

Cost-effective optical amplifier QSFP28



Overview

QSFP28 FR Cost Analysis: Single-Lambda 100G EconomicsThe QSFP28 FR module offers a robust optical link budget that ensures reliable data transmission over.

Key Takeaways

Cost-effective QSFP28 optical amplification can be achieved using coherent 100G ZR/ZR+ transceivers with integrated or external EDFA amplifiers, supporting distances up to 300 km over DWDM links.Coherent QSFP28 Modules with Amplification

Cisco QSFP28 100G ZR modules extend 100GbE links up to 80 km over dark fiber and up to 300 km over amplified DWDM networks, leveraging ITU-T standard-compliant staircase FEC and QPSK modulation. These modules are tunable across the C-band and compatible with standard QSFP28 ports, offering a cost-effective migration from multiple 10G wavelengths to 100G while supporting low-latency applications like metro access and data center interconnects . Adtran Coherent 100ZR+ QSFP28 transceivers provide low-power, cost-effective 100G transport over distances up to 120 km without amplification and up to 300 km with optical amplification. They are host-agnostic, support standard QSFP28 ports, and can be deployed in outdoor environments. When paired with EDFA-type amplifiers such as the AM-2S20L (dual pre- and booster amplifier) or AM-S23 (inline amplifier), these modules enable flexible, scalable, and automated optical line systems for long-haul coherent transport .

Cost-Effective Module Options



For shorter distances or data center interconnects, single-wavelength 100G QSFP28 modules using PAM4 modulation and PSM4 parallel transmission can reduce production costs by over 40% compared to traditional 4x25G NRZ modules. These modules support DR1, FR1, LR1, and ER1 variants, achieving up to 40 km on single-mode fiber, making them ideal for cost-sensitive deployments without requiring complex amplification. Third-party QSFP28 modules can also offer significant savings. While OEM ZR modules may cost several thousand dollars, compatible third-party modules for short- and medium-reach applications can start as low as \$35-\$280 per module, depending on reach and specifications. These modules typically consume 3.5–4.5W and adhere to QSFP28 MSA standards, providing a balance of cost and performance.

Amplifier Deployment Considerations

- Pre-amplifiers: Boost weak incoming signals before detection, improving receiver sensitivity.
- Booster amplifiers: Increase outgoing signal power to extend reach.
- Inline amplifiers: Compensate for fiber loss over long spans, often integrated with monitoring and auto-span equalization. Using compact EDFA amplifiers in combination with coherent QSFP28 modules allows operators to extend 100G links cost-effectively while maintaining signal integrity over metro and long-haul networks.

Summary

For cost-effective QSFP28 optical amplification:

- Use coherent 100G ZR/ZR+ QSFP28 modules for long-haul or DWDM links.
- Pair with EDFA pre-, booster, or inline amplifiers for distances beyond 80–120 km.
- Consider single-wavelength PAM4 QSFP28 modules for short- to medium-reach links to reduce cost and power consumption.
- Explore third-party QSFP28 modules for additional savings while ensuring MSA compliance and platform compatibility. This approach balances performance, reach, and cost, making it suitable for data center interconnects, metro networks, and enterprise deployments.

Article Content

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The QSFP28 FR module offers a robust optical link budget that ensures reliable data transmission over distances up to 2km. This

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C-QSFP28-EDFA-BOOST-17DB | ProLabs

This QSFP28 pluggable EDFA booster amplifier offers a optical input range and provides a +17dB nominal gain to a C-Band DWDM

QSFP28 PAM4 DWDM: High-Capacity 100G/400G Optical

As cloud computing, big data, and 5G continue to accelerate global data growth, network infrastructures are evolving

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