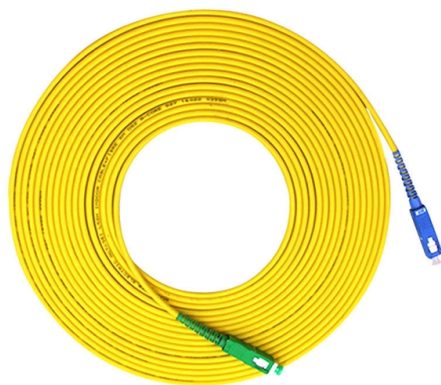


Metro-grade optical transceiver module EML



Overview

PRODUCT IDENTIFICATION This document serves as the definitive technical reference for the 100G/400G Optical Transceiver Family, a comprehensive suite of pluggable ...

Key Takeaways

EML (Electro-Absorption Modulated Laser) modules are ideal for high-speed, long-distance metro and backbone optical networks due to their low chirp, high signal integrity, and stable modulation.

Overview of EML Technology

An EM

L combines a distributed feedback (DFB) laser and an electro-absorption modulator (EAM) on a single chip.

The DF

B laser generates a stable continuous-wave (CW) light, while the EAM modulates the light intensity to encode data signals without altering the laser current. This separation of light generation and modulation reduces phase noise and wavelength drift, enabling high-speed, long-distance optical communication.



Key Advantages

High Modulation Speed: EMLs support data rates from 10 Gbps up to 100 Gbps and beyond, making them suitable for modern metro networks. **Low Chirp:** Minimal frequency shifts during modulation reduce dispersion over long fiber distances, improving signal integrity. **Long Reach:** EMLs can transmit 28 Gbaud PAM4 signals up to 240 km on standard single-mode fiber (SMF), making them ideal for metro and backbone deployments.

Stable Performance: The monolithic integration ensures consistent optical output and low signal distortion, even under high-speed operation. **Applications:** EML-based transceivers are widely used in: **Metro Networks:** For distances typically ranging from 10 km to 80 km, providing reliable high-speed connectivity between urban nodes.

Backbone and Long-

Haul Links: Supporting distances up to several hundred kilometers without the need for inline amplifiers. **Data Centers and Telecom Networks:** Especially for 400G, 800G, and emerging 1.6T optical modules where high-speed, long-distance links are required.

Comparison with Other Laser Technologies: **VCSEL:** Best for short-reach, low-cost, low-power applications within data centers (up to a few hundred meters). Not suitable for metro distances.

C

W Lasers: Require external modulators (e.g., Mach-Zehnder) and are scalable for cloud providers, but EMLs offer more compact integration and higher modulation efficiency for metro-grade links. **Directly Modulated Lasers (DMLs):** Simpler and cheaper but suffer from higher chirp and limited reach compared to EMLs.

Technical Structure

An EM

L chip typically includes three main components: **Laser Diode (DFB):** Produces a stable CW light source.

Electro-

Absorption Modulator (EAM): Modulates light intensity according to the electrical data signal. **Optical Waveguide:** Directs the laser light through the modulator and outputs the encoded signal. This integration allows high modulation efficiency, low power consumption, and minimal signal distortion, which are critical for metro-grade optical transceivers.

ConclusionEML-based optical transceivers are the preferred choice for metro and long-haul networks where high-speed, low-chirp, and long-distance performance are essential. While more expensive and power-intensive than VCSELs or DMLs, their superior signal quality, stability, and reach make them indispensable for modern telecom, metro, and high-performance data center applications.

Article Content

100G/400G Optical Transceiver Platform Specification & Architectural ...

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EML vs VCSEL vs CW Laser: Optical Transceiver Guide (2025)

Compare EML, VCSEL, and CW laser technologies in optical transceivers. Covers cost, reach, speed, the 2025 EML shortage, and silicon photonics alternatives.

1.6T Optical Module Solutions: SiPh vs. EML

Explore the differences between SiPh and EML technologies in 1.6T optical module design, including integration, power efficiency, transmission

100G QSFP28 ER4 30KM LC Optical Transceiver (EML)

The 100G QSFP28 ER4 optical transceiver delivers carrier-class performance for long-haul data transmission, supporting 100G Ethernet over single-mode fiber up to 30km. Designed for hyperscale

EML (Electro-Absorption Modulated Laser): Ideal for

EML diodes combine a laser and an electro-absorption modulator on one chip to enable fast and stable optical data transmission over long distances.

Electro-Absorption Modulated Lasers (EMLs) for Optical

The efficient operation of the EML is crucial for achieving high-speed and reliable data transmission in optical networks. To properly drive and control

Understanding EML Chips: Key Components for High-Speed Optical ...

Electro-Absorption Modulated Laser (EML) chips are critical components in modern optical communication systems, enabling high-speed data transmission with low power consumption

The Electroabsorption-Modulated Laser as Optical

We then introduce the recently proposed optical SSB Tx schemes based on electro-absorption modulation lasers (EMLs), including the double

What factors influence 400G optical transceiver modules price

From campus backbones to metro DWDM rings and hyperscale data centers, the cost of each 400g optical transceiver can swing hundreds or even thousands of dollars. To ensure you procure the right

200G QSFP56 LR4 EML LWDM4 10km/20km SMF LC Optical

The series uses 8 pairs of parallel single-mode fiber optic transmission with a central wavelength of 1310nm and distances up to 2km or 10km (both with FEC on), with optional industrial grade operating

Transceiver Types: SFP, SFP+, QSFP, XFP & More Explained

Transceiver Types: SFP, SFP+, QSFP, XFP & More Explained Compare all optical transceiver types — SFP, SFP+, SFP28, QSFP+, QSFP28, QSFP-DD, XFP, CFP — with speeds,

Pluggable Optical Modules Market : Global Industry Analysis and ...

Explore the global Pluggable Optical Modules market with expert analysis on growth drivers, trends, key insights, and forecast outlook to 2036.

Optical Modules Market Research Report 2034

The optical modules market was valued at \$14.8 billion in 2025 and is projected to reach \$39.6 billion by 2034, growing at a CAGR of 11.5%.

2026 Global Optical Module Selection Guide (Website Homepage

Metro DCI (40km): 800G ER4 (1550nm EML) - high stability for long distances Long-haul backbone (80-120km): Coherent optical modules (C-band/DWDM) - ultra-high capacity

400G Digital Optical Transceiver Market: Share & Growth Drivers

The 400G Digital Optical Transceiver market is projected for significant expansion. Analyze growth catalysts, key players like Cisco and II-VI, and an 11.47% CAGR by 2025. Access market

Germany Mellanox MMS1V90-WR 1310nm 10km SMF Optical Transceiver Modules ...

The LINK-PP LQD-CW400-LR4C is an enterprise-grade 400G QSFP-DD LR4 optical transceiver designed for long-reach data center interconnects. Engineered to meet IEEE 802.3bs and 100G

The Electroabsorption-Modulated Laser as Optical

The electroabsorption-modulated laser (EML) is a representative example of a monolithic integrated electro-optic converter that has early become

Optical Module: A Comprehensive Analysis from Source

For optical modules operating at 25Gbps and below, single-channel TO or butterfly-packaged optical transceivers components are typically soldered

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This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

