

Optical module distance representation



AI Overview

The distance of an optical module is expressed as the maximum transmission range over which it can reliably send optical signals, typically categorized as short, medium, or long distance.

Transmission Distance Categories

Optical modules are generally classified by their transmission distance:

- Short-distance (SR):** Typically below 2 km, often using multimode fiber and wavelengths around 850 nm for economical, short-range communication.
- Medium-distance (MR):** Ranges from 10 km to 20 km, commonly using single-mode fiber with wavelengths around 1310 nm.
- Long-distance (LR):** Distances of 30 km or more, often using single-mode fiber with wavelengths of 1310 nm or 1550 nm, sometimes employing CWDM or DWDM for distances above 40 km.

Factors Affecting Transmission Distance

The effective distance of an optical module depends on several key factors:

- Transmitted Optical Power:** The output power of the module's laser, usually measured in dBm.
- Receiver Sensitivity:** The minimum optical power required at the receiving end to maintain a specified bit error rate.
- Fiber Attenuation:** Loss of signal strength per kilometer, which varies by fiber type and wavelength (e.g., 0.35 dB/km at 1310 nm, 0.22 dB/km at 1550 nm for single-mode fiber).
- Dispersion:** Pulse spreading due to different propagation speeds of wavelengths, which can limit distance if severe, though often less restrictive than loss.

The loss-limited distance can be estimated using the formula: $\text{Distance} = \frac{(\text{Transmitting Optical Power} - \text{Receiver Sensitivity})}{\text{Fiber Attenuation}}$. This provides a theoretical maximum, though practical distances are usually shorter due to additional losses from splices, connectors, and bending.

Wavelength Considerations

The wavelength of the optical module also influences distance:

- 850 nm:** Short-range multimode applications, up to 2 km at 100M rate.
- 1310 nm:** Medium-range single-mode applications, typically 500 m to 20 km.
- 1550 nm:** Long-range single-mode applications, often exceeding 40 km, with minimal fiber attenuation.

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Article Content

2X SFP Optical Module Gigabit Single-Mode Optical Module SFP-GE

Popis a podrobnosti Shrnutí Product Name: SFP Gigabit Optical Module Product model: SFP-GE-LX-SM1310 Transmission rate: 1.25Gb/s Transmission distance: 0-20km Emission wavelength: 1310nm

4X SFP Optical Module Gigabit Single-Mode Optical Module SFP-GE

4X SFP Optical Module Gigabit Single-Mode Optical Module SFP-GE-LX-SM1310 20KM Dual Fiber 1.25G for H3C Beskrivelse Product Name: SFP Gigabit Optical Module Product model: SFP-GE-LX

Finisar FTLF8519P3BNL Compatible LINK-PP LS-MM851G-S5C

Finisar FTLF8519P3BNL Compatible LINK-PP LS-MM851G-S5C 1000BASE-SX SFP Optical Transceiver Module LINK-PP LS-MM851G-S5C is a Finisar FTLF8519P3BNL compatible 1G SFP

Optical Module Speed vs. Distance | Professional Design Guide

An in-depth technical analysis of how data rates affect transmission distance in fiber optics. Learn about attenuation, dispersion, and best practices for high-speed network deployment.

Relationship Between Link Budget And Transmission Distance In

As shown in the figure above, this diagram illustrates the attenuation of different wavelengths when transmitted in optical fiber. The vertical axis represents the attenuation value (in

Optical module transmission distance

This also explains why the optical module used with single-mode fiber has a longer transmission distance. Calculation of working distance of optical module When the optical module is

The Most Comprehensive Guide Of Optical Modules

Explore the ultimate guide to optical modules. Learn types, functions, performance metrics & how to choose the right module for your fiber network.

Optical module transmission distance and related classification

As a photoelectric conversion device, in the optical communication network, the optical module is the most common product. Among the characteristics of optical modules, transmission

A Comprehensive Look at the QSFP28-100G-ZR4 Optical Module

The QSFP28-100G-ZR4 optical transceiver is a high-performance module that delivers reliable data transfer across extended distances, with exceptional signal quality and reliability.

How to Choose the Right Fiber Optic Cable for Your Optical

How to Choose the Right Fiber Optic Cable for Your Optical Transceiver Selecting the right optical transceiver is only half of building a reliable fiber network. Many network failures that appear

Understanding the Transmission Distance of Optical

Distance: Surpasses the 80km mark on single-mode fiber, a testament to its capability in long-haul communications. In the complex world of

Optical module transmission distance and related classification

According to the different transmission distances of optical modules, they can be divided into three types: short-distance optical modules, medium-distance optical modules, and long

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,

How to Estimate an Optical Module's Transmission

Optical modules distinct from one another in their transmission distance, a feature that should be taken into account in addition to other

Long Distance Optical Module Characteristics and Application

However, the transmission distance of the optical module should adopt appropriate solutions in due course. The long-distance applications are mainly in the fields of server ports, switch ports, network

Technical Parameters of Optical Transceiver Modules

Optical power is represented by P_{out} , sensitivity is represented by P_{in} , transmission distance is represented by D (distance), and attenuation is represented by A (attenuation).

Transmission Distance of an Ethernet Module

100GBASE-SR10: The module rate is 100G, and 10 indicates 10 optical channels.

100GBASE-LR4: The module rate is 100G, and 4 indicates 4 optical channels.

SFP Distance Explained: Real-World Range, Limits,

SFP distance refers to the maximum effective range over which an SFP optical module can transmit data while maintaining signal integrity. It is

Exploring the Correlation Between Optical Module Wavelength and ...

This article delves into the correlation between optical module wavelength and transmission distance, shedding light on the complexities that impact the efficiency of data transmission.

Wavelength and Transmission Distance of Optical Transceiver Modules

The price of the optical sources and signal converters that are paired with 850nm optical transceiver modules is far lower than the prices of 1310nm and 1550nm devices, making it a very economical

The Ultimate Guide to ZTE SFP Module Distance and Wavelength

A deep understanding of ZTE SFP module distance and wavelength specs is a prerequisite for designing reliable, scalable, and high-performance networks. From the cost-effective 850 nm SR

Explanation of Optical Module Parameters

Considering that some newcomers to optical modules may not understand the letters on the optical module or the specific meanings of the parameters on the optical module, the following is

Optical module transmission distance

Let's take a look at the calculation method of the transmission distance of the optical module. Mastering the conversion method of optical power units is the basis for calculating the

Understanding the Transmission Distance of Optical

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

SFP Distance Explained: Real-World Range, Limits,

Understand SFP distance, fiber optic range, and real-world limits of SR/LR modules. Learn how wavelength, fiber type, and optics affect performance.

Contact Us

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