a combination of SFP/SFP+/SFP28 for 1G–25G, QSFP/QSFP28 for 40G–100G, and CFP/CFP2/CFP4 or QSFP-DD for 100G–400G applications. Choosing the right module and interface ensures optimal network performance, high port density, and compatibility with CWDM/DWDM systems .

Article Content

Optical module

OverviewElectrical Interface TypesOptical modulation and multiplexing typesIn-module componentsElectrical cable equivalentFront panel optical module MSAsOn-Board Optical module MSAsUsers of Optical Modules

An optical module is a typically hot-pluggable optical transceiver used in high-bandwidth data communications applications. Optical modules typically have an electrical interface on the side that connects to the inside of the system and an optical interface on the side that connects to the outside world through a fiber optic cable. The form factor and electrical interface are often specified by an interested group using a multi-source agreement (MSA). Optical modules can either plug into a front pa

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

What is an SFP? SFP (Small Form-factor Pluggable) is a compact, hot-pluggable network interface module used to connect network

Cisco Compatible Optical Modules Catalog

This document serves as the definitive technical reference for the Cisco Compatible Optical Modules Catalog, encompassing a

Optical module

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Understanding Optical Modules

If you know the model or type of an optical module, you can view the section "Pluggable Modules for Interfaces" in the Hardware

What is Optical Link Module?

An optical link module typically consists of an optical transmitter (TOSA, Transmitter Optical Sub-Assembly, containing a laser

Cisco Optical Services Modules

Cisco Optical Services Modules Cisco offers a wide variety of plug-in cards supporting optical based platforms. Additional Resources

Cisco Pluggable Optical Transceivers Product Selection Tools

The following tools provide dynamic user interfaces and interactive menus so you can query, search, and filter the information you

Cisco Optics-to-Device Compatibility Matrix

Comprehensive compatibility information for Cisco optical transceivers and network devices Disclaimer: Cisco makes the data in this

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Understanding Optical Modules: Types and Troubleshooting Guide

An optical module is mainly composed of optoelectronic devices (including the optical transmitter and optical receiver), functional

Cisco ASR 900 Router Series Configuration Guide, Cisco IOS XE 17

For example, if the optical interface module is installed in slot 0 of the chassis, the controller configuration address is specified as

Different Types of Optical Connectors | Inneos

Optical connectors are the physical interface that links an optical device to a fiber optic cable. Fiber optics are used in

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