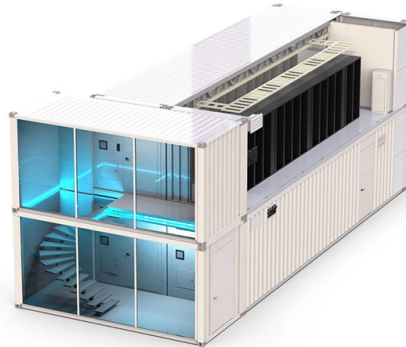


What are the different transmission distances of optical modules



AI Overview

The transmission distance of optical modules depends on wavelength, fiber type, and module design, ranging from a few meters for multimode fibers to over 80 km for long-distance single-mode modules. Classification by Distance Optical modules are generally categorized into three distance classes: Short-distance modules: Typically less than 2 km, often using 850 nm wavelength over multimode fiber (MMF) for data rates from 100M to 400G depending on fiber type and standard (). Medium-distance modules: Cover 10–20 km, usually employing 1310 nm wavelength over single-mode fiber (SMF) to balance attenuation and dispersion (). Long-distance modules: Exceed 30 km, often using 1550 nm wavelength with SMF and advanced lasers like DFB or EML to minimize chromatic dispersion and signal loss, with some modules reaching up to 80 km ().

Factors Affecting Transmission Distance

Wavelength: Shorter wavelengths (850 nm) experience higher attenuation, limiting distance, while longer wavelengths (1310 nm, 1550 nm) have lower fiber loss, enabling longer reach ().

Fiber Type: MMF (OM3, OM4, OM5) supports shorter distances due to modal dispersion, whereas SMF (OS2) allows much longer distances with minimal loss ().

Data Rate: Higher data rates reduce maximum distance due to increased signal degradation and dispersion ().

Laser Type: VCSELs are common for MMF short-distance modules, while DFB or EML lasers are used for long-distance SMF modules to improve power and reduce dispersion ().

Power Budget: The difference between transmitter power and receiver sensitivity must exceed total link loss, including fiber attenuation and connector losses, to achieve the rated distance ().

Practical Examples

850 nm MMF: 100 m for 25G/100G/200G/400G, 300 m for 10G, up to 2 km for 100M ().

1310 nm SMF: 10–20 km for medium-distance applications ().

1550 nm...

Article Content

Understanding Optical Modules: A Comprehensive Guide

The primary function of an optical module is to enable communication between network devices such as switches, routers, and servers.

Understanding SR/LR Optical Designations and Distances

The effective transmission distance of optical modules determines how far data can travel while maintaining signal integrity and performance. SR and LR modules use different fiber types,

Market Insights: 800G & 1.6T Silicon Photonics Optical Modules

For short-distance transmission between switches, where each laser has the same wavelength, one module may output eight fibers. In these cases, the packaging difference between

Understanding Single-mode and Multi-mode Optical Modules and Optical ...

Conclusion: In conclusion, single-mode and multi-mode optical modules and fibers serve distinct purposes in sfp optical module communication, offering compatibility with different transmission

What is SFP-10G-SR?

The wavelength of the SFP-10G-LR-S optical module is 1310nm, and the transmission distance can reach 10km when it is used with a single-mode optical fiber. And the wavelength of an SFP-10G-SR

What Are the Key Parameters of Optical Modules

Understand the key parameters of optical modules, including transmission rate, distance, wavelength, and fiber compatibility, for better network performance.

Understanding Single-mode and Multi-mode SFP Optical Modules

A SFP single-mode optical modules and SFP multi-mode optical modules are incompatible. If you mix SFP single-mode optical modules and SFP multi-mode optical modules, it may cause problems such

“Understanding Transmission Distance: Short-Range vs Long-Range

Do you really need a 10km module for a 300m connection? Many customers unknowingly overspend by not matching transceiver distance with real needs.

Understanding the Transmission Distance of Optical Modules ...

In the complex world of network design, understanding the reach of optical modules is crucial. From ensuring fast, local connections with SR to enabling extensive, long-haul

The relationship between wavelength and transmission distance of ...

The transmission distance of optical modules is divided into short distance, medium distance, and long distance.

What Is an Optical Module and Its FAQs (V200)

If the distance is within the transmission distance of the remote optical module, check whether the optical module and optical fiber on the interface are damaged.

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Optical module - A comprehensive exploration

The optical module is one of the core devices of the optical communication system, and its development has a vital impact on its related industrial chain. So, what is an optical module? How

What Is StarryLink Optical Module? Why Do We Need It?

What Is StarryLink Optical Module? In the AI era, data center network interconnection presents new challenges for optical modules, requiring significant improvements in transmission

What is an Optical Transceiver? - VCELINK

What are Optical Transceivers? The optical transceiver, also simply known as an optical module or fiber optic transceiver, is an integration of a

The Evolution of 400G, 800G, and 1.6T Optical Modules

As optoelectronic devices develop and integration levels increase, the performance and transmission bandwidth of these devices improve. Consequently, the packaging methods of optical

The relationship between wavelength and transmission distance of ...

The transmission distance of optical modules is divided into short distance, medium distance, and long distance. Short distance transmission usually refers to transmission distances below 2km, with a

Exploring the Correlation Between Optical Module Wavelength and ...

The transmission distance of optical modules refers to the distance over which optical signals can be transmitted without the need for relay amplification. It is divided into short, medium,

The Ultimate Guide to SFP Modules (2026): Types, Speeds

Confused by SFP vs SFP+? Read the definitive 2026 guide on SFP modules. We explain Single Mode vs Multimode, DDM diagnostics, and how to choose the right transceiver for Cisco, Juniper, and more.

DAC vs AOC vs Fiber + Optics Buying Guide | How to Choose the

Not sure whether to choose DAC, AOC, or Fiber + Optics? Learn the differences, transmission distances, applications, and recommended optical modules for data centers, enterprise

SFP vs SFP+ vs SFP28 vs QSFP+ vs QSFP28 vs QSFP-DD vs

Conclusion The transceiver module is a vital part of high-performance networks. As networks evolve, optical transceivers become more compact, cost-effective, and energy-efficient,

What is the relationship between optical module wavelength and ...

The transmission distance of the optical module refers to the distance over which the optical signal can be directly transmitted without relay amplification. It is divided into three types: short-distance, medium

What are the detailed parameters of the optical module

Loss and dispersion: the two mainly affect the transmission distance of the optical module. Generally, the link loss is calculated at 0.35dBm/km for the 1310nm optical module, and 0.20dBm/km

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