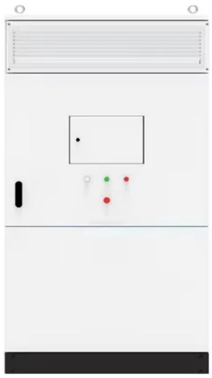
Optical module with the longest range of kilometers



Overview

Understand short-range and long-range 10G optical modules in terms of distance, budget, energy use, and scalability to make the right choice.

Key Takeaways

The longest-range optical modules currently available are ZX or ER SFP/SFP+ modules capable of transmitting up to 80 kilometers over single-mode fiber.

Long-

Range Optical Module Overview

Optical modules are classified by their wavelength, optical power, and fiber type, which determine their maximum transmission distance. For long-haul applications, single-mode fiber (SMF) is used due to its low attenuation and minimal dispersion over long distances. Modules designed for extended reach include: ZX SFP/SFP+ modules: Support distances up to 80 km using 1550nm wavelength lasers and higher optical power budgets, ideal for metro and regional networks, telecom backbones, and inter-data center links.

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R (Extended Reach) SFP/SFP+): Typically support 40 km over single-mode fiber at 1550nm, suitable for medium-range backbone connections.

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R (Long Reach) SFP/SFP+ and QSFP28 LR4: Designed for 10 km over single-mode fiber at 1310nm, commonly used in data centers and enterprise networks.

Technical Considerations

Wavelength: Longer wavelengths (1550nm) experience lower fiber attenuation, enabling longer distances compared to 1310nm modules. Optical Power Budget: Modules with higher transmit power and sensitive receivers can overcome fiber losses, splices, and connector losses to maintain signal integrity over extended distances. Data Rate Compatibility: Long-range modules support various speeds, including 1G, 10G, 25G, and 100G, depending on the module type (SFP, SFP+, QSFP28),.

Environmental Tolerance: Industrial-grade modules can operate in extreme temperatures (-40°C to +85°C), which is important for outdoor or remote deployments. Practical Applications80 km ZX SFP+ modules: Ideal for connecting geographically dispersed data centers or enterprise campuses without intermediate signal regeneration. 10 km QSFP28 LR4 modules: Suitable for high-speed 100G Ethernet links within large-scale data centers.

Intermediate ER/EX modules: Used for backbone or metro networks where distances range from 20 km to 40 km.

Summary

For the longest optical transmission distances, ZX or ER SFP/SFP+ modules operating at 1550nm over single-mode fiber are the top choice, achieving up to 80 km.

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R modules provide shorter but still significant reach (10 km) and are widely used in high-speed data center networks. When selecting a module, consider fiber type, wavelength, optical power budget, and environmental conditions to ensure reliable long-distance connectivity.

Article Content

10G Optical Modules: Short-Range vs. Long-Range

Understand short-range and long-range 10G optical modules in terms of distance, budget, energy use, and scalability to make the right choice.

Overview of QSFP28 LR4 Optical Transceiver

The QSFP28 LR4 is a hot-pluggable, four-channel, and full-duplex optical transceiver module designed for long-distance transmission up to 10 km in the 100G Ethernet network with a

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SFP Distance Explained: Real-World Range, Limits, and Optics

SFP distance refers to the maximum effective range over which an SFP optical module can transmit data while maintaining signal integrity. It is typically measured in kilometers (km) for

QSFP 40G 80km: Complete Guide to 40G Long-Distance Optics

This guide explains what QSFP 40G 80km modules are, how they work, their key specifications, and when they are the right choice for long-distance optical networking.

SFP Optical Transceiver Modules for Long Distance: A Complete

Discover everything you need to know about SFP optical transceiver modules for long-distance fiber transmission. Compare LX, EX, ZX models and choose the right module for your

Enabling Long-Reach 10G Connectivity: The 80km

The CC-PII448L-xD 10Gb/s SFP+ Optical Transceiver Module, designed for transmission distances up to 80 kilometers, addresses this need by

The Strength Of Long Distance Transmission: 10G SFP+ ZR 120KM

ETU-Link 10G SFP+ 120KM dual-fiber optical module is its ultra-long transmission distance of up to 120 kilometers.

100G DWDM QSFP28 80 vs 120: Complete Comparison Guide

Compare 100G DWDM QSFP28 80km vs 120km modules. Learn differences in optical budget, power, DCM requirements, and best applications.

How 10G SFP+ ER Modules Enable Long-Distance Optical Link

The 10G SFP+ ER module is designed to transmit data over long distances of up to 40 kilometers. Utilizing a wavelength of 1550nm, it is compatible with single-mode fiber.

Making long-haul large-capacity 400G optical network a reality

Long-haul large-capacity 400G optical transmission over 1,500 km is possible through advanced fibre-optic systems.

Optical networks

An optical transport network is a high-speed communication system that sends light signals over fiber-optic cables to move large amounts of data across long

Cisco 10GBASE SFP+ Modules Data Sheet

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The Cisco 10GBASE-ER Industrial Temperature Module supports a link length of up to 40 kilometers on standard Single-Mode Fiber (SMF, G.652). The SFP-10G-ER-I for Industrial Operating Temperature

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Ultra long range (120 kilometer) optics

Ultra long range (120 kilometer) optics - anyone know of any? Long shot, but there''s more collective wisdom here than in my google fingers, hopefully. I''ve been tasked with finding optics for what I

Reach Further, Faster: Your Ultimate Guide to Long-Range 10G Optical ...

Long-range 10G optical modules enable high-speed data over distances up to 80km. Learn about types, specs, compatibility, and choosing the right module.

Enabling Long-Reach 10G Connectivity: The 80km

In today''s data-driven world, the demand for high-speed, reliable, and long-distance optical connectivity continues to grow. The CC-PII448L-xD 10Gb/s

What is the longest transmission distance of a 10G

There is a variation of ranges, Technically ZR modules are the longest and can transmit data over single-mode fiber for distances up to 80

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