

40G Single-Mode Optical Module



Overview

Cisco 40GBASE QSFP Modules Data Sheet The Cisco 40GBASE-ER4 QSFP Module supports link lengths up to 40km over G.652 single-mode fiber with duplex 40G Optica.

Key Takeaways

40G single-mode optical modules, such as 40GBASE-LR4 QSFP+, transmit 40Gbps over single-mode fiber using four 10Gbps channels, standardized under IEEE 802.3ba and MSA protocols.

A 40G single-mode optical module is a high-speed transceiver designed to transmit and receive data at 40Gbps over single-mode fiber (SMF), typically using LC duplex connectors. These modules are widely used in data center interconnects, enterprise backbone networks, and service provider aggregation layers where long-distance transmission is required .

Standards and Compliance

- IEEE 802.3ba: Defines 40G Ethernet standards, including 40GBASE-LR4 for single-mode fiber.
- MSA (Multisource Agreement): Ensures interoperability across vendors, including QSFP+ form factor compliance and SFF-8436 electrical interface standards .



- QSFP+ (Quad Small Form-Factor Pluggable Plus): Supports four independent 10Gbps channels aggregated to 40Gbps, hot-swappable, and compatible with Ethernet, Infiniband, and Fibre Channel .

Transmission and Wavelength

- 40GBASE-LR4: Uses four CWDM wavelengths around 1310nm, each carrying 10Gbps over a single-mode fiber pair. Maximum reach is typically 10km .
- 40GBASE-SR4: Designed for multimode fiber, not single-mode, with shorter reach (100–150m on OM3/OM4 fibers) using MPO/MTP connectors .

Connectors and Channels

- LC Duplex: Standard for single-mode 40G modules like LR4, allowing two fibers (one transmit, one receive).
- MPO/MTP: Used in multimode 40G modules (SR4) for parallel fiber transmission.
- Internal Channels: Each QSFP+ 40G module has four independent optical channels, each capable of 10Gbps, which are multiplexed/demultiplexed using MUX/DEMUX devices to achieve 40Gbps over a single fiber pair .

Advantages

- High-Speed Transmission: Supports 40Gbps over long distances, ideal for backbone and interconnect applications .
- Space-Saving: Single-mode fiber reduces cabling complexity and infrastructure costs.
- Ease of Deployment: Standard LC connectors allow integration into existing single-mode fiber networks .

Applications

- Data Center Interconnects (DCI): Connecting multiple data centers over distances up to 10km.
- Enterprise Backbone Networks: High-speed links between core and distribution layers.
- Service Provider Networks: Aggregation and backbone links where multimode fiber is insufficient . In summary, 40G single-mode optical modules like 40GBASE-LR4 QSFP+ provide standardized, high-speed, long-distance connectivity over single-mode fiber, leveraging four 10Gbps channels, LC duplex connectors, and IEEE 802.3ba/MultiSource Agreement compliance for reliable and interoperable deployment in modern high-performance networks.

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QSFP 40G LR4 The QSFP+ optical module is specifically designed for 40GBASE Ethernet, supporting a throughput of up to 10km

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ER4 40Km single-mode 40G rate QSFP+ LC connector CWDM

The module can be used for 40G Ethernet, SONET or SDH networks. The ER4 standard is used for long range fiber connections

40G QSFP+ 10~40km transceiver

40GBASE QSFP+ LR4, ER4 optical transceiver module The QSFP+ module is designed for use in 40GBASE Ethernet throughput up

QSFP 40G LR4 Transceiver: 10km Single-Mode Optical Solution

QSFP 40G LR4 is the preferred 40G optical transceiver for single-mode links up to 10km, offering a balanced solution between

40G QSFP+ Duplex LC SM Fiber Transceiver

The QSFP+ module is specifically designed for efficient use in 40GBASE Ethernet applications that require data transmission up to

Arista Optics Modules and Cables

Each module is optimized for different media and reach (ranging from 0.5 meters to 80 kilometers). All interface speeds, from 1G to

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The series of product adopts LC or MTP/MPO connector and operates over Single Mode or Multimode optical fiber. They can be

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