

Article Overview

DAC (Direct Attach Cable) is widely used for short-distance, high-speed interconnects in data centers, connecting servers, switches, and storage devices with low latency and minimal power consumption.

Overview of DAC Cables

A Direct Attach Cable (DAC) is a factory-terminated high-speed cable assembly with integrated connectors at both ends, transmitting electrical signals directly over copper conductors without optical conversion . DAC cables are cost-effective, energy-efficient, and ideal for short-range connections, typically within a single rack or between adjacent racks in data centers . They are available in passive and active types:

- o Passive DAC: Relies solely on copper wiring, suitable for distances up to 5 meters, with nearly zero latency and minimal power consumption .
- o Active DAC: Incorporates signal conditioning electronics such as Redriver or Retimer chips to extend reach up to 10-15 meters while maintaining signal integrity .

Key Applications

DAC cables are primarily used in high-speed data center interconnects, including:

- o Server-to-switch connections: Directly linking servers to top-of-rack or leaf switches for 10G, 25G, 40G, 50G, 100G, or higher speeds .
- o Switch-to-switch connections: Short-range interconnects between switches within the same rack or adjacent racks, supporting high-density networking .
- o Storage area networks (SANs): Connecting storage devices to servers or switches for low-latency data access .
- o High-performance computing (HPC) clusters: Providing ultra-low latency links for compute nodes in AI, machine learning, and scientific computing environments .

Advantages

- o Low latency and power consumption: Passive DACs consume no additional power and introduce minimal signal delay .
- o Cost-effective: Eliminates the need for separate transceivers and fiber, reducing hardware and operational costs .
- o Ease of deployment: Factory-terminated assemblies simplify installation and reduce potential points of failure .

o High signal integrity: Active DACs (ACC and AEC) use Redriver or Retimer chips to compensate for signal loss, enabling longer distances while maintaining high-speed performance .

Comparison with Other High-Speed Cables

- o ACC (Active Copper Cable): Adds a Redriver chip at the receiver end to amplify and equalize signals, extending DAC reach beyond passive limits .
- o AEC (Active Electrical Cable): Uses Retimer chips at both ends to reshape and recondition signals, suitable for higher data rates and longer distances .
- o AOC (Active Optical Cable): Fiber-based solution with integrated optics, offering longer reach and reduced electromagnetic interference, but at higher cost .

Typical Deployment Scenarios

- o Intra-rack connections: Passive DACs for distances ≤ 5 meters.
 - o Adjacent rack connections: Active DACs (ACC or AEC) for distances up to 10-15 meters.
 - o High-density AI or HPC fabrics: Active DACs or AOCs for ultra-high-speed links with minimal latency .
- In summary, DAC cables are essential for short-range, high-speed interconnects in modern data centers, offering a balance of performance, cost, and energy efficiency, with active variants extending their applicability to longer distances and higher data rates.

Higher Ethernet speed, cloud computing, IoT, and virtual data centers demand more on operators of data centers.

Understand AOC, DAC, ACC & AEC modules in one guide. Compare features, benefits & best use cases to choose

That's where Direct-Attach Copper (DAC) cables shine. With almost zero latency, plug-and-play simplicity

Discover where DAC cables are used in data centers, AI clusters, enterprise and telecom networks. Learn when to

Gain in-depth insights into the performance differences, application scenarios, and selection

What is a DAC Cable? A DAC (Direct Attach Cable) Cable is a networking cable used to connect different networking

High Speed Cables As a low-cost alternative to optical modules for short distance connections, it is widely

2. 100G DAC Cables 100G DAC cables are used to meet the demands of ultra-high-speed data networking. These cables are

Molex High-Speed DAC Assemblies deliver a complete zSFP+and zQSFP+interconnect solution across multiple industry standards

Explore the various functions and types of DAC cables, including their benefits and applications in modern technology.

High speed direct attach cable (DAC) assemblies, or twinax cable assembly used in data centers. It provides a lower cost, higher

The DAC High Speed Copper Cable market is highly competitive, dominated by established players with strong

Direct Attach Cable (DAC) Assemblies High-speed I/O passive cable assemblies that can deliver data rates as high as 400 Gbps

High Speed Cables Market Size and Forecast (2021 - 2031), Global and Regional Share, Trend, and Growth Opportunity Analysis

The 100G QSFP28 to QSFP28 DAC can provide customers with 100G high-bandwidth data interconnection

Discover the world of 10G DAC Cables with our comprehensive guide! Explore the working principles, advantages,

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