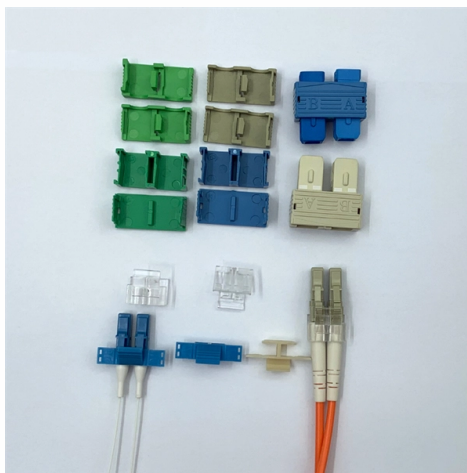


RIVO MULTITRADE OPTICAL SYSTEMS

800g Optical Module Solution



Overview

800G Optical Modules Explained: Standards, Types We will explore the emergence, technical standards, packaging, types, and applications of FS Launches 800G.

Key Takeaways

800G optical modules offer multiple solutions through different interface architectures, modulation schemes, and form factors to meet diverse data center and coherent network requirements. Interface Architectures and Modulation Schemes

There are three main optical interface architectures for 800G modules:

- **8x100G PAM4 Modules:** This solution uses eight parallel channels, each operating at 100Gbit/s with PAM4 modulation at 53Gbd. It includes 8 DAC/ADC pairs, 8 lasers, and 8 optical transceivers. CWDM or LAN-WDM devices may be used for multiplexing in longer-distance scenarios, though they are typically unnecessary for short-reach applications like SR (100m) or DR (500m) deployments .
- **4x200G PAM4 Modules:** This architecture reduces the number of optical channels to four, each running at 200Gbit/s with PAM4 modulation at 106Gbd. It uses 4 DAC/ADC pairs and 4 optical transceivers, simplifying module design while supporting higher per-channel speeds .



- Coherent 800G Modules (800ZR/800ZR+): Designed for long-reach applications (80–120km), these modules employ coherent detection with DP-16QAM modulation and OFEC forward error correction. They are suitable for Data Center Interconnects (DCIs) and metro networks, supporting client interfaces of 100GE, 200GE, 400GE, and 800GE .

Form Factors

Two mainstream pluggable form factors are widely adopted:

- QSFP-DD800 (Quad Small Form-Factor Pluggable Double Density): Supports dual-density, hot-swappable modules with 8 electrical channels, each capable of 25Gb/s (NRZ) or 50Gb/s (PAM4), aggregating up to 800G .
- OSFP (Octal Small Form-Factor Pluggable): Offers higher thermal dissipation and supports 8 parallel channels, suitable for high-density deployments in hyperscale data centers .

Application Scenarios

800G modules are deployed across various distances and use cases:

- Short Reach (SR): Up to 100m, typically within racks or between top-of-rack and leaf switches.
- Medium Reach (DR/FR/LR): 500m to 10km, connecting leaf to spine switches or spine to core routers.
- Extended Reach (ER/ZR): 40–80km, for metro or regional DCIs.
- Long-Haul Coherent (800ZR/800ZR+): 80–120km, point-to-point DWDM links for inter-data center connectivity .

Technological Considerations

- Baud Rate and Channel Capacity: Higher baud rates and parallel channels increase data throughput while reducing latency .
- PCB and Thermal Design: 800G modules require advanced PCB materials, HDI stackups, and back-drilling to maintain signal integrity at high speeds. Thermal management is critical to prevent bit error rate degradation .
- Standards and Interoperability: IEEE802.3, OIF, and MSA groups define specifications for 800G modules, ensuring interoperability and supporting both short-reach and coherent long-reach applications .

Evolution and Deployment

The evolution of 800G modules includes three generations:

- 8x100G Electrical/Optical: Commercially available since 2021.
- 4x200G Electrical/Optical: Expected commercial availability in 2024.

- 4x200G Optical with 4 Electrical Channels: Expected in 2026, representing the next step toward single-channel 200G optical/electrical technology . These solutions allow network operators to select modules based on reach, power consumption, and deployment density, enabling scalable upgrades from 400G to 800G in hyperscale and enterprise networks .

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