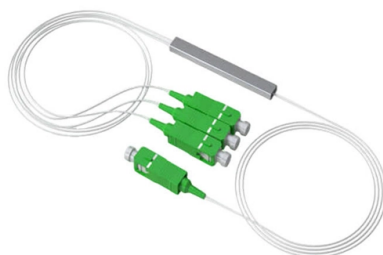


RIVO MULTITRADE OPTICAL SYSTEMS

AOC cable and optical module



Overview

Introduction Modern data centers demand a careful balance of cost, latency, power and reach when choosing interconnects.

Key Takeaways

Active Optical Cables (AOC) are fiber-optic cables with integrated transceivers at both ends, offering longer reach and EMI immunity compared to copper DACs, while optical modules are standalone transceivers paired with separate fiber for maximum flexibility and distance. What is an Active Optical Cable (AOC)?

An AOC is a pre-assembled, fixed-length cable that integrates optical fiber as the transmission medium and optical transceivers at both ends, which convert electrical signals to optical signals and back. The electronics embedded in the connectors make the cable "active," allowing it to support high bandwidth, low bit error rates, and longer distances than copper cables. Typical connector types include SFP+, SFP28, QSFP+, QSFP28, QSFP-DD, and OSFP, with speeds ranging from 10G to 800G. AOCs are lightweight, thin, and immune to electromagnetic interference (EMI), making them ideal for rack-to-rack links, AI/HPC clusters, and data centers where medium distances ($\approx 5\text{--}30$ m) are required.

Breakout AOCs

Breakout or fanout AOCs allow a high-speed port to connect to multiple lower-speed ports, such as a QSFP+ 40G module splitting into four 10G SFP+ modules. This is useful for interconnecting devices with different port speeds.

What are Optical Modules?

Optical modules are standalone transceivers (e.g., SFP28, QSFP28, QSFP56) that plug into network devices, paired with separate fiber patch cables. They provide maximum flexibility and reach, supporting distances from 100 meters to over 80 km, depending on the fiber type and module specification. Unlike AOCs, optical modules allow independent replacement, upgrades, and longer carrier-grade connections, but they come with higher cost and power consumption due to the need for two transceivers per link and additional fiber handling.

Comparison: AOC vs Optical Modules vs DAC

Feature	AOC (Direct Attach Copper)	Optical Modules + Fiber	DAC (Fiber with embedded transceivers)
Distance	Very short (≤ 5 m)	Medium (≈ 5 –30 m, sometimes up to 100 m)	Long (100 m $\rightarrow$ multi-km)
EMI Immunity	Low	High	High
Weight & Size	Heavy, bulky	Lightweight, thin	Depends on fiber and patching
Cost	Lowest	Medium	Highest per link
Flexibility	Fixed	Fixed length	High, modular
Use Case	Short interconnects	Rack-to-rack, HPC clusters	Carrier-grade, long-distance links

Applications

- AOCs: Data centers, high-performance computing, AI clusters, and medium-distance interconnects where ease of installation and EMI immunity are important.

- Optical Modules: Long-distance, flexible deployments, carrier networks, and situations requiring modular upgrades or multi-kilometer reach.

- DACs: Very short, cost-sensitive connections within racks.

Key Takeaways

- AOCs combine the convenience of DACs with the advantages of fiber optics, offering medium-range, high-speed, and EMI-resistant connections.

- Optical modules provide maximum flexibility and long-distance capability but at higher cost and complexity.

- Choosing between AOC and optical modules depends on distance, cost, power, and deployment flexibility requirements in data center or HPC environments.

Article Content

AOC, DAC, ACC, AEC Modules: The most Complete Overview

AOC consists of two modules on either end, connected by a section of optical fiber in the middle. The optical module

Ultimate AOC Cable Guide: Active Optical Cables Explained

Discover how AOC cable (active optical cables) works, benefits, types, and tips for using AOC cable solutions in high

Active Optical Cables (AOC)

Active Optical Cables (AOCs) are high-speed interconnects that combine optical fiber with integrated transceiver

Understanding AOC Cables: The Ultimate Guide to Active Optical Cables ...

A: AOC cables work well with standard Ethernet transceivers and optical modules. They offer a simple plug-and-play

AOC (Active Optical Cable) : Optical Transceiver Module | NEC

AOC (Active Optical Cable) Active Optical Cables (AOC) use optical fibers, allowing for longer distance transmission compared to

Dac Vs Aoc Vs Optical Modules: Cost & Performance Comparison For

Introduction Modern data centers demand a careful balance of cost, latency, power and reach when choosing interconnects. This

What is the Difference Between AOC and Optical Transceiver?

AOC active optical cable is an optical fiber with a module attached to each end, which is equivalent to a cable and a

NVIDIA Enterprise Support Portal | Introduction to Active Optical ...

AOC cables have a short bend radius and are much thinner than most DAC cables. This makes them easier to deploy

What is an Active Optical Cable and How Does It Work

An aoc active optical cable has a clever build. There are two main ends on the cable. Each end holds an optical

Active Optical Cables (AOC) – MapYourTech

An Active Optical Cable is an advanced cabling assembly that integrates fiber optic technology with active electronic

Active Optical Cable (AOC) Connection Solutions

AOC serves as an ideal cable for connecting racks in data centers, with the optimal length ranging from 5 to 30

Active Optical Cable (AOC) Explained in Details

Active Optical Cable assemblies revenue is expected to build significant growth over the next five years, according to a new 2010

What Is an Active Optical Cable (AOC)?

An active optical cable (AOC) is a factory-terminated cable assembly that carries data over optical fiber while using

Dac Vs Aoc Vs Optical Modules: Cost & Performance Comparison For

This comparison focuses on three dominant choices— DAC/AOC pairings (Direct Attach Copper and Active Optical Cables) and

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Master the fundamentals, architecture, and applications of high-speed Active Optical Cable technology for modern data

What is a Active Optical Cable (AOC)?

What is an AOC or Active Optical Cable? In simple terms, an active optical cable has modules at either end of an

What are Optical Transceiver Modules, AOC, DAC, and ACC?

The biggest advantage of this connection method compared to AOC is that it can realize flexible connections between

Active Optical Cables (AOC)

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

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