

LPO Pluggable Optical Module Test Report



Overview

LPO Pluggable Optical Module Test Report This data is available from LPO modules and represents an indication of the optical output power, which is equivalent.

Key Takeaways

LPO modules have been tested for lane calibration, interoperability, and power-efficient operation, demonstrating simplified tuning, low latency, and compatibility with modern data center ASICs. Overview of LPO Testing

Linear Pluggable Optics (LPO) modules are designed to shift signal processing from the module to the host ASIC, replacing DSPs with high-linearity analog components such as transimpedance amplifiers (TIAs) and driver chips. This architecture reduces power consumption and latency while maintaining high-speed performance for short-reach, high-density data center links. Testing focuses on verifying that these modules can operate reliably across multiple lanes, support host-based signal processing, and maintain interoperability with different switch or NIC platforms.

Key Test Results

- Lane Calibration and Signal Integrity CIG's ECOC 2023 presentation highlighted that single-lane tuning can calibrate all 8 lanes of a switch port, simplifying operations and reducing costs. Tests confirmed that LPO modules can maintain signal integrity across multiple lanes, even at speeds up to 200G per lane, provided the host ASIC can tune each port and the module driver compensates for impairments.

- **Interoperability Testing** Eoptolink demonstrated LPO modules in OSFP, OSFP-RHS, QSFP-DD, and QSFP112 form factors, showing that modules can operate across ports with varying insertion losses and that two FIR settings are sufficient for reliable operation . Interoperability tests also confirmed that LPO modules can coexist with DSP-based modules in the same system, supporting plug-and-play deployment.
- **Power and Latency Performance** LPO modules consistently showed lower power consumption compared to DSP-based optics due to the absence of onboard digital processing . Latency measurements indicated improved synchronization in AI/ML clusters and GPU fabrics, which is critical for high-performance computing environments.
- **Standards Compliance** LPO modules follow the 100G-DR-LPO MSA specification, supporting 53.125 GBd PAM4 optical interfaces, single-mode fiber links up to 500 meters, and host-module electrical interfaces compatible with DSP-based SerDes and RS(544,514) FEC . Testing ensures compliance with IEEE 802.3 and OIF CEI-112G-LINEAR-PAM4 standards, enabling Ethernet-like links with 1, 2, 4, or 8 lanes.

Summary

The LPO test reports indicate that these modules are suitable for dense, low-latency, and power-efficient data center interconnects. Key findings include:

- Simplified lane calibration and tuning for multi-lane ports
 - Reliable interoperability with different module vendors and host ASICs
 - Reduced power consumption and latency compared to DSP-based modules
 - Compliance with MSA and IEEE/OIF standards for high-speed optical links
- These results demonstrate that LPO modules are a viable solution for modern data centers, particularly in leaf-spine networks and AI/ML clusters where efficiency, scalability, and low latency are critical .

Article Content

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This data is available from LPO modules and represents an indication of the optical output power, which is equivalent to transmit

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Comparison to CPO g the need for a standalone module. Although CPO is becoming increasingly popular, LPO is seen as a natural

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This report, aside from probing into the development bottlenecks of existing optical module solutions, also focuses on

LPO MSA Specification

There are normative test points to ensure interoperability between host, module and optical fiber. The data path is linear in transmit

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Introducing Linear Pluggable Optics (LPO)

By shifting these functions from the module to the host, LPO achieves lower power consumption and latency while

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Overview Frlan, "200G LPO: Design Challenges and Latest Test Data," in Optical Fiber Communication Conference (OFC) 2026,

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Linear-drive Pluggable Optics: A Game-Changing Technology in

To reduce power consumption and cost while meeting the demands of high-speed, high-density optical communication

OSFP1600_and_OSFP-XD

3D views of the OSFP-XD solutions To accommodate both high-power optical and dense copper solutions, the specification will

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The key difference between LPOs and traditional optical modules is the Linear-drive. The so-called "linear drive"

What is LPO (Linear-drive Pluggable Optics)?

It makes optical interconnection flexible and convenient, and simplifies fiber cabling and equipment maintenance, making the system

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LPO optical modules, as a pluggable short-distance solution, are mainly used for intra-data center interconnection. Therefore,

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The 100G-DR-LPO specification has been validated by extensive member interoperability testing to confirm that it

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CPO vs LPO: Compare key differences, benefits, power savings, and best use cases for data centers to choose the

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What Is Linear Drive Pluggable (LPO)? Linear Drive Pluggable (LPO) is a DSP-less optical transceiver architecture

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