

Data Center Network Optical Modules



Overview

Analog Devices' optical networking solutions address a wide range of applications in data center, enterprise, and telecom markets.

Key Takeaways

Data center optical modules are pluggable transceivers that enable high-speed, scalable, and energy-efficient connectivity across modern data center networks.

Optical modules are critical components in data center networks, providing the physical interface for high-speed data transmission between servers, switches, and storage systems. They support a range of speeds from 10G to 400G and beyond, and are designed to optimize bandwidth, latency, power efficiency, and upgrade flexibility. Modern data centers, especially those supporting AI and cloud workloads, rely on these modules to maintain performance and scalability.

Common Types and Form Factors

- SFP/SFP+ (10G): Compact modules for short- and long-reach connections, often used in Top-of-Rack (TOR) switches.
- SFP28 (25G): Higher-speed variant for 25G networks, compatible with existing SFP infrastructure.
- QSFP+/QSFP28 (40G/100G): Quad Small Form-Factor Pluggable modules for aggregation and core layers.

- QSFP-DD (200G/400G): Double-density modules for high-bandwidth AI and cloud networks .
- OSFP (400G): Optimized for high-density, high-speed deployments .
- XPO (12.8Tbps): Next-generation pluggable modules designed for AI data centers, offering extreme bandwidth, liquid cooling, and high front-panel density .

Key Features and Benefits

- Pluggability: Modules can be replaced or upgraded without servicing the entire switch, minimizing downtime .
- Energy Efficiency: Coherent pluggable optics reduce power consumption and cooling requirements, saving up to 80% in energy and space for data center interconnects .
- High Bandwidth: Advanced modules like XPO deliver multi-terabit throughput per module, supporting AI and machine learning workloads .
- Flexibility: Support for multiple optical architectures (DR, FR, LR, SR, ZR) allows deployment across diverse network distances and topologies .
- Compatibility: Many modules are interoperable across vendors, enabling modular growth and future-proofing networks .

Deployment Considerations

When selecting optical modules, data centers should consider:

- Transmission distance: Short-range (SR) for intra-rack, long-range (LR/FR/ZR) for inter-data center links .
- Power and cooling: High-speed modules may require integrated heat sinks or liquid cooling .
- Network architecture: Modules must align with TOR, aggregation, or spine-leaf designs.
- Upgrade path: Choose modules that support future bandwidth requirements and AI workloads .

Vendor Solutions

- Cisco: Offers coherent pluggable modules for 400G+ interconnects, OSFP 1.6T, and QSFP-DD modules with integrated heat sinks for AI data centers .
- Arista: XPO modules provide ultra-high bandwidth, liquid cooling, and high-density deployment for AI workloads .
- Huawei: StarryLink pluggable modules offer flexible plug-and-play solutions for general-purpose and high-performance data center networks .

Conclusion

Data center optical modules are no longer simple transceivers—they are strategic enablers of network scalability, reliability, and energy efficiency. Selecting the right module involves balancing speed, density, power, cooling, and compatibility to meet current and future data center demands, particularly in AI-driven and hyperscale environments .

Article Content

Products

The solution simplifies transport between data centers by replacing stand-alone optical transponders with the Cisco ®

Cisco Optics | Transform Your Network

Get the highest quality, performance-leading optical transceivers for any network architecture. Find the transceiver model to fit your

AI Data Center Optical Interconnect Guide

Explore the 2026 AI Data Center Optical Interconnect Guide. Learn about AI networking architectures, 800G/1.6T

Recent advances in optical technologies for data centers: a review

Modern data centers increasingly rely on interconnects for delivering critical communications connectivity among numerous servers,

Top Optical Transceiver Modules for Data Center Applications

Introduction: Why Optical Modules Are Critical to Data Center Infrastructure In today's cloud-first, AI-driven, and 5G

Optical Modules and Networks for AI-Era Data Centers

We review recent advances in optical modules and networks for AI-era data centers (DCs), covering intra-DC optical pluggable

Optical Interconnection Networks in Data Centers: Recent Trends

In this article we follow the rise of optical interconnection networks for data centers in order to meet network traffic requirements and

Data Center Interconnect with Cisco Coherent Pluggable Optics

The solution simplifies transport between data centers by replacing stand-alone optical transponders with the Cisco® portfolio of

Comprehensive Guide to Optical Transceiver Classifications and

Optical modules are critical components in fiber optic communications, enabling the conversion between electrical

Data Center Optical Module Market Research Report 2034

The Data Center Optical Module market was valued at \$16.9 billion in 2025 and is projected to reach \$77.6 billion by 2034, growing

Cisco Optics | Transform Your Network

Pluggable optics enable high data-rate transmission between servers, switches, and routers. Get performance-leading optical

What is Data Center Interconnect (DCI) and Why Optical Modules Are ...

Discover what DCI is and how optical modules deliver high-speed, secure, and reliable connectivity between data

StarryLink Optical Module

Huawei's StarryLink optical modules for data center networks offer seamless interconnection from GE to 800GE across all scenarios,

Optical Networking Solutions | Analog Devices

Analog Devices' optical networking solutions address a wide range of applications in data center, enterprise, and telecom markets.

Marvell Optical DSPs | Powering the Future of AI Infrastructure

Optical DSPs are used in the pluggable optical modules essential for enabling high-bandwidth, low-latency and power-efficient

Skyworks | Data Center

Optical modules enable high-speed data path connections within the data center switching network, as well as to the external core

Types of Optical Transceivers for Data Center Design

Optical transceivers in data center design are electro-optical conversion modules that dictate network bandwidth and physical reach.

Related Video Reference

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

Contact Us

Continue your research online:

Website: <https://rivomultitrade.co.za>

Technical inquiry: <https://rivomultitrade.co.za/contact.html>

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

