

What types of 10 Gigabit single-mode optical modules are there

Article Overview

The main types of 10G single-mode optical modules are LR, ER, and ZR, designed for long-distance 10Gbps transmission over single-mode fiber.

Overview of Single-Mode 10G SFP+ Modules

Single-mode 10G SFP+ modules are optical transceivers that convert electrical signals into optical signals for transmission over single-mode fiber (OS2). They are ideal for long-distance links, ranging from 10 km to 80 km or more, making them suitable for building-to-building connections, campus networks, metro networks, and backbone upgrades . These modules typically operate at 1310nm or 1550nm wavelengths, which allows light to travel farther with minimal signal loss .

Common Types

- o 10GBASE-LR (Long Reach)
 - o Wavelength: 1310nm
 - o Maximum Distance: Up to 10 km over single-mode fiber (can reach 20 km in some cases)
 - o Applications: Campus networks, inter-building connections, metro area networks
 - o Features: Uses Distributed Feedback Laser (DFB), low power consumption, compact size
- o 10GBASE-ER (Extended Reach)
 - o Wavelength: 1550nm
 - o Maximum Distance: Up to 40 km over single-mode fiber
 - o Applications: Long-haul connections, data center interconnects, enterprise campuses
 - o Features: Cost-effective ultra-long-distance module, suitable for backbone links
- o 10GBASE-ZR (Ultra-Extended Reach)
 - o Wavelength: 1550nm
 - o Maximum Distance: Typically up to 80 km or more
 - o Applications: Metro and regional networks, long-haul telecom links
 - o Features: Designed for ultra-long-distance transmission, often used in service provider networks

Additional Considerations

- o Compatibility: Single-mode 10G SFP+ modules follow IEEE 802.3ae standards and SFP+ MSA, ensuring interoperability across switches, routers, and network interface cards .
- o Cost: LR modules are generally the most cost-effective for moderate distances, while ER and ZR modules are more expensive due to longer reach and higher-quality lasers .

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o Deployment: These modules are hot-swappable and typically use LC duplex connectors. They are preferred when multimode fiber cannot meet distance or scalability requirements .

Summary

For 10 Gigabit single-mode deployments, LR, ER, and ZR modules provide scalable options depending on distance and network requirements. LR is suitable for short to medium single-mode links, ER for extended distances, and ZR for ultra-long-haul connections. Choosing the right module depends on the required transmission distance, budget, and network infrastructure.

This blog will explore the function of SFP modules, SFP module types, applications and how to choose suitable SFP

Moxa's small form-factor pluggable transceiver (SFP) Ethernet fiber modules for 10 Gigabit provide coverage across a wide range of

Learn everything about 10GB SFP modules, including types, specifications, compatibility, and how to choose the right 10G SFP+

In fiber optic cabling, two primary types dominate the landscape: single-mode and multimode fiber cables. While both serve the

Commonly, 850nm SFP can reach up to 550 meters with multimode fiber optics, and the 1550nm SFP supports up to

What Is an SFP Port on a Gigabit Switch? An SFP port (Small Form-Factor Pluggable port) on a Gigabit switch is a

Cisco Transceiver Modules - Learn product details such as features and benefits, as well as hardware and software specifications.

1 Gigabit Singlemode SFP Transceivers Our 1 Gigabit Singlemode SFP Transceivers offer high-performance, reliable connectivity for

10 Gigabit Small Form-factor Pluggable (SFP) transceivers, commonly known as 10G SFPs, are compact modules used for data

There are five physical layer standards for Gigabit Ethernet using optical fiber (1000BASE-X), twisted pair

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cable (1000BASE-T), or

The SFP-10G Series 1-port 10 Gigabit Ethernet SFP+ modules are available as optional accessories for a wide range of Moxa

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The main types of 10GbE SFP+ transceivers include SR (Short Range) for multimode fiber connections up to 300-400 meters, LR

FS 10GbE SFP+ module solutions provide a wide variety of 10 Gigabit Ethernet connectivity options for data centers, enterprise

Connect a singlemode 10GBase-LR fiber cable to the SFP+ port on your Cisco switch or router with this Cisco-compatible SFP-10G

The Cisco® 10GBASE SFP+ modules (Figure 1) give you a wide variety of 10 Gigabit

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