

Article Overview

QSFP-DD and OSFP are the two leading 800G optical module form factors, with QSFP-DD prioritizing backward compatibility and OSFP optimized for thermal performance and future scalability.

Overview of Form Factors

QSFP-DD (Quad Small Form-factor Pluggable Double Density) is an evolution of the QSFP family, doubling the number of high-speed electrical lanes from 4 to 8 while maintaining mechanical compatibility with QSFP28 ports. It supports data rates up to 400G per module, with 800G achievable through advanced modulation techniques like PAM4 or higher-order modulation. QSFP-DD is widely adopted in enterprise and cloud data centers due to its backward compatibility and higher port density, allowing up to 36 ports per 1U switch. OSFP (Octal Small Form-factor Pluggable) is designed from the ground up for 400G and 800G applications. It features 8 electrical lanes and a larger physical envelope (22.58mm width, 107.8mm length, 13mm thickness) to accommodate higher power budgets and improved thermal management. OSFP is favored in hyperscale and AI/ML environments where maximum performance, thermal headroom, and future scalability are critical. It supports up to 32 ports per 1U switch, slightly lower than QSFP-DD, but offers better thermal and electrical performance for high-power modules.

Key Technical Differences

- o Thermal Capacity and Power: QSFP-DD modules typically handle 7-12W, while OSFP modules can support 12-15W or more, making OSFP better suited for high-power 800G deployments.
- o Electrical Interface: Both use 8-lane electrical interfaces, but OSFP's larger size allows optimized PCB routing, reduced crosstalk, and improved signal integrity.
- o Backward Compatibility: QSFP-DD supports QSFP28/56 modules, protecting existing investments. OSFP requires dedicated ports, though adapters exist for QSFP modules.
- o Bandwidth and Scalability: QSFP-DD currently supports up to 400G natively, with 800G achievable via modulation. OSFP is designed for 800G and future 1.6T applications, offering better scalability for next-generation networks.
- o Port Density: QSFP-DD provides slightly higher port density (36 vs 32 ports per 1U), translating to more aggregate bandwidth per switch faceplate.

Deployment Considerations

- o Data Center Interconnects (DCI): Both QSFP-DD and OSFP support 800G coherent optics for distances up to 120 km (800ZR) and beyond 1000 km (800G ZR+) over DWDM networks.
- o Thermal Management: OSFP's larger form factor and higher thermal headroom make it ideal for high-power

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AI/ML clusters or dense 800G deployments, while QSFP-DD is suitable for environments prioritizing port density and backward compatibility .

o Future-Proofing: OSFP's design accommodates 16-lane signaling (OSFP-XD) for 800G and 1.6T applications, whereas QSFP-DD is limited by its smaller form factor .

Summary

o Choose QSFP-DD if backward compatibility, higher port density, and gradual migration from QSFP28/56 are priorities, especially in enterprise or cloud data centers.

o Choose OSFP if thermal performance, high-power 800G modules, and future scalability to 1.6T are critical, particularly in hyperscale, AI, or HPC environments. Both form factors support the same optical specifications (SR8, DR8, FR4, LR4) for 800GbE, but OSFP provides additional design margin for signal integrity and power delivery, making it more suitable for demanding high-speed deployments .

400G Optical Transceivers: What's the Difference Between OSFP and QSFP-DD? To accommodate next-generation applications

Unsure which 400G module fits your data center? Compare QSFP-DD, OSFP, and

Modern optical transport networks are the nervous system of digital infrastructure. As data demand continues to

400G optical module packaging comparison: Choose QSFP-DD, OSFP, or QSFP112 for data center, AI, or HPC based on

This article provides an overview of 800G optical transceivers, focusing on the QSFP-DD and OSFP packages.

This article explores how to interconnect OSFP and QSFP-DD ports in 400G/800G networks, covering key principles,

This article explores the characteristics of OSFP and QSFP-DD form factors and practical solutions for

The QSFP-DD port is backward compatible with QSFP+ (40G), QSFP28 (100G) and QSFP56 (200G). The OSFP port

There are similarities and differences between QSFP-DD and OSFP. The following will introduce their differences in

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Product overview The FS® 800GBASE Quad Small Form-Factor Pluggable (OSFP/QSFP-DD) portfolio offers

QSFP-DD is the mainstream module of 400G transceivers which is different than other form

The explosive growth of global data volume has placed higher demands on the bandwidth and performance of data

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Discover the differences between 800G QSFP-DD and OSFP modules. Learn which packaging offers the best

Initial Published: February 19, 2022 The optical transceiver plays a crucial role in modern fiber networking. Various

Although OSFP modules can support slightly higher power levels, QSFP DD offers stronger

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