

Optical modules are cheap



Overview

Cost structure of optical module chips | WeylandLike other large-scale data centers, these modules rely heavily on optical chips, enabling them to transmit.

Key Takeaways

Optical modules may see lower cost per bit over time, but unit prices are likely to remain high in the near term due to technological complexity and supply constraints.

Market Demand and Pricing Dynamics

The optical module market is experiencing explosive growth, driven by AI, hyperscale data centers, and 5G infrastructure, with 800G and 1.6T modules leading demand in 2026. Major cloud providers and AI-focused companies are purchasing millions of units, creating strong demand that supports current high prices.

While historical trends show that average selling prices for 100G modules have declined by about 70% over the past five years, newer high-speed modules command premium prices due to advanced performance requirements.

Technological Factors

Advances in silicon photonics, LPO (Low-Power Optics), and CPO (Co-Packaged Optics) are improving efficiency, reducing power consumption, and increasing integration. These innovations can lower manufacturing costs and improve cost per transmitted bit, but the initial unit prices for cutting-edge modules remain high because of R&D, complex chip design, and specialized materials like indium phosphide lasers. For example, InnoLight and Tianfu Communication have achieved high yields in 1.

6T silicon photonics modules, reducing costs by 30% compared to traditional solutions, yet the modules still carry a premium.

Supply Chain Constraints

The optical module market faces supply bottlenecks, particularly in laser chips and PAM4 DSPs, which are produced by very few firms globally. These upstream scarcity factors limit the ability of assemblers to lower prices, even as downstream demand grows. Chinese assemblers dominate volume but are price-takers, while upstream suppliers with scarce components maintain pricing power.

Cost per Bit vs.

Unit Price

Although unit prices may remain high, the cost per bit transmitted is decreasing due to higher bandwidth and efficiency of new modules. This means that while customers pay more per module, the effective cost for data transmission is lower, creating value for large-scale data centers and AI clusters.

Outlook

In summary: Short-term: Optical modules are unlikely to become significantly cheaper in unit price due to high demand, technological complexity, and supply constraints. Medium to long-term: Technological iteration, higher yields, and silicon photonics adoption may reduce cost per bit, making optical interconnects more cost-efficient even if unit prices remain elevated. Market strategy: Companies investing in upstream scarce components will retain pricing power, while assemblers benefit from volume growth but cannot drastically lower prices.

Overall, optical modules are becoming more efficient and cost-effective per transmitted data unit, but the upfront module price will likely stay high for the next few years.

Article Content

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Like other large-scale data centers, these modules rely heavily on optical chips, enabling them to transmit, process, and convert signals efficiently. Understanding the cost structure of optical

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Behind them, Hisense Broadband holds a full chain from optical chips to terminal devices, HG Genuine has secured cost advantages through in-house EML chips and SiPh solutions, and TFC

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Learn optical link budget calculation for SFP modules with formulas, real examples, fiber loss breakdown, and troubleshooting tips for reliable links.

Deep Dive: Optical Module Market

In terms of pricing, 800G LPO modules have been sold at around \$600 this year, which is cheaper than single-mode conventional optical modules priced above \$700 but more expensive

Mapping the Micro LED Optical Interconnect Ecosystem

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CPO is often viewed as the next iteration of pluggable optical modules, leading many to assume optical module vendors will be the biggest beneficiaries. But Marvell's chip and system

CPO Technology Nvidia: Death of Optical Modules and the Future of

Analysis of Nvidia's announcement from June 3, 2026: why CPO is killing optical module suppliers, who the beneficiaries are (TSMC, Marvell) and what awaits InnoLight.

How Industry Collaboration Fosters NVIDIA Co-Packaged Optics

NVIDIA is developing a co-packaged optics (CPO) platform that integrates optical and electrical components to improve data-center connectivity, in collaboration with industry partners like

China PCB maker DSBJ bets US\$1.2 billion on AI optical modules

Suzhou Dongshan Precision Manufacturing (DSBJ) will invest US\$1.2 billion to expand optical chip and optical module capacity at Source Photonics, accelerating its shift from PCB

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This approach enables scalable, cost-efficient production of advanced optical modules for next-generation co-packaged optics, AI systems, and high-bandwidth data center applications.

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