

10G optical module trace length



Overview

Learn what an SFP 10GB LR transceiver is, its key specs, use cases, and how to choose the right 10G LR module for your network.

Key Takeaways

10G optical module trace lengths vary by standard: SR modules reach up to 400 meters on multimode fiber, LR modules up to 10 km on single-mode fiber, and ER modules up to 40 km on single-mode fiber. Trace Length by Module Type

- 10GBASE-SR (Short Reach): Designed for multimode fiber (MMF), typically 850 nm wavelength. Maximum distances depend on fiber type:
 - OM1: ~33 meters
 - OM2: ~82 meters
 - OM3: up to 300 meters
 - OM4: up to 400 metersSignal degradation occurs beyond these distances due to Differential Mode Delay (DMD), which causes pulse spreading and packet loss if the fiber span exceeds the standard limits .
- 10GBASE-LR (Long Reach): Operates over single-mode fiber (SMF) at 1310 nm, supporting distances up to 10 km. These modules are commonly implemented as SFP+ transceivers with LC duplex connectors and optional Digital Diagnostic Monitoring (DDM/DOM) for real-time telemetry . LR modules are suitable for enterprise backbones, metro networks, and data center interconnects.

- **10GBASE-ER (Extended Reach):** Also uses single-mode fiber, typically at 1550 nm, and supports distances up to 40 km. ER modules are used for longer metro or intercity links where LR modules cannot reach .
- **10GBASE-ZR (Ultra Long Reach):** Designed for distances beyond 80 km on single-mode fiber, often requiring precise optical power management and inline attenuation to prevent receiver overload .

Practical Considerations

- **Fiber Type:** Ensure the fiber matches the module specification (MMF for SR, SMF for LR/ER/ZR).
- **Optical Power Budget:** Calculate total loss including fiber attenuation, connector loss, and patch panels to maintain reliable link performance.
- **Insertion Loss and Dispersion:** High-quality connectors and clean fiber ends are critical to avoid signal degradation.
- **Module Compatibility:** Follow IEEE 802.3 standards and multi-source agreements (MSAs) to ensure interoperability across switches, routers, and NICs . In summary, 10G optical module trace length depends on the module type, fiber type, and wavelength, with SR modules suitable for short multimode links, LR for moderate single-mode distances, and ER/ZR for extended single-mode spans. Proper planning of optical budget and fiber quality is essential to achieve the rated distances.

Article Content

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

10GBASE-LR is a 10-gigabit Ethernet optical standard that operates at 1310 nm over single-mode fiber (SMF), supporting link

Cisco S-Class 10GBASE SFP+ Modules Data Sheet

Cisco SFP-10G-SR-S The Cisco 10GBASE-SR module supports a link length of 26 meters on standard Fiber Distributed Data

10GBASE-LRM SFP Module Guide: Specs, Distance & Use Cases

In this guide, you will learn what a 10GBASE-LRM SFP module is, how it works, its key technical specifications, and when it makes

10G SR vs LR vs ER vs ZR – Optical Transceiver Distance

Compare 10GBASE-SR, LR, ER, and ZR optical transceivers by distance, fiber type, and application. Find the right

10 Gbit/s SFP+ Optical Modules

10 Gbit/s SFP+ optical modules apply to 10 GE optical ports. The wavelength can be 850 nm, 1310 nm, or 1550 nm, and the

DATASHEET MODULETEK:SFP-10G-LR-10KM-x-H15

SHEET MODULETEK: SFP-10G-LR-10KM-x-H15 10Gb/s SFP+ LR Transceiver Overview
ModuleTek's SFP-10G-LR-10KM-x-H15

SFP 10GB LR Transceiver Guide: Specs, Distance & Buying Tips

Learn what an SFP 10GB LR transceiver is, its key specs, use cases, and how to choose the right 10G LR module for your network.

Cisco 10GBASE SFP+ Modules Data Sheet

The Cisco® 10GBASE SFP+ modules (Figure 1) give you a wide variety of 10 Gigabit Ethernet connectivity options for

Optical 10GB modules

Hi, i want to connect 4506-e and 6506-e with 10gb technology . Which modules and gbic are required? Thanks

10GBASE-LRM SFP Module Guide: Specs, Distance & Use Cases

Learn what a 10GBASE-LRM SFP module is, how it works on multimode fiber, key specifications, distance limits, and common

How to Choose a 10G SFP+ Optical Module

How to Choose the Right Walsun 10G SFP+ Optical Module When selecting the appropriate Walsun 10G SFP+

A Simple Guide to SFP-10G-SR and Its Practical Uses

When it comes to cost-effective 10 Gigabit Ethernet over short to medium distances, the SFP-10G-SR optical

SFP 10G LR: High-Speed Long-Reach Fiber Transceivers

Among the available 10G optical solutions, SFP 10G LR transceivers stand out as one of the most widely deployed and trusted

UniFi 10G Multi-Mode Optical Module

SFP+ transceiver that supports 10G connections up to 400 m using multi-mode fiber with a duplex LC UPC connector.

Cisco SFP-10G-SR module fiber length question

I would like some clarification on fiber lengths when using a SFP-10G-SR module. The link below indicates it supports

SFP-10G-LR Datasheet Overview

Overview Cisco SFP-10G-LR module is the single-mode 10G fiber optical transceiver, the Cisco 10G Base-LR Module supports a link

SFP 10G LR: 10G Ethernet Long-Reach Optics Explained

SFP 10G LR is a long-reach 10-Gigabit Ethernet optical transceiver defined by IEEE 802.3ae (10GBASE-LR). It

Long-Range vs Short-Range 10G SFP+: A Guide to Choosing the

Compare long-range 10g sfp+ and short-range 10g sfp+ modules by distance, fiber type, and cost to choose the best

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This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

