

Optical Module Selection for 1020km Range



AI Overview

For a 1020 km fiber link, high-performance long-haul optical modules such as 100G ZR/ZR+ coherent transceivers or DWDM-enabled modules over single-mode fiber are required, with careful attention to optical power budget, dispersion compensation, and amplification. Key Considerations for Ultra-Long-Haul Links

1. **Module Type and Technology Standard** SFP, SFP+, or even ER modules are insufficient for distances beyond 40–80 km due to signal attenuation and dispersion limitations. For a 1020 km link, you need coherent optical transceivers or DWDM (Dense Wavelength Division Multiplexing) ZR/ZR+ modules, which are designed for ultra-long-haul transmission. These modules use advanced modulation formats (e.g., DP-QPSK or 16-QAM) and coherent detection to maintain signal integrity over hundreds of kilometers.
2. **Wavelength and Fiber Type** Single-mode fiber (SMF, OS2) is mandatory for ultra-long distances because it minimizes modal dispersion. 1550 nm wavelength is preferred for long-haul links due to lower attenuation (~0.2 dB/km) and compatibility with optical amplifiers. DWDM systems allow multiple wavelengths on the same fiber, increasing capacity and enabling amplification along the route.
3. **Optical Power Budget and Amplification** Over 1020 km, the optical signal will experience significant loss (~200 dB without amplification). To maintain a reliable link: Erbium-Doped Fiber Amplifiers (EDFAs) or Raman amplifiers are required at intervals (typically every 80–100 km) to boost signal power. Modules must have high transmit power and receiver sensitivity to handle accumulated attenuation. A link margin of 3–5 dB is recommended to account for fiber aging, splices, and connector losses.
4. **Dispersion Management** Chromatic dispersion accumulates over long distances and can distort high-speed signals. Solutions include: Dispersion-compens...

Article Content

Basic Knowledge Of Optical Module Transmission Distance

Generally, short-range modules can reach up to 2 km, medium-range modules range from 10 km to 20 km, and long-range modules can exceed 20 km. Q: How do I choose the right optical module? A:

SFP Optical Transceiver Modules for Long Distance: A Complete

This guide provides a comprehensive breakdown to help network professionals, IT architects, and procurement teams make informed decisions when deploying long-range SFP modules.

10G SFP+ Optical Module Selection Guide: Demystifying LRM, SR,

As a leading optical module manufacturer, Velolan Networks offers a comprehensive portfolio from 1G to 800G. Our range of high-quality, standards-compliant 10G SFP+ dual-fiber

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.

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.

10G Optical Module Selection Guide: LRM,SR,LR,ER,ZR

By deeply understanding the differences and performance of LRM, SR, LR, ER, and ZR optical modules, we can make the right choice among many optical modules, thereby building an

What Is 10GBASE-LR? SMF 1310nm 10km SFP+ Explained

A practical, engineer-grade guide to 10GBASE-LR: what it is, 1310nm single-mode SFP+ specs, optical budget examples, deployment best practices and troubleshooting.

SFP module specification and selection guide (EN)

Description CXR SFP Modules are industry standard Small Form Pluggable optical modules that serve networking services in the range of low speed to 10-Gigabit application requirements:

How to Choose SFP Module for Compatibility, Speed, and Distance

Learn how to choose the right SFP module based on compatibility, speed, fiber type, wavelength, and distance. Practical guide for engineers and IT buyers.

SFP-1020-LR: SFP+ 10G LR Transceiver Module Single

The SFP-1020-LR is a long range singlemode 10G SFP+ optical module compatible with the 10GBase-LR specifications. It uses a Fabry-Perot laser transmitter at 1310nm.

Guide to 10G SFP+ Modules: LRM, SR, LR, ER, ZR

The selection of 10G SFP+ dual-fiber optical modules is a systematic project that requires comprehensive consideration of technical parameters, compatibility, cost-effectiveness and

100G QSFP28 Optical Module Selection Guide: Medium to Long

How to Choose 100G QSFP28 Optical Module When you consider choosing a 100G QSFP28 module, you first need to consider your transmission distance. When your transmission

Cisco SFP-10G-LR Module: 10km Range & Specifications

Complete guide to Cisco SFP-10G-LR module specs, 10GBASE-LR standard compliance, 1310nm laser operation, and EDGE Optic compatibility details.

The Most Comprehensive Guide Of Optical Modules

In the upcoming sections, we will delve into the classification of optical modules, future trends, and guidelines for selecting the appropriate optical module for your network.

10G SFP+ module SM 20KM 40KM 80KM TX/RX 1270/1330nm,single

40G QSFP+ Optical transceiver module solutions offer a full range of QSFP+ modules from 150m to 80km reach, and used for high-density switching, This transceiver is compliant with QSFP+ MSA and

SFP+10G 1310nm 10Km LC Optical Module Guide

9. Compatibility: Compliant with IEEE 802.3ae 10GBASE-LR standard and compatible with a wide range of network equipment from different vendors Advantages of SFP+10G 1310nm 10Km LC Optical

Nordic Semi nRF52840 Bluetooth 5.2 LE module achieves over 10 km range

Fanstel BT840XE is an nRF52840 Bluetooth 5.2 module with a power amplifier that can transmit data over a 10 km range with suitable antennas.

10G SFP+ Module Selection Guide for Short-Range Networks

10G optical networks have expanded beyond traditional data centers into enterprise campuses, security monitoring systems, edge computing environments, and industrial deployments.

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.

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

10G SFP+ dual-fiber optical module is an optical communication device widely used in 10G Ethernet, Fiber Channel and SDH/SONET network environments. It adopts SFP+ (Small Form

10G SFP+ Optical Transceiver, 10 km Range,

High-performance 10G SFP+ transceiver with 10 km SMF range, 1330/1270 nm wavelengths, real-time digital diagnostics, and RoHS compliant.

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

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

SFP+ SR, LR, and ER Modules: Your Definitive Guide to Choosing

SFP+ SR, LR, and ER Modules explained: key differences, fiber compatibility, distances, case study, and tips for choosing and deploying reliable 10G networks.

1G SFP ELX Transceiver Options for 10-20km

Learn how 1G SFP transceivers such as ELX modules ensure stable 10-20km transmission in campus, metro access, and security networks. Compare LX, ELX, and EX to choose

100G Optical Module Selection Guide: Advantages and Types of

Explore the QSFP28 100G optical module, a vital component for high-speed network connections. Discover its unique features, advantages, and various types to meet diverse

How to Choose the Right Optical Transceiver Module for You in 2025

Learn how to select the ideal optical transceiver module for your network based on transmission distance, data rate, wavelength, and scalability.

Contact Us

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