

# Optical modules account for a significant portion of the cost of AI servers



## Overview

Organizations deploying AI infrastructure often discover that GPU servers account for only 60% of their total investment. The hidden costs are advanced cooling systems, power upgrades, specialized networking, and operational overhead, which can double or triple your initial budget. Optical modules are essential components for interconnecting data centers internally and connecting data centers to each other. Currently, the mainstream products in the market are 100G and 400G modules, while 800G modules have primarily been used in fields such as supercomputing. According to. These compact modules are the high-speed, high-bandwidth lifelines connecting the massive compute and storage resources AI demands. Understanding their role is key to building efficient, scalable AI systems. Every minute of downtime can result in thousands of dollars in lost productivity. Table 1 below provides a. Global leading cloud service providers such as Google, Amazon, Microsoft, etc.



## Article Content

Why do AI Data Centers Need 800G Optical Modules?

AI applications and large models have made computing power a key infrastructure for the AI industry. As the need for faster communication increases,

Analyzing Optical Modules in the AI Era

With the continuous expansion of the scale of data centers and the surging demand for bandwidth in AI training and inference, cloud vendors are

The AI Boom Could Use a Shocking Amount of Electricity

Powering artificial intelligence models takes a lot of energy. A new analysis demonstrates just how big the problem could become

Optical Module Products for AI Computing

Discover the increasing demand for optical modules in AI computing and the role they play in supporting high-speed data transmission. Learn about

AI Server Data Center Cost Breakdown: 2025

Explore the real costs of deploying AI-ready infrastructure, from GPU servers to advanced cooling and power delivery. Learn how to plan and optimize

Building a high-performance AI room: The key role of optical modules

Conclusion The role of optical modules cannot be ignored in the construction of AI server rooms. They can not only provide high-speed and stable data transmission, but also meet the

AI-driven Changes in Optical Modules

Optical components include optical chips and optical element assemblies and account for more than 70% of module cost. Auxiliary materials include housings, pins, printed circuit boards, and

Powering the Next Data Race: How 800G & 1.6T Optical

In summary, the surging demand for 800G and 1.6T optical modules—driven by AI computing clusters, hyperscale data centers, and next-generation cloud

McKinsey Direct Opportunities in networking optics: Boosting supply

Opportunities in networking optics: Boosting supply for data centers Potential shortfalls in networking optics supply could hinder data center and AI expansion. How can players boost supply and seize

Co-packaged optics can supercharge generative AI computing

Knickerbocker and his team are thinking smaller, though. Because of optical connectors' lower cost and higher energy

## Optics for AI

A detailed analysis of the pivotal role being played by optical connectivity including NVLink, UALink and CXL/PCIe in the implementation of AI Cluster architectures is central to this report.

## Optical Modules and Networks for AI-Era Data Centers

We review recent advances in optical modules and networks for AI-era data centers (DCs), covering intra-DC optical pluggable transceivers, DC interconnections, optical cross-connect based flexible

## The cost of compute power: A \$7 trillion race | McKinsey

Amid the AI boom, compute power is emerging as one of this decade's most critical resources. In data centers across the globe, millions of

## Accelerating AI Innovation: New Servers and Integrated Rack ...

Two new Dell PowerEdge servers, XE7740 and XE9685L, will be offered in the new Dell Integrated Rack 5000 (IR5000) series as a part of the Dell Integrated Rack Scalable Systems (IRSS)

## How AI Revolutionizes the Optical Module Industry

AI-driven demand fuels global optical module industry growth, with Chinese firms leading innovation and market share expansion.

## 800G Optical Module Cost Analysis | TCO Optimization Guide

Optical module costs represent a significant portion of AI data center network investment—typically 15-25% of total network infrastructure costs. However, the impact of these

## The Rise of Co-Packaged Optics: A Deep Dive into CPO

A CPO optical module integrates optical and electronic components to boost data center speed, efficiency, and bandwidth while reducing power use.

## High-Speed Optical Module Demand Soars: AI

Discovering the intersection of AI computing and escalating market trends, the reliance on optical modules has surged. From high-scale

## The Application of Optical Modules in AI Technology

Optical modules reduce power consumption and improve system stability, allowing AI systems to run longer with fewer interruptions. These

## The Critical Role of High-Quality Optics in AI Networks

While the premium paid for high-quality optics might appear significant upfront, it represents a relatively small fraction of the total cost of building and operating an AI infrastructure.

What we know about energy use at U.S. data centers

Data centers accounted for 4% of total U.S. electricity use in 2024. Their energy demand is expected to more than double by 2030.

Audio Science Review (ASR) Forum

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The Evolving Landscape of AI Optical Modules 400G

Explore the development trends of AI optical modules, including higher speeds, enhanced integration, lower power consumption, and broader

Why Artificial Intelligence Is So Expensive

Why AI Is So Expensive The push for bigger AI models, and more chips and data centers to support building them, is driving up costs for technology

Why AI Servers Are Getting More Expensive

The GPU unit price is a fraction of total system cost: networking, optics, power, cooling, and bring-up routinely push system-level cost to 1.5 to 3x the GPU module price alone.

Energy demand from AI - Energy and AI - Analysis

Energy and AI - Analysis and key findings. A report by the International Energy Agency.

The Critical Role of High-Quality Optics in AI Networks: How ...

AI networks require an infrastructure that can handle continuous high utilization and harsh thermal conditions - and do so without failure. Investing in premium optics can mitigate the

ASIC servers drive up demand for optical modules, Goldman Sachs

This architecture requires high-speed multi-chip connections, directly boosting demand for high-speed optical modules. ASIC AI servers from global cloud service providers (CSPs) are

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