Actual transmission distance of 2km optical module

Overview

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

Key Takeaways

A 2km optical module can reliably transmit data up to 2 kilometers over single-mode fiber, depending on wavelength, optical power, and fiber type.

Key Factors Affecting Transmission Distance

The actual transmission distance of a 2km optical module is determined by several factors rather than just the module's label: Fiber Type: Single-mode fiber (SMF) is typically used for 2km modules, while multimode fiber (MMF) may limit distance due to higher attenuation and modal dispersion. Wavelength: Modules operating at 1310nm are commonly used for 2km transmission, as this wavelength balances attenuation and dispersion for short to medium distances. Data Rate: Higher data rates can slightly reduce effective distance due to signal degradation, but optical design often compensates for this.

Optical Power and Link Budget: The module's transmit power and receiver sensitivity define the maximum distance before the signal becomes too weak or distorted. Examples of 2km Optical ModulesQSFP-DD FR4: This 400G optical transceiver uses CWDM wavelengths and PAM4 modulation, multiplexing four 100Gb/s channels into a single 400Gb/s optical link. It is designed for up to 2km over single-mode fiber.

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QSFP-DD FR8: Similar to FR4, it uses eight DML lasers with LWDM wavelengths and supports 2km transmission over SMF. 1000BASE-SX SFP: A 1G module using 1310nm multimode fiber can also reach up to 2km, suitable for short-range enterprise links.

Practical Considerations

Connector Quality and Fiber Cleanliness: Dirty or misaligned connectors can reduce effective distance. Environmental Factors: Temperature fluctuations and bending losses in fiber can slightly reduce the maximum reach. Compatibility: Ensure the module's wavelength and fiber type match the installed infrastructure to avoid unstable connections.

In summary, a 2km optical module is designed to reliably transmit data up to 2 kilometers, typically over single-mode fiber at 1310nm, with performance influenced by optical power, fiber quality, and data rate. Modules like QSFP-DD FR4 and FR8 are practical examples used in high-speed data center networks.

Article Content

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

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

SFP Optical Module Transmission Distance Range | Yingda

When selecting SFP optical modules, determine the required transmission distance based on the actual application scenario and pay attention to the wavelength, fiber type, and other

Can this module reach a maximum transmission distance of 2km

Arista Networks SFP-1G-SX-2 Compatible 1000BASE-SX SFP 1310nm 2km DOM Duplex LC MMF Transceiver Module | 2km is the theoretical maximum transmission distance, and the actual

Overview of 400G QSFP-DD Mid-Range Optical Modules

The "FR" in QSFP-DD FR4 optical module denotes a transmission distance of 2km. It employs four non-cooled EML lasers with CWDM wavelengths, achieving a single-wave rate of

The relationship between wavelength and transmission distance of ...

When paired with multimode, the maximum transmission distance is 2km, and when paired with single-mode, the maximum transmission distance is 40km. At 1310nm wavelength,

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Optcore 2.5G single-mode SFP

This SFP transceiver module provides 2km transmission distance over single mode fiber at a nominal wavelength of 1310nm. The transmitter section incorporates a 1310nm DFB laser that is a class 1

What is the maximum distance that an SFP transceiver can ...

If longer transmission distances are required, you can choose multimode SFPs with 1310nm wavelength, which can reach a maximum transmission distance of 2km. For long distance transmission, single

1000Base-BX WDM Bi-Directional SFP Module

TP-LINK´s TL-SM321B-2 and TL-SM321A-2 is designed to work in a pair to create an on-site gigabit fiber communication up to 2km (2,000 meters). With one single-mode fiber, the pair of modules can

400G FR4 QSFP112 1310nm 2km LC Optical Transceiver Module

It boasts a transmission range of up to 2km over duplex LC connector single-mode optical fiber cables, making it suitable for medium-range data communication and interconnect applications.

Basic Knowledge Of Optical Module Transmission Distance

Optical module transmission distance refers to the distance that the optical signal travels from the transmitting end to the receiving end within a fiber optic system.

What are the detailed parameters of the optical module

What are the detailed parameters of the optical module? Optical module center wavelength, transmission distance, loss and dispersion, laser type, fiber interface, etc. Let''s take a look below!

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

Introduction to Optical Fibers, dB, Attenuation and Measurements

This document is a quick reference to some of the formulas and important information related to optical technologies. This document focuses on decibels (dB), decibels per milliwatt (dBm),

Wavelength and Transmission Distance of Optical Transceiver Modules

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Therefore, multi-mode fiber mostly uses 850nm wavelength optical transceiver modules for connection and transmission. Under 850nm wavelength, 100Mbps optical transceiver modules can transmit up

SFP Optical Module Transmission Distance Range | Yingda

SFP optical modules transmission distance vary from the type of fiber, wavelength, and data rate, and can be hundreds of meters, 2km, 10km to 80km or more.

Fiber Optic Cable Distance: A Comprehensive Guide

However, fiber optic cable performance over distance varies depending on factors such as cable type, installation quality, and signal amplification techniques. In this guide, we''ll explore how

How To Calculate The Transmission Distance Of The Optical

WHGearlink, as a professional optical module manufacturer, provides high-quality optic fiber transceiver with reasonable fiber optic transceiver price. In order to prevent signal instability, packet loss and

Multimode fiber: OM1 vs OM2 vs OM3 vs OM4

In 10 Gb/s Ethernet using 850 nm VCSEL, the fiber transmission distance can reach 300 m. OM4 is an upgraded version of OM3 multimode optical fiber, and the optical fiber transmission

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