Most expensive optical module



Overview

QSFP-DD Price by Module Type (2026) The 400G transceiver price spread between the most economical and the most expensive modules is roughly 100:1.

Key Takeaways

The most expensive optical modules are 400G coherent ZR+ transceivers, which can exceed $130,000 per unit.

Overview of High-

Cost Optical Modules

The highest-priced optical modules are typically coherent long-haul transceivers used for Data Center Interconnects (DCI) and ultra-long-distance fiber links. For example, a 400G QSFP-DD coherent ZR+ module from an OEM can cost over $130,000, while short-reach 400G SR8 modules for in-rack connections are priced under $2,000 from third-party vendors, illustrating a price spread of roughly 100: 1 depending on technology and reach.

Factors Driving Cost

Transmission Distance and Technology: Modules designed for long-haul or ultra-long-haul transmission, such as LR4, ZR, and ZR+ optics, require coherent detection, high-precision lasers, and advanced DSP chips, which significantly increase cost.

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M vs Third-Party: OEM-branded modules from Cisco, Juniper, or Arista often carry a premium due to certification, support, and vendor lock-in, whereas third-party compatible modules are much cheaper but may lack full vendor guarantees. Optical Components: Single-mode optics, extended reach, and specialized lasers (EML or DFB) are more expensive than multimode or short-reach modules. Performance Requirements: Modules with higher optical power, tighter tolerances, and advanced coding (e.g., PAM4, FEC) command higher prices.

Price Comparison by Module Type10G SFP+: $10–$300+, with LR/ER modules at the higher end. 25G SFP28: Typically lower than 10G due to market competition, but high-end LR/ER modules remain costly. 100G QSFP28: OEM modules can reach several thousand dollars, especially for long-reach or DWDM variants.

400G QSFP-DD: SR8 modules $1,400–$1,800; LR4 modules over $10,000; ZR+ modules exceeding $130,000. 800G QSFP-DD: Emerging high-speed modules are expected to be similarly expensive, particularly for coherent long-haul applications.

Conclusion

The most expensive optical modules are coherent 400G ZR+ transceivers, primarily due to their long-haul capabilities, advanced optical and digital signal processing technologies, and OEM branding. These modules are critical for high-capacity, long-distance data center interconnects, and their cost reflects the complexity and precision required for reliable ultra-high-speed transmission.

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In particular, in 800G optical modules, the DSP chip is often the highest-value single component. For example, in 800G DR8 or SR8 modules, the DSP chip alone may account for

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Technologies like Co-Packaged Optics (CPO)—where the optical engine moves off the faceplate and directly onto the switch ASIC substrate—are being developed to solve the looming

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