Optical Modules for Data Centers

Article Overview

Modern data centers increasingly rely on 800G and 1.6T optical modules, including QSFP-DD, OSFP-XD, and co-packaged optics, to meet high-bandwidth, low-latency requirements for AI and hyperscale workloads.

Key Optical Module Types

1. QSFP-DD and OSFP Modules

• QSFP-DD (Quad Small Form-factor Pluggable Double Density) and OSFP (Octal Small Form-factor Pluggable) are widely used for 400G and 800G deployments, providing high-density, pluggable solutions for leaf-spine and top-of-rack architectures .
• OSFP-XD and next-generation OSFP-224 are designed for 1.6T deployments, addressing power, heat, and signal integrity challenges at 224 Gbps per lane . 2. Co-Packaged Optics (CPO)
• CPO integrates optical transceivers directly onto the switch ASIC, reducing electrical losses, power consumption, and improving signal integrity .
• Silicon photonics-based CPO switches are being adopted by hyperscalers like NVIDIA to eliminate pluggable transceivers entirely, achieving significant power savings . 3. Linear Pluggable Optics (LPO)
• LPO modules remove the DSP chip from the transceiver, relying on the host platform's DSP, which reduces latency by up to 90% and lowers power consumption from 7–9W to 2–4W for 400GbE transceivers .
• LPO is ideal for short links, such as switch-to-switch or GPU-to-GPU connections within racks, supporting high-performance computing and AI fabrics . 4. Coherent Pluggable Optics...

Article Content

Opportunities in networking optics: Boosting supply for data centers

Optical transceivers and their various components are integral to supporting capacity and performance within various configurations

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

An optical digital signal processor (DSP) converts high-speed electrical data into optical signals and corrects errors to ensure signal

Optical Modules in General-Purpose Computing Scenarios

Huawei offers a comprehensive portfolio of pluggable StarryLink optical modules for data center networks, with various models

Understanding the applications of optical modules in a data center

All these features make optical modules relevant across wider choice of equipment, and also allow the IT managers to

Data Center Control Solutions for Optical Systems and Modules

Data Center Control Solutions for Optical Systems and Modules Analog Devices'' optical control solutions, including precision

XPO: Redefining Pluggable Optics for AI Networking

XPO represents a new class of optical pluggable module designed specifically for next-generation AI data center fabrics. Each XPO

Transceiver Modules for Data Center Interconnect

Learn how and where to implement Cisco Optics solutions to gain the reach you need for connecting data centers across your metro

Products

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

Marvell Optical DSPs | Powering the Future of AI Infrastructure

Discover how Marvell''s Optical DSPs enable high-speed, energy-efficient connectivity for AI workloads, data center interconnects,

DCI Optical Modules | Delivering high bandwidth over distance

Explore DCI Modules Marvell offers a portfolio of DCI modules designed to efficiently transmit data over regional fiber networks.

What is Co-Packaged Optics (CPO) Technology? | Corning

Today, data centers use a separate approach for optics and electronics, in which optical modules are connected to switches and

The Evolution of Optical Modules: Powering the Future

Data centers, the beating hearts of this digital revolution, are tasked with processing and

What Is an Optical Module and Its FAQs (V200)

What Is an Optical Module and Its FAQs (V200) Describes what an optical module is and FAQs, including the fundamentals,

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

Optical module design resources | TI

Integrated circuits and reference designs help you create a smaller and faster optical module design used in high-bandwidth data

Cisco Digital CFP2-DCO Coherent Optical Module Data Sheet

Cisco offers a comprehensive range of pluggable optical modules in the Cisco ONS pluggables portfolio. The wide

GlobalFoundries accelerates adoption of co-packaged optics for

GlobalFoundries accelerates adoption of co-packaged optics for advanced AI data centers with SCALE optical module

The Evolution of Optical Modules: 400G → 800G → 1.6T – A Strategic ...

Discover the evolution from 400G to 800G and 1.6T optical modules. Learn key technologies, CPO vs pluggable, and

Understanding Optical Module Demand in Evolving Data Center ...

Explore optical module demands in evolving data center architectures. Learn about usage in traditional, improved,

Optical module

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

Selection Solution for 400G Optical Modules In Data Centers

This article is mainly about several options for 400G optical modules in data centers and the application scenarios.

Tower Semiconductor Teams with NVIDIA to Advance AI

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The Critical Role of Optical Transceivers in Cloud Computing

Optical modules boost cloud computing by enabling fast, reliable, and scalable data transmission in modern data

How to Customize Optical Modules in Data Centers? |FiberMall

Since the development speed of data centers is much faster than that of the traditional telecommunications industry, the

Top Optical Transceiver Modules for Data Center Applications

This guide explores the most widely used and performance-optimized transceiver modules in modern data centers,

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

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