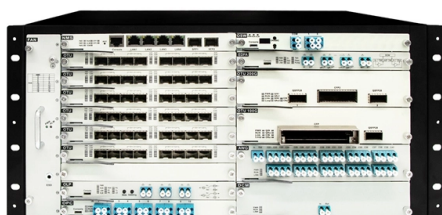


How much does an optical module for communication equipment cost



Overview

An optical module is a typically hot-pluggable optical transceiver used in high-bandwidth data communications applications.

Key Takeaways

Optical module prices vary widely, from as low as \$5 for basic 1G SFPs to several hundred dollars for high-speed or coherent modules, depending on type, speed, and vendor. Price Ranges by Module Type and Speed

- 1G SFPs: Generic or third-party modules typically cost \$5-\$25, while OEM-branded modules can range from \$60-\$120+ for industrial or extended-temperature versions .
- 10G SFP+ modules: Compatible modules often sell for tens of dollars, whereas OEM or long-reach (LR/ER) modules can cost hundreds of dollars .
- 25G SFP28, 40G QSFP/QSFP+, 100G CFP/QSFP28: Prices vary by reach and vendor. For example, a QSFP28 SR4 module may cost around \$35, delivering 100G at \$0.35 per Gbps, while a 10G SFP+ module at \$20 equates to \$2 per Gbps .
- Coherent optical modules: These are more expensive due to DSP and advanced modulation, but they offer longer reach and higher spectral efficiency. They are cost-effective for links ≥ 100 km or > 100 Gbps per fiber, despite higher unit prices .

Factors Influencing Cost

- Material Costs: Includes lasers, detectors, electronic components (chips, capacitors, sensors), and packaging materials. Higher-quality components increase module cost .

- **Manufacturing Costs:** Production equipment, labor, and process efficiency affect pricing. Advanced manufacturing improves yield but raises costs .
- **R&D and Design:** Coherent modules with DSP, higher-order QAM, and long-reach capabilities require significant development investment .
- **Vendor and Branding:** OEM modules often cost more due to platform-specific coding, warranty, and support, while third-party modules can offer substantial savings if compatibility is ensured .
- **Power Consumption and Thermal Design:** Modules consuming 3.5–4.5W (e.g., QSFP28) may have higher costs due to thermal management and reliability requirements .

Cost-Efficiency Considerations

- **Cost per Gbps** is a key metric: higher-speed modules often provide lower cost per unit bandwidth despite higher upfront prices .
- **Deployment scenario:** Non-coherent modules are cheaper for short, low-capacity links (

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