

LDI in the optical module



Overview

Laser Direct Imaging (LDI) LDI is an advanced technology that uses a computer-controlled laser beam to directly expose circuit patterns onto a The Revoluti.

Key Takeaways

LDI (Laser Direct Imaging) is a precision technique that uses a computer-controlled laser to directly pattern photosensitive materials, enabling high-resolution fabrication in optical modules. What LDI Is

Laser Direct Imaging (LDI) is a photolithography method where a laser beam directly exposes a photosensitive layer according to digital design files, eliminating the need for physical masks or films . In optical modules, this allows for micrometer-level precision in creating waveguides, micro-optical circuits, or alignment features on substrates, which is critical for high-performance optical communication and sensing devices .

How LDI Works in Optical Module Fabrication

- **Design Input:** The optical circuit or microstructure is designed digitally and uploaded to the LDI system.
- **Substrate Preparation:** The optical substrate (glass, polymer, or PCB-based optical board) is coated with a photosensitive resist.
- **Laser Exposure:** A UV or visible laser scans the substrate according to the design, inducing chemical changes in the photoresist to define the optical patterns .

- **Development:** The exposed substrate undergoes chemical development, leaving behind the precise optical structures.

- **Post-Processing:** Additional steps like etching, metallization, or deposition may follow to complete the optical module.

Advantages of LDI in Optical Modules

- **High Precision:** Achieves line widths and feature sizes down to a few micrometers, essential for dense optical interconnects and waveguides .

- **Flexibility:** Digital control allows rapid design changes without creating new masks, reducing prototyping time .

- **Reduced Defects:** Eliminates mask misalignment and wear, improving yield and reliability .

- **Efficiency:** Faster exposure and reduced setup time compared to traditional photolithography, enabling quicker production cycles .

Applications in Optical Modules

LDI is particularly useful in:

- Optical interconnects for high-speed data transmission.

- Micro-optical components such as lenses, gratings, and waveguides.

- High-density optical PCBs used in photonics and telecom modules.

- Prototyping and small-batch production, where flexibility and precision are critical .

By directly imaging patterns with a laser, LDI ensures consistent, high-quality optical structures, which is essential for maintaining signal integrity and performance in modern optical modules.

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The optical module includes the following types: 1. 10Gbs optical modules (XFP, SFP+) - compact 10Gb/s optical

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