

Dual-fiber LC optical module



Overview

When planning a fiber optic network, one key decision is choosing between single-fiber (BiDi) and dual-fiber optical transceivers.

Key Takeaways

Dual-fiber LC optical modules use two separate fibers—one for transmitting and one for receiving data—offering stable, high-bandwidth communication for long-distance networks.

A dual-fiber optical transceiver requires two fibers: one dedicated to transmitting (TX) and the other to receiving (RX) signals. These modules typically use duplex LC connectors, which are standard in single-mode fiber networks, and are designed for high-speed data transmission, often supporting 10Gbps or higher over distances ranging from 10km to 20km on single-mode fiber (SMF). Unlike single-fiber BiDi modules, dual-fiber modules do not require wavelength pairing and can connect any two compatible modules.

Key Features

- Data Rate: Commonly 1Gbps to 10Gbps, with some modules supporting up to 11.1Gbps.
- Transmission Distance: Typically 10–20km on single-mode fiber.
- Connector Type: Duplex LC interface for dual-fiber modules.
- Compatibility: Works with standard SFP+, XFP, or other pluggable transceivers in Ethernet and telecom networks.

- Advantages: High transmission stability, minimal signal interference, and suitability for backbone or long-distance networks .

- Cost Consideration: Generally less expensive per module than single-fiber BiDi modules, but requires two fibers per link .

Applications

Dual-fiber LC modules are ideal for:

- Long-distance backbone networks where fiber resources are sufficient.
- High-bandwidth Ethernet and telecom systems.
- Data centers requiring reliable, high-speed connections.
- Optical fiber communication systems in industrial or enterprise environments .

Comparison with Single-Fiber BiDi Modules	Feature	Dual-Fiber LC	Single-Fiber BiDi
Fiber Usage	Two fibers (TX/RX)	One fiber (bidirectional)	
Connector	Duplex LC	Simplex LC	
Wavelength	Single wavelength per fiber (WDM)	Two wavelengths per fiber	
Cost	Lower per module, higher fiber cost	Higher per module, saves fiber	
Pairing	Any two compatible modules	Must be used in matched pairs with complementary wavelengths	
Stability	High, minimal interference	Slightly more sensitive to fiber quality and wavelength mismatch	

Dual-fiber modules are preferred when fiber availability is not a constraint and network stability and simplicity are priorities, while BiDi modules are chosen to save fiber resources in constrained environments .

Conclusion

A pair of dual-fiber LC optical modules provides a reliable, high-speed solution for long-distance single-mode fiber networks. They are cost-effective, easy to deploy, and compatible with standard network equipment, making them suitable for backbone, data center, and enterprise applications where fiber resources are sufficient .

Article Content

What Is an SFP Duplex LC Connector in Fiber Networks

In fiber optic networking, the term Duplex LC describes a connector configuration that combines the LC connector

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1.25G SFP MODULE- 1.25Gbps SFP Optical Transceiver, Dual LC single-mode fiber, 1310nm, up to 20km super long

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1.25G SFP MODULE- 1.25Gbps SFP Optical Transceiver, Dual LC single-mode fiber, 1310nm, up to 20km super long distance

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Fiber Type:1.25Gb/s Dual LC OM3 Fiber Module 10 Pack; Wavelength: 850 nm Multimode;

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