

High-speed copper cable connectors and optical modules



Overview

High-Speed I/O Solutions | Copper Cable Assemblies | Active Optic. Amphenol is a technology leader in the design, manufacture, and supply of high-perform.

Key Takeaways

High-speed copper and optical interconnects enable data transmission from 10G to beyond 1.6T per lane, with solutions optimized for signal integrity, density, and low latency in modern data centers and AI clusters. Copper Cable Connectors

High-speed copper connectors, including Direct Attach Cables (DAC) and Active Electrical Cables (AEC), are widely used for short-reach connections (typically under 5 meters) due to their cost-effectiveness and reliability . Modern copper solutions, such as QSFP DD, OSFP, and SFP28 assemblies, support data rates from 10G to 400G per link, with PAM4 signaling enabling higher bandwidth per lane . Advanced copper connectors integrate DSPs to extend reach and maintain signal integrity at higher speeds, reducing insertion loss and crosstalk . Examples include Amphenol's micro-LinkOVER and Molex's 112G AEC cables, which provide low VSWR and high SNR for demanding applications .

Optical Modules



Optical modules, including Active Optical Cables (AOC) and pluggable transceivers, are essential for longer distances (from several meters to kilometers) and high-bandwidth applications . Systems like Samtec's FireFly™ Micro Flyover support up to 28 Gbps per lane with a path to 112 Gbps PAM4, offering interchangeable copper and optical connectivity in the same footprint . Optical modules often incorporate PAM4 DSPs, transimpedance amplifiers, and silicon photonics, enabling high-speed, low-latency transmission while reducing power per bit . Pluggable modules are critical in AI clusters and hyperscale data centers for server-to-switch and switch-to-switch links.

Key Features and Trends

- Form Factors: QSFP, QSFP-DD, OSFP, SFP-DD, and micro high-speed edge card connectors allow high-density deployment .
- Bandwidth: Copper and optical solutions now support 100G, 200G, 400G, and up to 1.6T per lane with PAM4 signaling .
- Signal Integrity: Advanced designs minimize crosstalk, insertion loss, and EMI, with integrated heat sinks for thermal management .
- Flexibility: Some systems allow interchangeable copper and optical connections using the same connector, simplifying board design and reducing costs .
- Applications: Data centers, AI clusters, high-performance computing, and distributed architectures benefit from these interconnects for low-latency, high-bandwidth communication .

Summary

High-speed copper connectors are ideal for short-reach, cost-sensitive applications, while optical modules excel at longer distances and ultra-high bandwidth requirements. Modern interconnect solutions integrate DSPs, silicon photonics, and advanced form factors to meet the growing demands of data centers, AI clusters, and hyperscale computing environments, providing scalable, reliable, and high-performance connectivity .

Article Content

JPC connectivity Inc. | 800G/400G Optical Transceivers & High-Speed ...

JPC connectivity Inc. delivers high-speed interconnect solutions — 1.6T/800G/400G optical transceivers, OSFP/QSFP-DD modules,

High-Speed Cable Assemblies

These cable assemblies support aggregate data rates of 25, 50, 100, 200, 400 and 800 Gbps. We offer custom cabling solutions and

HIGH SPEED CABLES, LINEAR DRIVE AND CO-PACKAGED

Active Optical Cables (AOCs) embed optical transceiver technologies into enclosed cables that hide the high-speed optics behind

Active Optical Cables (AOC)

Overview Molex's Active Optical Cables (AOC) offer significant cost advantages over traditional optical modules. Additionally, AOCs

High Speed Connectors | TE Connectivity

Explore our latest rugged high-speed connector solutions for Aerospace, Defense and Marine industries supporting VITA standards,

Cisco Optics | Transform Your Network

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

Small Form-factor Pluggable

Small Form-factor Pluggable (SFP) is a compact, hot-pluggable network interface module format used for both telecommunication

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://coetzerinvestments.co.za>

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

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

