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## Active Thermal Control in Thermal Hood Assembly for Co-Packaged Optical Transceivers

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## **Active Thermal Control in Thermal Hood Assembly for Co-Packaged Optical Transceivers**

### Abstract

Routing of fast signals in electronic devices can be challenging. A technique is disclosed that provides active, load-driven temperature control of optical transceivers which are co-packaged with ASICs. Peltier thermo-electric cooling devices are integrated into a thermal hood assembly to enable device-specific active cooling.

### Description

This disclosure relates to the field of thermal management.

A technique is disclosed that provides active, load-driven temperature control of optical transceivers which are co-packaged with ASICs.

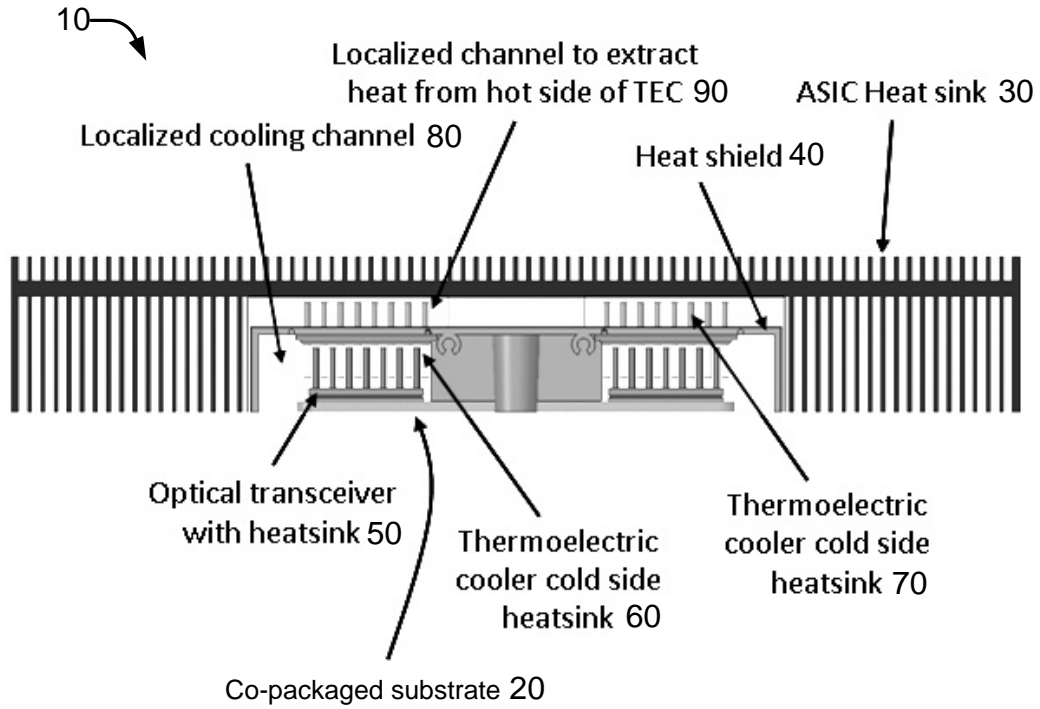
As high-power high-radix ASICs use faster signals (e.g., >25Gbps/lane), high-speed electrical signal routing between the ASIC and optical transceivers on a system board becomes challenging, requiring expensive PCB materials, and/or the use of electrical retimer chips that can dramatically increase system costs.

Up to now, there have only been passive solutions to this problem. Placing optical transceivers closer to high-power ASIC is a solution for the electrical signals, but high-power ASIC generating high heat negatively impact the optical transceivers wear-out life time, which in turn adversely affects overall system reliability.

According to the present disclosure, and as understood with reference to the Figure, Peltier thermo-electric cooling devices are integrated into a thermal hood assembly or heat shield to enable device-specific active cooling. The cooling devices remove heat from the air channel for the optical transceivers. In this way, active thermal control is provided at the device level. This active thermal control can lower preheating and control transient loads on the optical transceivers.

In one example, an ASIC and optical transceiver package 10 includes a co-packaged substrate 20. A thermal hood assembly includes an ASIC heat sink 20 and a heat shield 40. An optical transceiver with heat sink 50 is disposed adjacent the substrate 20. The thermal hood assembly also includes a thermoelectric cooler cold side heat sinks 60, 70. The package 10 also includes a localized cooling channel 80 and a localized channel to extract heat from the hot side of the TEC 90.

The disclosed technique advantageously provides active temperature control of optical transceivers co-packaged with ASICs, and enables active, load driven cooling of optical transceivers.



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