

Low-power optical module OSFP ODM



AI Overview

Low-power OSFP optical modules leverage linear pluggable optics (LPO) to reduce module power consumption while maintaining high-speed performance for AI and hyperscale data centers. Overview of OSFP Modules OSFP (Octal Small Form-Factor Pluggable) modules are designed for high-density, high-speed interconnects, supporting 400G, 800G, and emerging 1.6T speeds. They offer a wider thermal envelope and improved airflow compared to QSFP-DD, making them ideal for GPU-to-GPU topologies and AI cluster deployments. OSFP modules typically support power budgets up to 60W, enabling high-speed operation without compromising thermal management or port density.

Low-Power Design with Linear Pluggable Optics (LPO) Low-power OSFP modules often use Linear Pluggable Optics (LPO) technology, which removes the DSP (digital signal processor) from the module and shifts signal processing to the host ASIC. Instead of performing retiming, equalization, and FEC inside the module, LPO modules rely on high-linearity analog components such as drivers, lasers, photodiodes, and transimpedance amplifiers (TIAs). This approach reduces module power consumption by up to 40%, lowering it from around 14W to less than 8W per module while maintaining system performance.

Advantages of LPO in OSFP Modules

- Lower latency:** By removing DSP processing from the module, signal delays are minimized, which is critical for AI/ML workloads requiring tight synchronization.
- Reduced power consumption:** LPO modules consume significantly less power, enabling higher port density and lower operational costs.
- Scalability:** Ideal for hyperscale data centers and GPU fabrics, where multiple high-speed links are deployed in dense configurations.
- Compatibility:** LPO modules can operate alongside DSP-based optics, but host ASICs must support linear signal processing.

Performance and Deployment Low-power OSFP modules are suitable for short-reach, high-density connections where efficiency and low latency are priorities. They are deployed in le...

Article Content

400G LPO QSFP112 FR4 Optical Transceiver Module

FiberMall LQSFP112-400G-FR4 uses LPO technology and is a high-performance, scalable, low-power optical module suitable for high-speed network applications.

CMOS Low-Power Optical Transceiver for Short Reach

Although optical communication systems provide broad bandwidths, their relatively low power efficiency (>10 pJ/bit) continues to limit their deployment in new applications, such as

ADTRAN Holdings, Inc.

News summary: AI clusters and GPU fabrics demand massive capacity, yet traditional 800G optics increase energy consumption, heat and cost burdens Adtran's LiteWave800™

Designing a Module for High-Speed Optical Communication

The ultimate goal for all-optical connectivity with an ultra-high F5G bandwidth is to increase transmission rates. Optical modules — the foundation of optical communication networks — face the design

Using Comparators in Octal Small Form Factor Pluggable Modules

Optical Modules The Octal Small Form Factor Pluggable (OSFP) module is an optical transceiver designed to provide high speed 400G/800G data communications for data centers and networking

Optical module design resources | TI

View the TI Optical module block diagram, product recommendations, reference designs and start designing.

OSFP1600_and_OSFP-XD

3D views of the OSFP-XD solutions To accommodate both high-power optical and dense copper solutions, the specification will define separate but compatible heatsink specifications for both optical

800G OSFP SR8 Linear Pluggable Optics (LPO) Transceiver

- “ Linear drivers with gain and equalization control of VCSELs at transmitter” Trans-impedance amplifiers (TIA) with output amplitude and equalization control at receiver
- “ Ultra-low power consumption: $< 4W$ ”

Cisco Digital CFP2-DCO Coherent Optical Module Data

Cisco offers a comprehensive range of pluggable optical modules in the Cisco ONS pluggables portfolio. The wide variety of modules gives you

Smallest Thinnest Power Modules for Data Center Optical Modules

Since in high-capacity data centers, multiple copper-fiber connections are required, multiple numbers of optical modules are used. Each optical module is exposed to a high volume of data packets and

LPO & Low-Power Optics Guide 2025 | Data Center Power Efficiency

LPO modules cut per-port power by up to 50% compared to DSP-based optics, enabling denser fabrics and lower rack-level OPEX. Ideal for hyperscale, cloud, and enterprise AI

1.6T OSFP-XD: Next-Gen Data Center Optical Module

The 1.6T OSFP-XD DR8 optical module features low power consumption, high density, and hot-pluggable design, making it widely used in

LPO: Leading Low-Power 800G Optical Communication and

Advantages and Limitations of LPO Optical Modules LPO demonstrates compelling advantages in low power consumption and cost-effectiveness, positioning it as a potential

Increasing Further Data Rates Using High-Current Power Converters

Pushing the Limits of Thermal Designs Data rates are continuously increasing, now going up to 1.6Tbps. Though the form factor of pluggable optical modules are defined to be inter-operable and compatible

OSFP OCTAL SMALL FORM FACTOR PLUGGABLE MODULE

Abstract: This specification defines the electrical connectors, electrical signals and power supplies, mechanical and thermal requirements of the OSFP Module, connector and cage systems. The OSFP

OSFP Transceivers: High-Density Optical Connectivity from 400G to

Designed for high thermal capacity, electrical scalability, and forward compatibility, OSFP modules now drive connectivity across 400G, 800G and the emerging 1.6T generation.

Low-Power Optical Modules Supplier Guide: to Lower Data center

Choosing low-power optical modules today is one of the simplest, lowest-risk ways to reduce OPEX and improve sustainability without changing architecture or vendor lock-ins.

An ultra-low power 4×28Gbps linear optical receiver for short-reach ...

Emerging ultra-low-power solutions integrate high-sensitivity photodetectors, low-power Digital Signal Processor (DSP), and efficient modulation to support 28Gbps+ channels. To address

1.6Tb/s Twin-port XDR OSFP 2xDR4 1310nm 500m Optical Transceiver

Description The OSFP-1.6T-2xDR4H is a cost-effective module with high performance, which is optimized for AI Datacenter, supporting data-rate of 8x212Gb/s PAM4 Optical interface and

How a Tiny, Low-Power MCU Meets the Needs of an Optical Module

There are many high-speed optical modules which convert multiple electrical signals into one optical signal. The DSP, a device that consumes a high amount of power, is used to process

Understanding OSFP Modules: Your Guide to High-Speed Optical ...

Discover how OSFP modules provide high-speed optical connectivity for data center applications. Learn about the different form factors, data rates, and compatibility options available.

Optical Interconnect Technology Analysis: LPO, NPO,

Exploring optical interconnects for AI data centers: LPO for low-power, short-distance links, NPO for high-density, near-package connections,

Linear Pluggable Optics – An Overview

Comparison of proposed solutions: In response, several solutions such as Linear Receive Optics (LRO), Linear Pluggable Optics (LPO) and Co-Packaged Optics (CPO) have been proposed. Fig. 1

Common 400G QSFP-DD Transceiver Types in the Market

400G QSFP-DD optical module is a high-speed hot-pluggable transceiver. Here it will help you learn what 400G QSFP-DD optical modules exactly are, and the classification, and application

800G LPO Module: Enabling Low-Cost, Low-Latency Connectivity

Low Power Consumption and Latency: Compared to traditional 800G DSP-based transceivers that consume up to 17W, the FS 800G OSFP finned-top LPO module dramatically

FS Launches 800G LPO Module: A Power Efficiency and Latency

Designed for AI/ML applications, this advanced 800G DR8 OSFP finned top LPO module enables high-speed data transmission with ultra-low power consumption, reduced latency, and

Pluggable Optics Modules – Thermal Specifications, Part 1

Bonnie Mack and Terence Graham 1. Introduction Pluggable optics modules, (POMs), such as SFP, QSFP, QSFP+, QSFP28, CFP, CFP2, and CFP4 transceivers, are optical interface devices

Smallest Thinnest Power Modules for Data Center Optical Modules

By operating from a single 2.7V to 5.5V input power rail and integrating the controller, gate driver, power inductor, and MOSFETs, these mini modules are optimized for space-constrained applications like

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