Lightmatter Unveils Passage M1000 Photonic Superchip, World's Fastest AI Interconnect

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Breakthrough 3D photonic interposer enables highest bandwidth and largest die complexes for next-gen AI infrastructure silicon designs

Mountain View, CA – March 31, 2025 – Lightmatter, the leader in photonic (super)computing, today announced Passage™ M1000, a groundbreaking 3D Photonic Superchip designed for next-generation XPUs and switches. The Passage™ M1000 enables a record-breaking 114 Tbps total optical bandwidth for the most demanding AI infrastructure applications. At more than 4,000 square millimeters, the M1000 reference platform is a multi-reticle active photonic interposer that enables the world's largest die complexes in a 3D package, providing connectivity to thousands of GPUs in a single domain.

In existing chip designs, interconnects for processors, memory, and I/O chiplets are bandwidth limited because electrical input/output (I/O) connections are restricted to the edges of these chips. The Passage M1000 overcomes this limitation by unleashing electro-optical I/O virtually anywhere on its surface for the die complex stacked on top. Pervasive interposer connectivity is enabled by an extensive and reconfigurable waveguide network that carries high-bandwidth WDM optical signals throughout the M1000. With fully integrated fiber attachment supporting an unprecedented 256 fibers, the M1000 delivers an order of magnitude higher bandwidth in a smaller package size compared to conventional Co-Packaged Optics (CPO) and similar offerings.

Lightmatter has worked closely with industry leaders, including GlobalFoundries (GF) and Amkor, to facilitate production readiness for customer designs based on the M1000 reference platform, while ensuring the highest standards of quality and performance. The Passage M1000 utilizes the GF Fotonix™ silicon photonics platform which offers seamless integration of photonic components with high-performance CMOS logic into a single die, creating a production-ready design that can scale effectively with AI demands.

"Passage M1000 is a breakthrough achievement in photonics and semiconductor packaging for AI infrastructure," said Nick Harris, founder and CEO of Lightmatter. "We are delivering a cutting-edge photonics roadmap years ahead of industry projections. Shoreline is no longer a limitation for I/O. This is all made possible by our close co-engineering with leading foundry and assembly partners and our supply chain ecosystem."

"GF has a long-standing strategic partnership with Lightmatter to commercialize its breakthrough photonics technology for AI data centers," said Dr. Thomas Caulfield, president and CEO of GF. "The M1000 photonic interposer architecture, built on our GF Fotonix platform, sets the pace for photonics performance and will transform advanced AI chip design. Our advanced manufacturing capabilities and highly flexible, monolithic silicon photonics solution are instrumental in bringing this technology to market, and we look forward to continuing our close collaboration with Lightmatter."

“The insatiable demand for scale-up bandwidth is fueling interconnect innovation and momentum, with in-package optical integration at the forefront,” said Vlad Kozlov, founder and CEO, LightCounting. “Lightmatter’s unique 3D active photonic interposer presents a compelling advancement, with capabilities that surpass existing CPO solutions.”

Key features of the M1000 include:

- 8-tile 3D active interposer with integrated programmable waveguide network
- 3D integrated electrical integrated circuits containing a total of 1024 Electrical SerDes
- 56 Gbps NRZ modulation
- 8 wavelength WDM transmission on waveguides and fibers.
- 256 optical fibers edge attached with 448 Gbps bandwidth per fiber
- 1.5 kW power delivery in integrated advanced package (7,735 mm^2)

The Passage M1000 and Passage L200, also announced today, accelerate advances in AI by enabling larger and more capable AI models to be trained faster than ever before. Passage M1000 will be available in the summer of 2025, accompanied by the world’s most powerful light engine: Guide™, from Lightmatter.

Lightmatter will showcase its latest innovations in its booth #5145 at the Optical Fiber Conference in San Francisco, from April 1-3, 2025.

For more information on Passage M1000, please visit https://lightmatter.com/

About Lightmatter

Lightmatter is leading a revolution in AI data center infrastructure, enabling the next giant leaps in human progress. The company’s groundbreaking Passage™ platform—the world’s first 3D-stacked silicon photonics engine—connects thousands to millions of processors at the speed of light. Designed to eliminate critical data bottlenecks, Lightmatter’s technology enables unparalleled efficiency and scalability for the most advanced AI and high-performance computing workloads, pushing the boundaries of AI infrastructure.

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