FR1 Optical Module



Overview

This 100G QSFP28 FR1 transceiver module is engineered for long-distance transmission in datacom and telecom networks.

Key Takeaways

FR1 refers to a 100G optical transceiver standard that transmits 100Gbps over single-mode fiber using a single wavelength with PAM4 modulation, typically supporting distances up to 2 kilometers. Overview of FR1 Optical ModulesThe term FR1 is part of the IEEE 802.3 Ethernet standard for high-speed fiber-optic communication. In this context: 100GBASE indicates a 100 Gigabit per second Ethernet connection.

FR1 specifies a single-mode fiber transmission over short to medium distances, generally up to 2 km. FR1 modules use duplex (2-fiber) single-mode cabling and a single wavelength for data transmission, simplifying the optical system compared to multi-wavelength modules.

Technical Details

Modulation: FR1 employs 4-level Pulse Amplitude Modulation (PAM4), which encodes two bits per symbol, effectively doubling the data rate per lane. Symbol Rate: The equivalent symbol rate is approximately 106.25 GBd per lane. Optical Wavelength: Typically operates at 1310 nm using a cooled Electro-absorption Modulated DFB Laser (EML).

Data Conversion: Electrical input of 4x25Gbps NRZ signals is converted into a single 50Gbaud PAM4 optical signal via a DSP-based gearbox. Connector Type: Standard duplex LC connectors are used for interfacing with network equipment. Power Consumption: Maximum power usage is around 3.5W.

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ApplicationsFR1 optical modules are widely used in: Data center interconnects for high-speed rack-to-rack or building-to-building connections. Enterprise core networks and service provider networks requiring reliable 100Gbps links over short to medium distances. High-performance computing (HPC), cloud services, and content delivery networks where low latency and high bandwidth are critical.

Advantages

Simplified design: Single-wavelength transmission reduces complexity and cost. High efficiency: Supports 100Gbps per wavelength with low latency. Scalability: Compatible with future upgrades to 400G or higher-speed networks.

Energy savings: Lower power consumption compared to multi-lambda modules. In summary, an FR1 optical module is a high-speed, single-wavelength, single-mode fiber transceiver designed for 100Gbps Ethernet over distances up to 2 km, using PAM4 modulation to maximize data throughput while maintaining efficiency and scalability in modern network infrastructures.

Article Content

100G QSFP28 FR1/LR1 Optical Transceiver

The 100 Gbps FR1/LR1 QSFP28 Optical Transceiver hardware pins support a full SFF-8436 and SFF-8636-compliant set of control, alarm, and monitoring features through a standard I2C management

QSFP28 100G FR1 Optical Transceiver, 1310nm EML, 2km Reach

This 100G QSFP28 FR1 transceiver module is engineered for long-distance transmission in datacom and telecom networks.

100G QSFP28 DR1 EML 1310nm 500m Optical Transceiver

GIGALIGHT 100G QSFP28 FR1 optical transceiver module is used for long-distance transmission in the datacom or telecom field and is compliant with the 100G Lambda MSA 100G-FR1 specification. The

100GBASE QSFP-100G Modules Data Sheet

The QSFP-100G-FR-S module is compliant to IEEE 802.3 100GBASE-FR1 requirements. The 100 Gigabit Ethernet signal is carried over a

100G QSFP28 Optical Transceiver

T1-QSFP28-100G-FR1 is designed for 2km optical communication applications. The module incorporates one channel optical signal, on 1310nm center wavelength, operating at a 50Gbaud data

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100GBASE-FR1 QSFP28 Single Lambda 1310nm 2km DOM LC SMF

The 100GBASE-FR1 Single Lambda QSFP28 Optical Transceiver Module is designed for use in 100GBASE Ethernet throughput up to 2km over single mode fiber (SMF) using a wavelength of

Single Lambda 100G QSFP28 Modules Overview

The 100GBASE-FR Single Lambda transceiver is a single lambda short reach single-mode 100GBASE-FR1 optical module transceiver compatible with the 100GBASE-FR1 specification.

100GBase FR1 Datasheet

General Description This product is a transceiver module designed for 2km optical communication applications. The module incorporates one channel optical signal, on 1310nm center wavelength,

100GBASE-FR1 Application Overview

The TIA FOTC provides a comprehensive overview of 100GBASE-FR1 capabilities and single-mode optical fiber channel characteristics.

100G QSFP28 Optical Transceiver

The module has a maximum power consumption of 3.5W. T1-QSFP28-100G-FR1 is designed with form factor, optical/electrical connection, digital diagnostic interface according to the QSFP28 Multi-Source

Cisco OSFP 800G Transceiver Modules Data Sheet

The OSFP 800G transceiver modules are Cisco''s new generation of pluggable transceiver modules based on the OSPF specification. They offer flexible connectivity, with options for 800GE,

QSFP-10002-FR1-datasheet

QSFP-10002-FR1 100G QSFP28 FR1 2km Single Lambda with FEC optical transceiver with full real-time digital diagnostic monitoring, and pull tab

100G Optical Module: How to Choose Between SR4,

Continuing our discussion on 100G optical modules, let''s explore the essential 100G transmission standards—SR4, DR1, DR4, BiDi SR, LR4,

Optical module

An optical module is a typically hot-pluggable optical transceiver used in high-bandwidth data communications applications. Optical modules typically have an electrical interface on the side that

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Arista Optics Modules and Cables

Arista''s Optical Modules and Cable portfolio offer a wide variety of high-density and low-power 800G (dual 400G), 400G, 200G, 100G, 50G, 40G, 25G, 10G, 1G, and 100M Ethernet connectivity options

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

Key differences between SR4, DR4, FR4, and LR4 400G optical modules. Expert advice from Asterfusion engineers to optimize your data center network.

Difference Between DR and FR in Optical Transceivers

DR (Direct Reach) and FR (Far Reach) are commonly used terms in Ethernet optical transceivers, referring to different types of transmission distances and

What are the 100G-DR, 100G-FR and 100G-LR QSFP Transceivers?

The 100G-DR, 100G-FR and 100G-LR QSFP transceivers are optical modules that support 100 Gigabit Ethernet data rates over single-mode fiber.

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

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