

Direct-connection cable optical module



Overview

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Key Takeaways

Direct connection cables, including DAC and AOC, provide high-speed, short-distance links between optical modules or network devices without the need for separate transceivers. Types of Direct Connection Cables

1. Direct Attach Copper (DAC) Cables DAC cables are pre-terminated copper cables that connect two optical modules directly. They are cost-effective for short distances (typically up to 7 meters) and are available in passive and active versions. Passive DACs are simpler and cheaper, while active DACs include signal conditioning for longer reach and higher reliability . 2. Active Optical Cables (AOC) AOCs are fiber-based cables with integrated transceivers at each end. They support longer distances than DACs (up to 100 meters or more) and are suitable for high-speed connections like 40G, 100G, or 400G. AOCs are plug-and-play and reduce the need for separate optical transceivers . 3. MTP/MPO Cables For high-density environments, MTP/MPO multi-core fiber cables are used. These cables can connect multiple fibers in a single interface, supporting parallel transmission for high-speed modules. They come in trunk cables for main links and breakout cables to split multi-core connections into single or dual-core connectors for direct module connections .

Connector Types and Compatibility

- LC, SC, MPO/MTP are common connectors. LC is widely used for 1G-25G modules, SC for older 1G systems, and MPO/MTP for high-density 100G-400G modules .

- Wavelength and fiber type must match the optical module: multimode fibers (OM3/OM4) typically operate at 850nm, while single-mode fibers (OS2) operate at 1310nm or 1550nm .

- Vendor compatibility is important; some network equipment requires vendor-specific EEPROM information, but third-party DACs and AOCs are often tested to work reliably with multiple vendors .

Application Recommendations

- Use DACs for short-distance, cost-sensitive connections within racks.

- Use AOCs for longer distances or when reducing electromagnetic interference is important.

- Use MTP/MPO cables in data centers for high-density, high-speed parallel connections.

- Always ensure fiber type, connector type, and module speed match to avoid signal loss or link failure . By selecting the appropriate direct connection cable based on distance, speed, and module type, you can achieve reliable, high-performance optical links while optimizing cost and installation efficiency.

Article Content

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What is a DAC (or Direct Attach Copper) Cable? In simple terms, a DAC has modules at either end of a ~26-28 AWG

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