

Article Overview

OCP optical modules are manufactured to meet Open Compute Project standards, enabling high-speed, low-latency, and scalable data center interconnects.

Overview of OCP Optical Modules

OCP optical modules are designed for high-performance data center and AI/ML applications, supporting ultra-low latency and high bandwidth. These modules often include mid-board optical transceivers like Samtec's FireFly(TM) series, which are compact and optimized for AI/ML system topologies . They are engineered to integrate seamlessly with OCP-compliant racks and interconnect architectures, ensuring compatibility with Open Rack v3 (ORv3) and other OCP standards .

Manufacturing Capabilities

Leading manufacturers such as Sanmina, TE Connectivity, and Amphenol provide end-to-end OCP-compliant solutions. Sanmina offers vertically integrated manufacturing, covering design, prototyping, and production of optical modules and liquid-cooled solutions for thermal efficiency . TE Connectivity focuses on high-speed, high-power connectors and modular I/O assemblies, supporting 48V architectures and 112GbE module form factors for dense AI/ML deployments . Amphenol provides high-speed interconnects, power connectors, and modular jacks for ORv3 systems, ensuring signal integrity, thermal performance, and scalability .

Optical Circuit Switching (OCS) Integration

OCP optical modules are increasingly used in Optical Circuit Switching (OCS) networks, which eliminate optical-electrical-optical (OEO) conversions to reduce latency and power consumption . OCS technologies include MEMS beam steering, liquid crystal devices, piezo-actuated systems, and silicon photonics switches, allowing dynamic, protocol-agnostic, and bufferless optical connections. Optical modules in these systems must meet stringent requirements for insertion loss, switching speed, and reliability .

Key Considerations in Manufacturing

- o Form Factor and Compatibility: Modules must fit OCP-standard racks and interconnects, supporting high-density deployments.
- o Thermal Management: Liquid-cooled or heat-dissipating designs are critical for AI/ML workloads.
- o Signal Integrity: High-speed optical modules require precise alignment and low-loss optical paths.
- o Scalability: Manufacturing processes must support large-scale production for hyperscale data centers.
- o Compliance and Testing: Modules undergo rigorous testing to meet OCP specifications for performance, reliability, and interoperability .

Conclusion

OCP optical module manufacturing combines advanced photonics, high-speed interconnect design, and scalable production to meet the demands of modern data centers. Companies like Sanmina, Samtec, TE Connectivity, and Amphenol provide comprehensive solutions, from design to deployment, ensuring modules are OCP-compliant, high-performance, and suitable for AI/ML and hyperscale applications. These modules are integral to OCS-enabled networks, enabling low-latency, energy-efficient, and protocol-agnostic data center architectures.

Enter Co-Packaged Optics (CPO), a transformative architecture where the optical engine moves inside the switch ASIC

As the data center ecosystem rapidly transitions toward Co-Packaged Optics (CPO) and Optical I/O (OIO) to meet the

Liquid cooling using cold plates cooling technologies has been the focus of many technology papers and industry guidelines. It is

Enter optical modules, which leverage the power of light to transmit data efficiently over long

Source Photonics is one of the world's leading optical communications suppliers, with operations spanning optical

While this specification is focused on 400G operation, the module shall be compliant to the 200G-FR4 QSFP56 OCP Technical

Open OCS to Deliver High-performance AI Cluster Networking The Open Compute Project Foundation (OCP), the

The adoption of a 1.6T optical system based on 224G per lane technology represents a pivotal advance for future AI

Samtec had several live-product optical demonstrations at OFC 2025, including PCIe 5.0 over fiber, co-packaged chip systems, the

This article focuses on the key points of optical module processing and manufacturing process control, and how to

Co-Packaged Optics (CPO) has long promised to transform datacenter connectivity, but it has taken a long

time for the

Scale-Up Diversity Industry rapidly evolving to three protocols for scale-up: Ethernet, UALink, Nvlink CPO based Optical

NVIDIA is developing a co-packaged optics (CPO) platform that integrates optical and electrical components to

With our plug-and-play power connectors and cable assembly solutions for Open Compute Project (OCP)

Central to the report is the recognition of advanced semiconductor packaging (2.5D & 3D) as the cornerstone of co-packaged optics

The OCP version can be distinguished from other versions by the "OCP green"-colored pull tab, as shown in Figure 3.

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