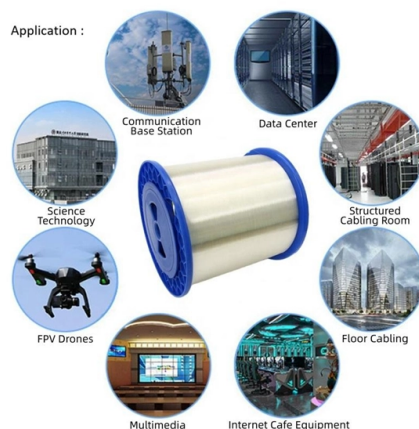


Selection Guide for Upgraded Data Center Interconnect-Grade Optical Receivers



Overview

A complete guide to 100G QSFP28 transceivers covering types, specs, reach, compatibility, and how to choose the right module for data center and telecom networks.

Key Takeaways

Choosing the right DCI-grade optical receiver depends on link distance, modulation format, detection type, and operational efficiency, balancing performance, cost, and scalability.

Detection Method

Direct Detection (IM/DD) is suitable for short-reach DCI links, typically within a few kilometers. It converts optical power directly into an electrical signal, recovering only amplitude information. This method is cost-effective, power-efficient, and simpler to operate, making it ideal for intra-data center or metro-scale links.

Coherent Detection mixes the incoming optical signal with a local oscillator, enabling recovery of amplitude, phase, and polarization. It supports advanced modulation formats, higher spectral efficiency, and longer reach (tens to hundreds of kilometers), making it suitable for regional or inter-city DCI deployments. Coherent receivers require digital signal processing (DSP) and higher power but provide superior capacity and scalability.



Modulation and Signaling

Modern DC

1 systems, especially 400G and 800G, use PAM4 signaling, which encodes data across four voltage levels per lane. This increases the Nyquist frequency and imposes stricter requirements on receiver sensitivity and signal integrity. Forward Error Correction (FEC) is mandatory for 800G links to maintain reliable data transmission.

Optical Transceiver Types

Active Electrical Cables (AEC) bridge the short-to-medium reach gap (3–7 meters) where passive copper is insufficient but full optics are not cost-effective. Active Optical Cables (AOC) and optical transceivers are preferred for longer intra-data center links, offering low latency and high bandwidth. Expanded Beam Optical (EBO) connectors improve dust resistance, reduce cleaning requirements, and enable faster installation for hyperscale deployments.

Key Selection Criteria

Link Distance: Short-reach (2 km) favors coherent optics. Capacity Requirements: Higher data rates (400G–800G) require PAM4-compatible receivers with FEC support. Power and Cost: IM/DD is lower power and cost; coherent optics are more expensive but scalable.

Operational Efficiency: Consider connector technology (e.g., EBO) to reduce installation time and maintenance. Future Scalability: Coherent receivers support advanced modulation and network expansion, ensuring long-term adaptability.

Practical Recommendations

For intra-data center links up to a few hundred meters, use IM/DD receivers with PAM4 support and low-power optics. For metro or regional DCI links, select coherent receivers with DSP-enabled transceivers to maximize spectral efficiency and reach. For hyperscale deployments, consider EBO ferrule technology to minimize downtime and simplify installation while maintaining high reliability.

Always ensure FEC compatibility and verify that the receiver supports the required lane count and signaling format for 400G or 800G systems. By evaluating these factors—detection type, modulation, reach, power, and operational efficiency—network operators can select upgraded DCI-grade optical receivers that meet current performance demands while providing flexibility for future growth.

Article Content

100G QSFP28 Transceivers: Types, Specs and How to Choose

A complete guide to 100G QSFP28 transceivers covering types, specs, reach, compatibility, and how to choose the right module for data center and telecom networks.

800G Data Center Interconnect Guide: DAC, AEC, AOC & Optical

DAC · ACC · AEC · AOC · Optical Transceivers — the complete engineer's framework for choosing the right interconnect for every link in your AI data center. Updated February 2026.

400G, 800G and 1.6T Interconnect Selection Guide

Data center networking guide for selecting 400G, 800G, and 1.6T interconnects. Compare DAC, ACC, AEC, AOC, and optical transceivers by distance, density, power, compatibility, and migration planning.

QSFP28 Transceiver: Complete 100G Connectivity Guide

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Learn how and where to implement Cisco Optics solutions to gain the reach you need for connecting data centers across your metro areas and beyond.

Key Differences, Applications, and Selection Guide for Optimal 100G ...

Learn how 100G direct-detection (IM/DD) and coherent optical solutions compare for metro DCI, and select the best option for your network needs.

800G Data Center Interconnect Selection Guide

We published the complete 800G Data Center Interconnect Selection Guide on our blog — here's the decision framework in one visual.

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Open Data Center Optical Interconnect Solutions Catalog

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