Adtran and Vertilas answer AI demands with industry-first ultra-low-power 100G PAM4 single-mode VCSEL technology

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News summary:

- Surge in AI/ML applications calls for unprecedented bandwidth and enhanced energy efficiency in intra-data center connectivity
- Adtran's VCSEL arrays achieve 800Gbit/s and 1.6Tbit/s speeds with transmit optics power savings of up to 80%
- Single-mode VCSEL technology will extend MicroMux™ family of pluggable transceivers to support data-intensive compute clusters

HUNTSVILLE, Ala.--(BUSINESS WIRE)-- Adtran and Vertilas today announced the industry's first 100Gbit/s PAM4 single-mode vertical-cavity surface-emitting laser (VCSEL) technology with capabilities up to 1.6Tbit/s. On display at this week's OFC, it sets new standards for low power consumption in optical engines and modules, with up to 80% reduction in power on the transmit optics compared to conventional solutions. Tailored specifically for the rigorous demands of intra-data center operations and AI/ML workloads, Adtran's latest offering achieves unprecedented efficiency, consuming less than 2pJ/bit, including the laser driver. This significantly undercuts current industry standards, including those cited by co-packaged optics. The advancement is set to extend the capabilities of Adtran's MicroMux™ family of small-form-factor pluggable transceivers. A major step towards meeting the needs of the rapidly expanding generative AI application market, Adtran's latest innovation addresses the growing demand for robust, high-capacity and environmentally friendly data processing solutions.

"As the importance of data volume and speed escalates, the demand for increased bandwidth and enhanced energy efficiency accelerates. Our introduction of the market's first 100Gbit/s PAM4 single-mode VCSEL technology, scalable to 1.6Tbit/s, epitomizes our proactive approach to tackling these emerging requirements. By pushing the limits of speed and significantly reducing power consumption, we're creating tomorrow's benchmarks," said Ross Saunders, GM of optical engines at Adtran. "Our new technology promises to significantly improve intra-data center connectivity and AI application efficiencies, merging high performance with long-term sustainability. As we prepare for the leap towards 800Gbit/s and 1.6Tbit/s applications, we're enhancing the foundations of efficient, high-capacity data ecosystems worldwide."

Building on the success of Adtran's MicroMux™ family, the new VCSEL technology leverages a short-cavity single-mode design and is based on indium phosphide semiconductor material. This enables it to operate across both O-band and C-band wavelengths, delivering 100Gbit/s per channel. By stacking multiple single-mode lasers into arrays, this approach achieves throughput of 800Gbit/s and 1.6Tbit/s, ensuring superior performance with a significant reduction in power consumption and costs. This enhanced energy efficiency presents a major advantage for IP router and Ethernet switch faceplate density. What's more, its versatility extends to supporting a wide array

of applications from DR4/8/16 to various FR4 links within optical engines, all while maintaining power consumption below 200mW per lane.

“As applications such as generative AI proliferate and enterprises expand their AI clusters, the need for advanced optical interconnects capable of supporting Terabit connectivity has reached a critical juncture. Our 100Gbit/s PAM4 single-mode VCSEL technology meets this challenge head-on. It enables energy efficiency and the capacity for higher-density deployments while at the same time addressing manufacturing, testing and assembly costs,” commented Christoph Glingener, CTO of Adtran. “This technology supports throughput of up to 800Gbit/s and 1.6Tbit/s, significantly reducing operational expenses while enhancing network capabilities. Our approach underscores a commitment to delivering sustainable, high-capacity networking solutions that break through existing barriers, readying networks for the next wave of AI infrastructure development.”

Demos of Adtran’s new VCSEL technology are available at this week’s OFC on request.

About Adtran

ADTRAN Holdings, Inc. (NASDAQ: ADTN and FSE: QH9) is the parent company of Adtran, Inc., a leading global provider of open, disaggregated networking and communications solutions that enable voice, data, video and internet communications across any network infrastructure. From the cloud edge to the subscriber edge, Adtran empowers communications service providers around the world to manage and scale services that connect people, places and things. Adtran solutions are used by service providers, private enterprises, government organizations and millions of individual users worldwide. ADTRAN Holdings, Inc. is also the largest shareholder of Adtran Networks SE, formerly ADVA Optical Networking SE. Find more at Adtran, LinkedIn and X.

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