What is the largest silicon photonics module



Overview

Intel® Silicon PhotonicsBased on our field-proven Intel® Silicon Photonics platform, which has already shipped more than 8 million PICs with over 32 millio.

Key Takeaways

The largest silicon photonics module currently reported is Ayar's TeraPHY chip, integrating eight 256Gbps engines for a total bandwidth of 2Tbps. Overview of the Largest ModuleAyar's TeraPHY chip represents the most advanced silicon photonics module in terms of integration and bandwidth. It incorporates eight 256Gbps silicon photonics engines within a single package, achieving 2Tbps of total bandwidth.

This module is designed to be co-located with processors, GPUs, or switches, enabling high-speed optical interconnects directly on the processor substrate or multi-chip module (MCM) for AI and high-performance computing applications.

Key Features

Bandwidth: 2Tbps total, achieved via eight parallel 256Gbps engines. Integration: Co-located optical engines reduce latency and power consumption compared to traditional pluggable optics. Multi-wavelength support: Uses a multi-wavelength light source (SuperNova) capable of powering 16 ports or two TeraPHY chips, enabling dense optical interconnects.



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Application: Primarily for AI data centers, high-performance computing, and inside-node optical connections where high bandwidth and low latency are critical. Context in the IndustrySilicon photonics modules are evolving rapidly, moving from 100G transceivers to 800G and beyond, with integration trends shifting from hybrid to monolithic designs. The TeraPHY module exemplifies the current state-of-the-art in integration, combining multiple engines and optical paths in a single module, which is larger in functional capacity than typical commercial modules used in data centers.

Implications

The development of such large silicon photonics modules allows for: Higher bandwidth density in hyperscale data centers. Lower power consumption compared to copper interconnects. Scalability for AI/ML workloads and next-generation optical computing.

In summary, while physical dimensions are not publicly detailed, Ayar's TeraPHY module is the largest silicon photonics module in terms of integrated bandwidth and engine count, representing the cutting edge of optical interconnect technology.

Article Content

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As someone who studied silicon photonics in Professor Fainman''s lab at UC San Diego, I can tell you it''s in one of the densest clusters of photonics expertise in the world.

Silicon Photonics in Pluggable Optics White Paper

In this white paper, we describe the benefits that silicon photonics offers, citing examples from Cisco''s silicon photonics technology base. Silicon

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Silicon photonics

Silicon photonic devices can be made using existing semiconductor fabrication techniques, and because silicon is already used as the substrate for most integrated circuits, it is possible to create hybrid

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SCALE CPO solution is the industry''s first OCI MSA capable platform and built with GF''s proven silicon photonics technology MALTA, N.Y., May 4, 2026 – GlobalFoundries (Nasdaq: GFS)

NVIDIA Corporation

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NVIDIA silicon photonics networking switches are available as part of the NVIDIA Spectrum-X Photonics Ethernet and NVIDIA Quantum-X Photonics InfiniBand platforms.

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Nvidia is responding by moving away from traditional electrical signaling and adopting silicon photonics, a shift the company argues is now essential for scaling large AI systems.

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While linear-drive pluggable modules remain competitive, CPO is expected to offer unmatched customization and scalability, with large-scale adoption targeted for 2028-2030. With AI

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And the newest entrant: UMC (NYSE: UMC), which licensed imec''s iSiPP300 silicon photonics process and plans to begin risk production in 2026–2027. The finished, shippable product

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