

Customized Energy-Saving Process for Transparent Optical Cables in Data Centers



Article Overview

Energy-efficient optical interconnects in data centers can reduce power consumption by up to 95% compared to traditional copper solutions through MicroLED-based co-packaged optics and low-power transceiver designs.

MicroLED-Powered Optical Interconnects

Microsoft's MOSAIC technology demonstrates a customized energy-saving approach by replacing conventional laser-based optical cables with MicroLED-powered interconnects, achieving up to 68% reduction in networking power consumption . Key features include:

- Directly Modulated MicroLEDs: Each MicroLED consumes only a few hundred microwatts, 100–1,000 times less than traditional lasers, and is inherently temperature-stable and dust-insensitive .
- Multicore Imaging Fiber: Thousands of parallel fiber cores within a single cable allow hundreds of low-speed channels to transmit data simultaneously, reducing the need for high-power, high-speed channels .
- Low-Power Analog Backend: Operating at 2 Gbps per channel with NRZ encoding eliminates power-hungry DSPs, ADC/DACs, and CDR circuits, further lowering energy use . This architecture is particularly suited for short-distance, high-density intra-rack connections, enabling energy-efficient AI and cloud computing workloads....

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