

Optical Module Heat Dissipation Device



AI Overview

Optical module heat dissipation equipment includes passive and active thermal solutions such as heat sinks, vapor chambers, heatpipes, and thermoelectric coolers to maintain performance and reliability in high-power optical transceivers.

Passive Cooling Solutions

Heat sinks and heat spreaders are commonly used to remove heat from optical modules. These devices transfer heat from critical components, such as lasers, photodiodes, and DSP chips, to the surrounding air. Designs often include zoned heat dissipation, where fixed and floating shell portions of the module interface with corresponding heat sink areas to target high-heat components efficiently, reducing thermal resistance and preventing hotspots (WO2025060737A1).

Vapor chambers and heatpipes enhance thermal distribution by moving heat from the module to larger radiators or remote cooling areas. Vapor chambers are particularly effective in low-height applications, while heatpipes can transport heat over longer distances to remote radiator stacks, improving airflow and thermal uniformity (Heatscape).

Fin geometry optimization and detachable heatsink covers are used in OSFP modules to balance airflow impedance and heat exchange surface area, ensuring reliable operation under datacenter airflow conditions (Link-PP).

Active Cooling Solutions

Thermoelectric (Peltier) coolers provide active cooling by pumping heat from the module to a hot side, which is then dissipated via a heat sink. These devices are compact, capable of operating in tight spaces, and can maintain module temperatures below critical limits even in high ambient conditions (Laird Thermal).

Liquid-cooled cold plates and manifold assemblies are used for high-power pluggable optics, distributing coolant efficiently to multiple modules while avoiding pre-heating effects, which is essential in dense, high-performance systems (Heatscape).

Design Considerations

Thermal Interface Materials (TIMs): Used between components and shells or heat sinks to reduce interface thermal resistance and improve heat transfe...

Article Content

OSFP Optical Module Thermal Design: Structure, Heat Dissipation ...

Explore how OSFP optical modules are thermally designed for optimal cooling and reliability. Learn about airflow impedance, gradient fins, heatsinks, and cooling solutions for 400G+

WO/2025/060737 OPTICAL MODULE HEAT DISSIPATION DEVICE

Embodiments of the present disclosure provide an optical module heat dissipation device.

HEAT DISSIPATION STRUCTURE OF OPTICAL MODULE, AND ELECTRONIC DEVICE ...

Because the heat conducting material also has a very large thermal resistance, a heat dissipation requirement of the optical module cannot be well satisfied, reducing the service life of the

Photonics & Optoelectronics Thermal Analysis

High-Resolution Thermal Imaging – Detect hotspots and thermal gradients in photonic devices. Transient Thermal Analysis – Measure rapid heat dissipation

WO/2026/045854 OPTICAL MODULE HEAT DISSIPATION DEVICE

The device comprises: a circuit board; mounting cages, used for mounting optical modules, wherein a plurality of mounting cages are provided, the plurality of mounting cages are

Active Cooling of Optical Transceivers

The objective was to design a thermoelectric cooler assembly that can remove heat generated by optical transceivers running in environments where temperatures can exceed 95°C.

Thermal design study of 200G QSFP-DD LR4 optical

This article mainly studies the influence of the environment on heat dissipation of optical module, especially the influence of various parameters of

Efficient Heat Dissipation of Uncooled 400-Gbps (16×25-Gbps) Optical ...

An effective heat dissipation of uncooled 400-Gbps (16×25-Gbps) form-factor pluggable (CDFP) optical transceiver module employing chip-on-board multimode 25-Gbps vertical-surface-emitting-laser ...

Advanced Thermoelectric Cooling for Optoelectronics

Active Thermoelectric Cooling Active thermoelectric devices such as thermoelectric coolers are used in conjunction with passive heat sinks to offer spot cooling and

Integrated thermal dissipation micro structures for CDFP optical

Concentrating on the thermal design of CDFP optical module, we propose two integrated thermal dissipation micro structures (ITDMS). The first is graphene thermal pad (GTP)-based one,

HEAT DISSIPATION STRUCTURE OF OPTICAL MODULE, AND

Because the heat conducting material also has a very large thermal resistance, a heat dissipation requirement of the optical module cannot be well satisfied, reducing the service life of the

Transparent radiative cooler with high thermal

Effective heat dissipation is vital for wearable devices like smart glasses, which directly contact human skin. Here, Li et al. develop a transparent

WO2021244290A1

An optical module heat dissipation assembly (200) and a communication device, which are used for improving the heat dissipation efficiency of two optical modules symmetrically arranged on two sides

Integrated thermal dissipation micro structures for CDFP optical module

Based on basic heat transfer equations and by SOLIDWORKS Flow Simulation software, the ITDMS are numerically validated for effective heat dissipation of CDFP optical modules and hence have great

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EEL M12 650nm Laser Diode AL52010001

The EEL M12 650nm Laser Diode is engineered for high precision and stable optical power output, featuring excellent heat dissipation and an integrated APC

The Complete Guide to Optical Module Thermal Management

Mastering heat dissipation, cooling techniques & design strategies for reliable optical transceivers. Optical modules are the backbone of high-speed networks — from data centers to 5G front-haul.

Hot Topics, Cool Solutions: Thermal Management in Optical

Hot Topics, Cool Solutions: Thermal Management in Optical Transceivers In a world of optical access networks, where data speeds soar and connectivity reigns supreme, the thermal management of

Enabling Higher Data Rates for Optical Modules With Small and

As optical modules have a great number of heat-generating components in a small space, the temperature inside them increases considerably. This higher internal temperature is the ambient

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the purpose of the present application is to solve the above problems, and provide a heat dissipation device for an optical module, which uses a through hole on a PCB to optimize heat...

Optical module heat dissipation design: key technology to ensure ...

The heat dissipation design of optical modules plays a vital role in optical communications and optoelectronic equipment. With the continuous development of optical communications and

Thermal Management Strategies for Optical Devices

Optimize your optical system with effective thermal management strategies to maintain performance, image quality, and user comfort.

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

This study explores the application of cold plate liquid cooling technology in co-packaged optics (CPO). By integrating optical modules and the switch chip on the same substrate, CPO

Study on heat dissipation behavior of optical polymer microstructured ...

Optical illumination elements rely on polymer materials to ensure overall performance, but the low thermal conductivity leads to heat accumulation. On the micro-optic polymer surface, heat

Researching | Design of thermal control system for high-speed ...

Therefore, the heat dissipation environment of optical modules must be ensured. In order to ensure that the optical module can still maintain good performance under extreme environment, it is necessary to

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