ER4 Optical Module Manufacturing Process



Overview

We have presented a comprehensive overview of the transmission standards governing 400G optical modules.

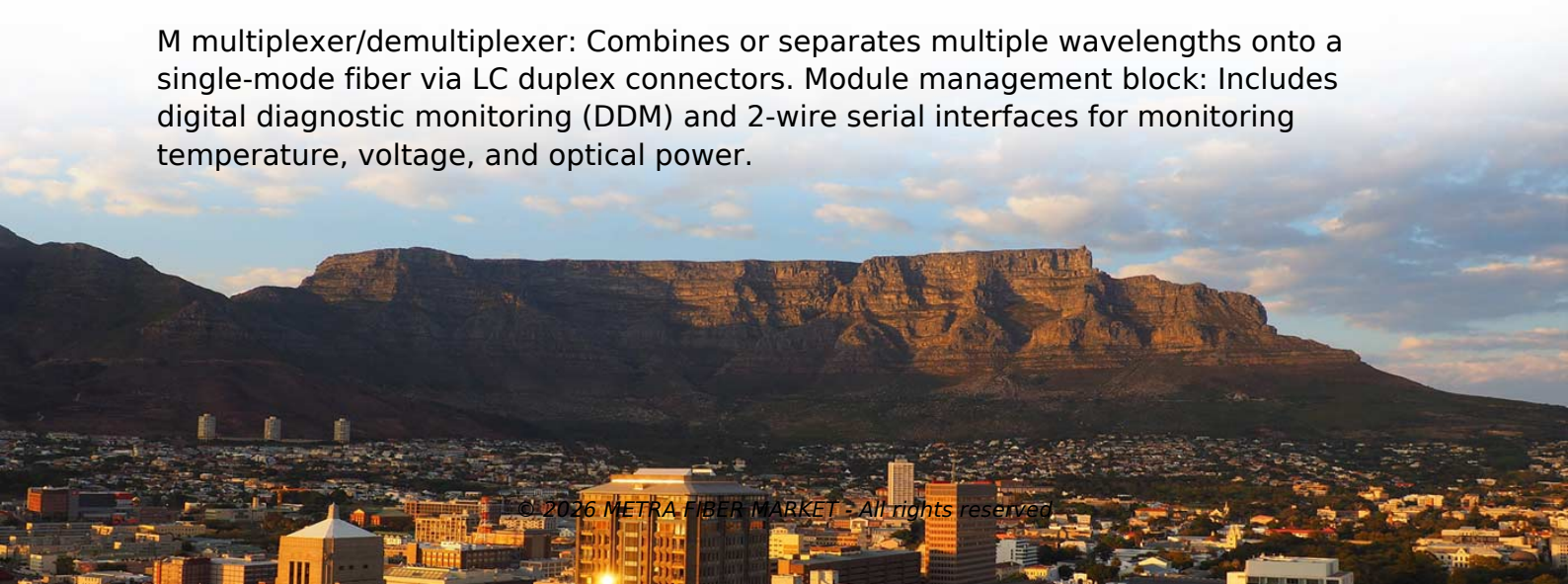
Key Takeaways

The 100G QSFP28 ER4 optical module is manufactured through precise assembly of high-performance optical and electronic components, integrating WDM transmitters, SOA amplifiers, APD receivers, and module management systems for long-reach 100Gb/s transmission. Overview of ER4 Optical Module ComponentsThe ER4 module consists of several key components: 4-lane optical transmitter: Each lane converts 25Gb/s electrical signals into LAN WDM optical signals at wavelengths 1295nm, 1300nm, 1304nm, and 1309nm. 4-lane optical receiver: Uses APD photodetectors to convert incoming optical signals back into electrical signals.

Semiconductor Optical Amplifier (SOA): Amplifies optical signals before detection to extend transmission distance up to 40 km.

WD

M multiplexer/demultiplexer: Combines or separates multiple wavelengths onto a single-mode fiber via LC duplex connectors. Module management block: Includes digital diagnostic monitoring (DDM) and 2-wire serial interfaces for monitoring temperature, voltage, and optical power.



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Typical Manufacturing Steps

Component Fabrication: DFB lasers for transmitters and APD photodiodes for receivers are fabricated using semiconductor processes.

SO

As are produced to meet gain and noise specifications for long-reach transmission. Subassembly Preparation: Optical transmitters and receivers are mounted on submounts with precise alignment for coupling into single-mode fibers.

WD

M multiplexers/demultiplexers are prepared to combine or split the four LAN WDM channels. Module Assembly: Transmitters, receivers, SOAs, and WDM components are integrated into the QSFP28 form factor housing. Electrical circuits for signal processing and DDM monitoring are soldered onto the PCB.

L

C duplex connectors are attached for fiber interfacing. Alignment and Coupling: Each optical lane is aligned with sub-micron precision to ensure minimal insertion loss.

WD

M channels are carefully coupled into the single-mode fiber. Testing and Calibration: Optical power, wavelength accuracy, and BER (bit error rate) are measured.

SO

A gain and APD sensitivity are verified to meet 40 km transmission requirements.

DD

M functions are calibrated to monitor module health. Encapsulation and Final Inspection: The module is sealed to protect against temperature, humidity, and EMI interference. Final inspection ensures compliance with IEEE 802.

3ba 100GBASE-ER4 and QSFP28 MSA standards.

Quality Control Considerations

Temperature and Humidity Testing: Modules are tested across operating ranges to ensure reliability. Optical Performance Verification: Includes eye diagram analysis, insertion loss, and crosstalk measurements. Compliance Testing: Ensures adherence to 100G Ethernet and OTU4 standards for long-reach applications.

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Summary

The ER4 optical module manufacturing process combines precision semiconductor fabrication, meticulous optical alignment, and rigorous testing to produce a high-performance 100Gb/s transceiver capable of long-distance transmission. The integration of SOAs, APD receivers, and WDM technology ensures reliable operation over distances up to 40 km, making it suitable for data center interconnects and backbone networks.

Article Content

A Comprehensive Guide to 400G Optical Modules: Navigating

We have presented a comprehensive overview of the transmission standards governing 400G optical modules. We trust this guide will aid you in pinpointing the optimal standard for your

Analysis of 100G QSFP28 ER4 optical module beyond the limitations

The 100G QSFP28 ER4 optical module is a 100Gb/s module designed for optical communication applications that comply with the Ethernet 100G BASE-ER4 standard. The 100G QSFP28 ER4

In-Depth Analysis of the QSFP28 100G ER4 Optical Module

These four optical signals are combined into one via a multiplexer at the transmitter and travel over a single fiber. At the receiver end, they are separated by a demultiplexer and converted back into four

400G Optical Modules Explained: SR4 Vs. DR4 Vs. FR4 Vs. LR4

The main difference between the 400G SR4 and 400G SR4.2 optical modules lies in their wavelength division multiplexing functionality. Each pair of fibers uses two wavelengths, 850nm and

QSFP28 ER4 Optical Transceiver Overview

100G QSFP28 ER4 optical transceiver can reach a 40km transmission distance on the SMF which supports both 100G Ethernet and OTU4 network applications. This post will illustrate the

SOA Module for 100GBASE-ER4

To minimize the optical coupling loss, the optical path of the new SOA module is laid out to be straight from the input to the output. Input light is collimated by the second lens (IN) at the fiber end of the

100G Optical Module: How to Choose Between SR4,

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Long-distance modules (e.g., LR4/ER4) may have higher costs but offer reliable performance, justifying the investment for critical links. Today, we''ve

100 Gb/s 40 km QSFP28 ER4 Transceiver

This product is designed with form factor, optical/electrical connections, and digital diagnostic interface according to the QSFP28 Multi-Source Agreement (MSA) and compliant to IEEE

QSFP28 100G ER4 | HiSilicon Optoelectronics

This module contains 4-lane optical transmitter, 4-lane optical receiver and module management block including 2 wire serial interfaces. The optical signals are multiplexed to a single-mode fiber through

qsfp 100g er4l s Transceiver

In the realm of 100G networks, the selection and manufacturing processes of optical components must be meticulously controlled to ensure product stability and reliability. This module exemplifies

What is QSFP & QSFP+ Transceiver: An Ultimate

It utilizes industrial ICs and optical assemblies, also passing the more stringent tests across a -40 to 85 °C temperature range to handle hardened

400G ER4 QSFP-DD | Optical Transceivers | Carritech

The 400G ER4 – 400Gbps QSFP-DD ER4 Optical Transceiver is a high-performance module designed for ultra-long-distance communication over single

40Gbps QSFP ER4 Optical Transceiver Module AQSFP-40G-ER4

Recommended Operating Conditions ... 40Gbps QSFP ER4 Optical Transceiver Module AQSFP-40G-ER4 datasheet Electrical Characteristics ... Notes: 1. Power-on Initialization Time is the time from

100G Optical Module: How to Choose Between SR4, DR4, FR4, LR4,

Continuing our discussion on 100G optical modules, let''s explore the essential 100G transmission standards—SR4, DR1, DR4, BiDi SR, LR4, CWDM4, SWDM4, ER, and ZR. These

Optical Module: A Comprehensive Analysis from Source to Terminal

The end-to-end process from demand to the completion of optical module design. This article descibes the end-to-end manufacturing process of optical modules, starting from customer

What is the production process of optical modules?

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An optical module is an interface device that converts electrical signals into optical signals and optical signals into electrical signals, and is an important device in optical fiber

Optical Transceiver Manufacturer,Production Process Of Optical Modules ...

11. Product final testing: In order to ensure that all aspects of the optical module do not inadvertently appear loopholes, We will do the final product test again and check all the products.

SOA Module for 100GBASE-ER4

SOA Module for 100GBASE-ER4 Ryota TERANISHI*, Yasuyuki YAMAUCHI, Yasushi FUJIHARA, Satoru KANEMARU, Tsutomu ABE and Keiji SATOH The authors have developed a semiconductor

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

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