Lightmatter Introduces Guide Light Engine for AI, Featuring VLSP Technology

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A new class of integrated lasers to scale CPO for AI infrastructure

MOUNTAIN VIEW, Calif.–([BUSINESS WIRE](#))–Lightmatter, the leader in photonic (super)computing, today announced a foundational advancement in laser architecture: Very Large Scale Photonics (VLSP). Embodied in the Guide™ light engine, this breakthrough creates the industry's most integrated laser platform supporting unprecedented bandwidths—moving laser manufacturing from manual assembly lines toward foundry production. VLSP technology leverages large-scale photonic integration to overcome power-scaling limitations, enabling the photonic interconnect roadmap for AI with an initial 8X increase in optical bandwidth density, unprecedented deployment scalability, and wavelength stability.

Just as Lightmatter's Passage™ photonic interconnects have shattered shoreline bandwidth limitations with their unique 3D architecture, the company's new Guide™ light engine represents a giant leap forward in laser technology. The largest AI clusters in hyperscale data centers now depend on connectivity that is fundamentally constrained by bandwidth density—limited not only by I/O at the chip edges but also by the fact that even the most advanced photonic interconnects are only as capable as the laser technology that powers them.

Overcoming The Power Wall

Current co-packaged optics (CPO) and near-package optics (NPO) solutions rely on discrete indium phosphide (InP) laser diodes integrated in External Laser Small Form Factor Pluggable (ELSFP) modules. These architectures face a power wall: connector end faces and epoxy-bonded assemblies are vulnerable to thermal damage, where contamination absorbs light and can cause fiber damage at power levels as low as hundreds of milliwatts. This limits the usefulness of scaling optical power in InP lasers—the traditional roadmap for laser technology. Doubling the bandwidth today requires doubling the number of ELSFPs, leading to corresponding increases in cost, power consumption, and front-panel space, ultimately decreasing system-level reliability. Further, discrete lasers struggle to achieve tight wavelength spacing and control in upcoming dense wavelength division multiplexing, where laser arrays must maintain precise wavelengths with minimal drift.

A New Scaling Paradigm

The Guide VLSP light engine establishes a new bandwidth-scaling paradigm by reducing the high component counts associated with discrete laser modules while delivering inherently superior yields and field reliability. By moving to an integrated architecture, Lightmatter has defined a laser roadmap that efficiently scales from 1 to 64 wavelengths and beyond while reducing assembly complexity. The result is a massive density improvement: the first generation Guide validation platform enables 100 Tbps of switch bandwidth in a compact 1RU chassis, a feat that would require about 18 conventional ELSFP modules, occupying 4RU of rack space.

"Our customers are building infrastructure for MoE and world models at scales that demand semiconductor-grade integration everywhere—including the light source," said Nick Harris, co-founder and CEO of Lightmatter. "Scalable lasers unlock scalable CPO. Guide delivers massive bandwidth density through integration."

"The transition toward co-packaged optics (CPO) is becoming a key enabler for the next generation of AI-scale networks, driven by the need for higher bandwidth density and lower power per bit as electrical I/O limits tighten at very high data center rates", said Jean-Christophe Eloy, Founder and President of Yole Group. "Lightmatter's VLSP innovation represents a fundamental shift in how we power optical interconnects. Its level of photonic integration provides a scalable light source that can enable hyperscale CPO deployments over the next decade, addressing a laser market opportunity that alone rivals the scale of the optical engine segment."[1]

Lightmatter VLSP Technology Validation

The Guide light engine, powering Passage M-Series and L-Series ("Bobcat") rack-scale validation platforms, showcases unprecedented laser performance:

- **High Bandwidth Density:** Up to 51.2 Tbps per laser module for NPO and CPO applications
- **High Optical Output Power:** Minimum of 100 mW per fiber
- **Wavelengths:** generates 16 wavelengths with multiplexing
- **Closed-Loop Control:** Enabling bidirectional photonic links, in which two 400 GHz-spaced wavelength grids interleave at precisely 200 GHz offset with +/- 20 GHz accuracy, while delivering optical power uniformity of up to 0.1 dB across the channels in fiber

Learn more: [Lightmatter SC25 live demonstrations](#)

Availability

The VLSP-based Guide validation platform is sampling now, powering the latest rack-scale Passage L-Series and M-Series test and validation platforms. The Guide laser module is designed to be interoperable with third-party NPO and CPO solutions. Evaluation Kits (EVKs) are available on a priority basis to select strategic partners.

About Lightmatter

Lightmatter is leading the 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—and Guide®—the industry's first VLSP light engine—connect thousands to millions of XPUs. Designed to eliminate critical data bottlenecks, Lightmatter's technology delivers unprecedented bandwidth density and energy efficiency for the most advanced AI and high-performance computing workloads, fundamentally redefining the architecture of next-generation AI infrastructure. Visit www.lightmatter.co to learn more.

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[1] Source: [Co-Packaged Optics for Data Centers 2025 report](#), Yole Group

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