

Optical module CPO heat dissipation



Overview

In this paper, a series of research studies have been conducted on the thermal management of the CPO, and a corresponding thermal management scheme has been designed according to the layout and heat dissipation requirements of the CPO. Microring Modulators (MRMs) have become the core optoelectronic devices of CPO optical engines due to their micro-scale size, ultra-high modulation efficiency, and natural compatibility with Wavelength Division Multiplexing (WDM) technology. The scheme can efficiently cool the high heat flux switch chip. This innovative approach integrates optical transceivers directly onto switch ASICs or processors, eliminating the need for traditional pluggable optical modules and reducing signal path lengths significantly. CPO technology co-packages an electronic integrated circuit (EIC) and a photonic integrated circuit (PIC) on the same carrier. CPO technology enables optical communication assemblies to be located closer to. In Co-Packaged Optics (CPO) where optical devices and ICs are attached to a common base substrate, there are requirements to keep the temperature of high-heat-dissipating ICs as low as possible and also to keep the temperature of optical devices constant.



Article Content

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CPO Is Extending The Limits Of What's Possible In AI...

The main challenges include heat dissipation near the GPU/ASIC (advanced heat management such as liquid-cooled cold plates, microfluidics,

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Thermal solution for Co-Packaged Optics (CPO) modules

In Co-Packaged Optics (CPO) where optical devices and ICs are attached to a common base substrate, there are requirements to keep the temperature of high-heat-dissipating ICs as low

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Electronic Chip Package and Co-Packaged Optics

Flip-chip technology offers superior heat dissipation and reduced signal path lengths, making it ideal for high-speed and high-performance applications

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Global AI Optical Transceiver Market to Reach US\$26 Billion in 2026 ...

- At the same time, the rising power consumption and heat dissipation challenges of high-speed optical modules are increasing system design complexity, adding pressure on actual data

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Global logistics for optics: 2026 Lead times & Risks

As the internal temperature of the module rises due to poor heat dissipation, the laser's efficiency drops. To maintain the required optical output power, the module's microcontroller

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S5735R-L8T4X-QA-V2 (98012668)

Indicators and Buttons The S5735R-L8T4X-QA-V2 has similar indicators to those on the S5735R-L8P4X-QA-V2 except that the S5735R-L8T4X-QA-V2 does not have a PoE mode indicator. For

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New Paradigm of Optical Interconnection Under the Computing Power ...

The sustained demand for AI computing power drives optical interconnection technology to evolve from traditional pluggable modules into three new technical routes: NPO, CPO and XPO,

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OSFP vs QSFP-DD vs QSFP112 - Choosing the Best

Many vendors are already introducing QSFP112 and OSFP 800G DR8/FR8 modules, setting the foundation for AI-driven and cloud-scale

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Heat dissipation difficulties of co-packaged optics (CPO) limit its ...

In this paper, a series of research studies have been conducted on the thermal management of the CPO, and a corresponding thermal management scheme has been designed according to the layout

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2026 Global Optical Module Selection Guide (Website Homepage

—— Explosive Growth of 800G/1.6T Technologies, Scene-Based Selection + Finisar Original Solutions in One Stop In 2026, driven by AI computing power, optical modules have entered

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Co-packaged optics (CPO): status, challenges, and solutions

For both methods, heat dissipation and strain-induced performance degradation need to be considered for future applications in CPO. In the form of 3D integrated CPO, the silicon photonic chips serve as

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Co-packaged optics (CPO): status, challenges, and

Co-packaged optics (CPO) is a disruptive approach to increasing the interconnecting bandwidth density and energy efficiency by dramatically

Aug 30, 2025

US20250284076A1

The present disclosure provides an optical module with CPO configuration which includes a housing, a substrate, a plurality of optical communication assemblies, and a plurality of heat...

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Thermal Design for CPO Microring Modulators

This diagram illustrates the core structure of TSMC's Co-Packaged Optics (CPO) technology, which integrates an electronic chip and a silicon

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(PDF) Simulation and experimental investigation of liquid

For the unique architecture of CPO, this study analyzes its heat dissipation needs in detail, and a thermal management scheme is designed.

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Optical Communications Industry Chain: Critical Infrastructure in the ...

This trend indicates that optical communication is becoming a core component of AI computing infrastructure, especially in supporting scale-out and scale-up networks within AI clusters.

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CPO will soon replace pluggable optical modules, and Rubin will

Nvidia announced its first CPO solution, which will be deployed in its scale-out switches. CPO packages silicon photonics devices with ASICs, and is about to replace traditional pluggable optical modules,

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Glass-substrate-based CPO at the Georgia Institute of Technology's ...

For the unique architecture of CPO, this study analyzes its heat dissipation needs in detail, and a thermal management scheme is designed. The thermal management scheme is simulated and...

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Co Packaged Optics Market Report: Size, Growth,

Co Packaged Optics Market size is projected to reach USD 0.84 Billion by 2032, growing at a CAGR of 27.5% from 2026 to 2032 The report provides key trends,

Aug 13, 2025

Co-packaged Optics: Powering the Next Wave of AI

Co-packaged optics (CPO) will play a fundamental role in improving the performance, efficiency, and capabilities of networks, especially the scale-up

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Simulation and experimental investigation of liquid-cooling thermal ...

For the unique architecture of CPO, this study analyzes its heat dissipation needs in detail, and a thermal management scheme is designed. The thermal management scheme is

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How to Reduce Heat in Co-Packaged Optics Systems

The primary technical objective of CPO thermal management is to establish effective heat dissipation pathways that maintain electronic components within their operational temperature

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Optical Component Startup Tracker

The number of venture-backed optical component startups has exploded - the Optical Component Start-Up Tracker identifies these companies

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Co-Packaged Optics Market Size, Growth & Trends, 2031

On-board optics remain serviceable for enterprise and telco workloads that value module swaps, yet their added latent heat and trace loss impose

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Predicting Cost Trends for Widespread Co-Packaged Optics Adoption

Thermal management presents additional complexity, as CPO modules must dissipate heat from both electronic switching circuits and optical components within confined spaces. This

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