DAC High-Speed Cable Assembly Construction Method



Overview

High-speed I/O passive cable assemblies that can deliver data rates as high as 400 Gbps with a variety of lengths or customized options for greater design flexibility.

Key Takeaways

DAC (Direct Attach Copper) high-speed cable assemblies are constructed using tightly controlled twinaxial or copper cabling with precision connectors, shielding, and termination to ensure high signal integrity for data rates up to 800 Gbps. Cable Core and Conductor DesignDAC assemblies typically use twinaxial copper cables, which consist of two tightly twisted conductors surrounded by a continuous shield to minimize crosstalk and electromagnetic interference (EMI) while maintaining low insertion loss. The conductors are often made of high-purity copper and may be plated with tin or silver to improve conductivity and reduce oxidation.

For high-speed applications, the cable diameter and twist rate are carefully controlled to maintain impedance matching and minimize signal reflections. Shielding and InsulationHigh-speed DACs employ continuous longitudinal shielding and sometimes additional braided or foil layers to protect against EMI and maintain signal integrity over short interconnect distances. The insulation material is selected for low dielectric loss and flexibility, often using LSZH (Low Smoke Zero Halogen) or OFNP (Plenum-rated) jackets for safety and compliance in data centers.

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Some assemblies also feature mesh sleeves for mechanical protection and airflow optimization. Connector TerminationDAC assemblies are terminated with pluggable I/O connectors such as QSFP+, QSFP28, QSFP56, QSFP-DD, SFP+, or SFP28, depending on the data rate and application. The connectors are precision-molded and often include gold-plated contacts to ensure reliable low-resistance connections.

Active DA

Cs (ACC/AEC) may include signal conditioning chips within the connector housing to extend reach and improve performance at higher speeds.

Assembly Process

Cable Cutting and Stripping: The copper or twinax cable is cut to precise lengths, and the ends are stripped to expose conductors for termination. Connector Crimping or Soldering: Conductors are inserted into connector pins and mechanically crimped or soldered to ensure a secure electrical connection. Shield Termination: The cable shield is connected to the connector housing to maintain grounding and EMI protection.

Molding and Overmolding: Connectors are overmolded with plastic or thermoplastic elastomer to provide strain relief and mechanical stability. Testing: Each assembly undergoes signal integrity testing, including insertion loss, return loss, and crosstalk measurements, to ensure compliance with high-speed standards up to 800 Gbps. Performance ConsiderationsDAC assemblies are designed for short-reach, high-density interconnects in data centers, typically ranging from 0.

5 meters to 5 meters.

Passive DA

Cs are cost-effective and low-power, while active DACs include electronics to support longer distances or higher speeds. Proper selection of cable type, length, and shielding is critical, as incorrect installation can lead to instant link failures in high-speed fabrics.

Summary

The construction of DAC high-speed cable assemblies involves precision copper conductors, advanced shielding, high-quality connectors, and rigorous testing to ensure reliable, low-latency, high-bandwidth performance in data center environments. Both passive and active designs are used depending on reach and speed requirements, with careful attention to signal integrity, mechanical durability, and compliance with industry standards.

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High-Speed Data Center Cable Guide

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Server speeds above 10 Gb/s can be achieved either directly using point-to-point high-speed cables such as DACs and AOCs, or via optical transceivers with fiber optic structured cabling.

Understanding High-Speed Copper Cables: DAC, ACC,

As data centers continue to scale and demand faster, more reliable connectivity, high-speed copper solutions such as DAC (Direct Attach Cable),

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What Is DAC Cable, Direct Attach SFP+ Cable Passive vs Active

High speed direct attach cable (DAC) assemblies, or twinax cable assembly used in data centers. It provides a lower cost, higher density alternative cabling solution for high speed 10G-400G

9 common DAC Cables that Make Your Networking Efficient

DAC cable is a high-speed copper twin-ax assembly with pluggable connectors on either end. They can usually be divided by form factor: SFP+ DAC, XFP DAC, QSFP DAC, and so on.

What is DAC Cable? The Definitive Guide

What is a DAC cable? A DAC cable is short for direct-attach copper cable. It is a pre-terminated Twinax copper cable assembly with two pluggable connectors, connecting ports directly

Understanding the Basics of DAC Cable

When selecting a DAC cable assembly, you should consider several things, such as the distance between the devices, the number of connectors

Common Types and Uses of Direct Attach Copper (DAC) Cables

Explore the types and uses of DAC cables for data centers, including passive, active, and high-performance options to enhance connectivity.

Molex High-Speed Direct Attach Cable (DAC) Assemblies

Molex High-Speed Direct Attach Cable (DAC) Assemblies deliver data rates as high as 100Gbps with cable lengths ranging from 0.50m to 5m. These assemblies feature dual-ended

Efficient and High-Speed DAC Cables

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Learn all about DAC cables: types, compatibility & performance tips. Ensure seamless connectivity in your data center. Shop DAC today!

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