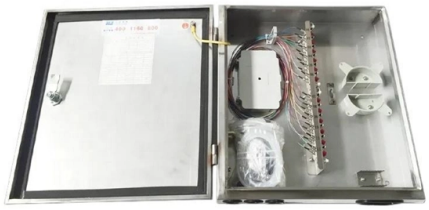
Optical Switch Chips and Modules



Overview

Backed by over 25 years of engineering expertise, we manufacture components, OEM modules, and turnkey systems with comprehensive control interface options.

Key Takeaways

Optical modules convert electrical signals from switch chips into optical signals for high-speed data transmission, with Co-Packaged Optics (CPO) offering integrated, high-efficiency solutions.

Role of Optical Modules and Switch Chips

In modern data centers and high-speed networks, switch chips (ASICs or NPUs) handle massive volumes of data, performing packet processing, routing, and forwarding. Optical modules act as the interface between these electrical signals and fiber-optic networks, converting serialized electrical data into optical signals for transmission and vice versa, ensuring signal integrity, low latency, and high throughput (Weyland).

Physical Interfaces

Optical modules use standard form factors such as SFP+, QSFP28, QSFP-DD, OSFP, and CFP2/CFP4, which plug directly into switch board cages. The switch chip exposes high-speed SerDes lanes (Serializer/Deserializer), typically operating at 10G, 25G, 50G, 100G, or 400G per lane, matching the optical module's data rate. The physical connection is designed to minimize signal loss and reflection, ensuring reliable high-speed communication.

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Electrical Signaling

The link between a switch chip and an optical module relies on differential high-speed electrical signals. The switch chip transmits serialized data over differential pairs to the optical module's laser driver and transmitter circuits. For example, a QSFP28 100G module uses 4 lanes at 25G each, which the module converts into 100G optical signals using PAM4 or NRZ modulation.

High-speed lanes require impedance matching, pre-emphasis, and equalization to compensate for PCB trace loss and connector impairments. On reception, photodetectors and TIA circuits convert optical signals back to electrical signals for the switch chip.

Co-

Packaged Optics (CPO)CPO technology integrates optical components (lasers, photodetectors) directly alongside the switch ASIC in the same package, drastically reducing the distance between electrical and optical components. This millimeter-level integration improves signal integrity, reduces insertion loss, lowers power consumption, and frees up front-panel space compared to traditional pluggable optics.

Benefits of CPO

Power Efficiency: Shorter electrical paths reduce energy loss, lowering power requirements and operational costs. Higher Bandwidth: Direct integration supports next-generation data rates, including 400G, 800G, and 1. 6T Ethernet.

Improved Performance: Reduced latency and enhanced signal integrity enable faster, more reliable data transfer. Scalability: CPO allows high-bandwidth connections across multiple nodes, supporting large-scale AI and cloud computing clusters.

Considerations

While CP

O offers significant advantages, challenges include loss of configurability, as all ports must use the same optics type, and potential serviceability and interoperability issues. Alternatives like Linear Pluggable Optics (LPOs) may offer comparable power efficiency with simpler deployment in some scenarios.

Summary

Optical modules and switch chips form the backbone of high-speed data transmission, with optical modules converting electrical signals to optical signals for fiber networks.

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Emerging CP

O technology integrates these components at the chip level, enhancing bandwidth, power efficiency, and performance, making it a key enabler for next-generation data centers and AI computing clusters.

Article Content

CPO Switch: Next-Generation Integrated Optical Networking ...

CPO switches shorten the electrical signal path, reduce power consumption, and decrease the number of pluggable modules by co-packaging optical modules with switch chips, while

Optical Switches

Backed by over 25 years of engineering expertise, we manufacture components, OEM modules, and turnkey systems with comprehensive control interface options. Custom solutions and made-in-the

Co-Packaged Optics — a deep dive | APNIC Blog

In summary, Broadcom''s solution is a single-package switch with optics embedded, whereas NVIDIA features a novel package with removable photonics modules. The spectrum-X CPO

Passive Modules, Optical Switch Modules, Functional Modules and

GLSUN offers passive and active modules such as optical switch modules, olp modules, obp modules, cwdm modules, dwdm modules, ccwdm modules, edfa, dcm and other customzied modules for

Optical Switch Modules-DFB Chip, APD Chip, Optical Switch, Optical

Widely production portfolio including DFB LD chips, TO-CAN, high data rate passive optical devices and modules, function modules, optical transmission equipment, optical line protection and cable

The Optical Circuit Switching Market

The Optical Circuit Switching Market – 4Q25 In this update to our OCS report we cover more vendors and technologies, investigate additional applications, and update our market forecast.

What is Co-Packaged Optics (CPO) Technology?

Instead of relying on traditional pluggable optics, CPO uses tightly integrated optical and electrical components within the same package to couple light into and out

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Co-Packaged Optics (CPOs)

From Jensen Huang showcasing CPO switches at GTC 2025 to a wide range of vendors demonstrating optical engines integrated inside ASIC packages at OFC 2025, co-packaged optics

Optical Circuit Switches

Lumentum optical circuit switches enable flexible, energy-efficient optical interconnects for AI and cloud networks with ultra-low latency and high scalability.

Optical Switch Module, Optical Switches Manufacturer | GLSUN

GLSUN offers optical switch modules including multichannel optical switch, rotary optical switch, cascade optical switch, mems mxn optical switch, multicast switch and mems matrix optical switch

POLATIS Optical Switch Modules from 16x16 up to 48x48 Ports

POLATIS ® Series 6000 Optical Switch Modules (OSM) are high-performance, fully non-blocking all-optical matrix switch modules with port counts from 16xCC up to 48xCC, offering "any-to-any" port

DFB LD Chips | Fiber Optical Switches | Optical Line Protection and ...

GLSUN makes DFB LD chips & photodiode chips, high quality optical switches, mems variable optical attenuators, optical isolators, cwdm, dwdm, optical splitters, optical line protection and fiber

Broadcom CPO: Highest Power Efficiency and Bandwidth Density

Co-Packaged Optics (CPO) is an advanced integration of optics and silicon on a single packaged substrate addressing interconnect bandwidth and power challenges.

Ultrafast optical circuit switching for data centers using integrated ...

Optical technologies could enable fast and power-efficient networks for data centers. Here, the authors report Si3N4 microcomb based ultrafast photonic switching to provide enhanced

A New Era in Data Center Networking with NVIDIA ...

Conclusion NVIDIA''s silicon photonics-based network switching marks a groundbreaking shift in data center networking. By integrating optical transceivers directly with switch ICs, this

Optical Components and Modules

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Everything you need to build an optical network from end-to-end. Thin-film filter and PLC based AWG for multiplexing, a full suite of components for optical amplification use, optomechanical or MEMS-based

The Most Comprehensive Guide Of Optical Modules

Explore the ultimate guide to optical modules. Learn types, functions, performance metrics & how to choose the right module for your fiber network.

A comprehensive analysis of silicon photonic switching chips

Recently, interest has increased in the flexibility of silicon-integrated photonic system design with the complementary metal-oxide semiconductor (CMOS) advancements, which enables

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

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