# 40GBASE Optical Transceivers and Cables Portfolio



## Product Overview

The 40G transceiver module portfolio offers customers a wide variety of high-density and low-power 40 Gigabit Ethernet connectivity options for data center, high-performance computing networks, enterprise core and distribution layers, and service provider applications. It includes 40GBASE QSFP+ modules, 40G Converter modules, 40G DACs/AOCs and their breakout cables. Featured products such as QSFP-SR4-40G modules and QSFP-LR4-40G modules are also available for choice.

## Features

- Hot pluggable to maximize uptime and simplify serviceability
- Flexible choice of compatibility, distance and interface for all need
- Tested on brand devices for performance, quality, and reliability
- Compliant with RoHs, CE, REACH, FDA and etc.

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# 1. 40GBASE Transceiver Module Series

40G QSFP+ Transceiver Module Series include SR4, BIDI, CSR4, PIR4, LX4, IR4, LR4,PLR4 and ER4. The series of product adopts LC or MTP/MPO connector and operates over Single Mode or Multimode optical fiber. They can be used for connections from 150m up to 40km and are suitable for 40G Ethernet or Breakout to 10GBASE-SR Ethernet or Optical Transport Network OTU3 applications.

## 1.1 40GBASE QSFP+ Modules

| Image | Part Number | Description |
|---|---|---|
|  | QSFP-SR4-40G | 40GBASE-SR4 QSFP+ 850nm 150m DOM MTP/MPO-12 |
|  | QSFP-BIDI-40G | 40GBASE-SR BIDI QSFP+ 850nm 300m DOM LC |
|  | QSFP-CSR4-40G | 40GBASE-CSR4 QSFP+ 850nm 400m DOM MTP/MPO-12 |
|  | QSFP-PIR4-40G | 40GBASE-PLRL4 QSFP+ 1310nm 1.4km DOM MTP/MPO-12 |
|  | QSFP-LX4-40G | 40GBASE-UNIV QSFP+ 1310nm 2km DOM LC SMF/MMF |
|  | QSFP-IR4-40G | 40GBASE-LR4L QSFP+ 1310nm 2km DOM LC |
|  | QSFP-LR4-40G | 40GBASE-LR4 QSFP+ 1310nm 10km DOM LC |
|  | QSFP-PLR4-40G | 4x10GBASE-LR QSFP+ 1310nm 10km DOM MTP/MPO-12 |
|  | QSFP-ER4-40G | 40GBASE-ER4 QSFP+ 1310nm 40km DOM LC |
|  | QSFP-4×10G-SR | 4x10GBASE-SR QSFP+ 850nm 150m DOM MTP/MPO-12 |

## 1.2 40GBASE Converter Modules

| Image | Part Number | Description |
|---|---|---|
|  | CVR-QSFP-SFP10G | 40G QSFP+ to 10G SFP+ Adapter Converter |

**Note:**

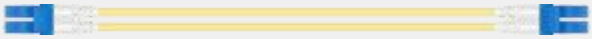
1. ≤4m cable length is required if QSFP+ to SFP+ Converter Module is applied with 10G passive DAC.
2. ≤2m cable length is required if QSFP+ to SFP+ Converter Module is applied with 40G to 4x10G passive DAC.

## 1.3 40GBASE QSFP+ DACs/ AOCs

| Image | Part Number | Description |
|---|---|---|
|  | QSFP-PCxx | 40G QSFP+ Passive DAC, 0.5-7m |
|  | QSFP-40G-ACxxx | 40G QSFP+ Active DAC, 1-10m |
|  | QSFP-AOxx | 40G QSFP+ AOC Cable, 1-50m |
|  | QSFP-40G-4SPCxxx | 40G QSFP+ to 4x10G SFP+ Passive DAC Cable, 0.5-7m |
|  | QSFP-40G-4SAOxxx | 40G QSFP+ to 4x10G SFP+ Breakout AOC Cable, 1-30m |
|  | Q-8LCAOxx | 40G QSFP+ to 4 Duplex LC Breakout AOC Cable, 1-30m |

# 2. Product Specifications

## 2.1 Connector & Media

| Part Number | Connector | Media | Sample Diagram |
|---|---|---|---|
| **QSFP-SR4-40G**<br>**QSFP-CSR4-40G** | MTP/MPO-12 | MMF | <br>OM4/OM3 MTP/MPO-12 Fiber Type B |
| **QSFP-BIDI-40G** | LC duplex | MMF | <br>OM3/OM4 LC-LC Duplex |
| **QSFP-PIR4-40G** | MTP/MPO-12 | SMF | <br>OS2 MTP/MPO-12 Fiber Type B |
| **QSFP-LX4-40G** | LC duplex | SMF/MMF | <br>OM3 LC-LC Duplex<br><br>OS2 LC-LC Duplex |
| **QSFP-IR4-40G**<br>**QSFP-LR4-40G** | LC duplex<br>LC duplex | SMF<br>SMF | <br>OS2 LC-LC Duplex |
| **QSFP-PLR4-40G** | MTP/MPO-12 | SMF | <br>OS2 MTP/MPO-12 Fiber Type B |
| **QSFP-ER4-40G** | LC duplex | SMF | <br>OS2 LC-LC Duplex |

## 2.2 Optical Characteristics

### 2.2.1 40GBASE QSFP+ Modules

| Part Number | Max Data Rate | Wavelength | Max Distance | Power Consumption | Tx Power (dBm) | | Rx Power (dBm) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Min. | Max. | Min. | Max. |
| QSFP-SR4-40G | 42Gbps | 850nm | 150m | 1.5W | -7.6 | 1 | -11.1 | 2.4 |
| QSFP-BIDI-40G | 41.2Gbps | 850nm | 300m | 3.5W | -7.5 | 3 | -9 | 3 |
| QSFP-CSR4-40G | 42Gbps | 850nm | 400m | 1.2W | -7.5 | 0 | -9.9 | 2.4 |
| QSFP-PIR4-40G | 41.2Gbps | 1310nm | 1.4km | 2.5W | -9.4 | 0.5 | -14.4 | 0.5 |
| QSFP-LX4-40G | 41.2Gbps | 1310nm | 2km | 3.5W | -7（MMF）<br>-10 (SMF) | 4.3 (MMF)<br>2.3 (SMF) | -10 (MMF)<br>-12.7 (SMF) | 4.3 (MMF)<br>2.3 (SMF) |
| QSFP-IR4-40G | 41.2Gbps | 1310nm | 2km | 3.5W | -7 | 2.3 | -11.5 | 2.3 |
| QSFP-LR4-40G | 44.6Gbps | 1310nm | 10km | 3.5W | -7 | 2.3 | -11.5 | 2.3 |
| QSFP-PLR4-40G | 44.4Gbps | 1310nm | 10km | 2.5W | -6 | -1 | -14.4 | 0.5 |
| QSFP-ER4-40G | 44.6Gbps | 1310nm | 40km | 3.5W | -2.7 | 4.5 | -21.2 | -4.5 |
| QSFP-4×10G-SR | 41.2Gbps | 850nm | 150m | 1.5W | -7.6 | -1 | -11.1 | 2.4 |

#### 2.2.2 40GBASE QSFP28 DACs / AOCs

| Part Number | Max Data Rate | Connector Type | Cable Type | Cable Length | Wire AWG |
|---|---|---|---|---|---|
| **QSFP-PCxx** | 40Gbps | QSFP+ to QSFP+ | Passive Copper Cable | 0.5-7m | 30AWG for ≤3m, 26AWG for 4/5m, 24AWG for 6/7m |
| **QSFP-40G-ACxxx** | 40Gbps | QSFP+ to QSFP+ | Active Copper Cable | 1-10m | 30AWG for ≤5m, 28AWG for 7m, 26AWG for 8~10m |
| **QSFP-AOxx** | 40Gbps | QSFP+ to QSFP+ | Active Optical Cable | 1-50m | / |
| **QSFP-40G-4SPCxxx** | 40Gbps | QSFP+ to 4 SFP+ | Passive Copper Cable | 0.5-7m | 30AWG for ≤3m, 28AWG for 4/5m |
| **QSFP-40G-4SAOxxx** | 40Gbps | QSFP+ to 4 SFP+ | Active Optical Cable | 1-30m | / |
| **QSFP-40G-4LCAOxxx** | 40Gbps | QSFP+ to 4 duplex LC | Active Optical Cable | 1-30m | / |

### 2.3 Environmental Conditions

- Operating temperature range: 0 to 70°C (32 to 158°F).
- Commercial temperature range: 0 to 70°C (32 to 158°F).

## 3. Application

- The 40G transceiver module portfolio offers customers 40 Gigabit Ethernet connectivity options for data center, high-performance computing networks, enterprise core and distribution layers, and service provider applications.

# 4. Regulatory and Standards Compliance

## 4.1 Standards Compliance

- SFF-8636 :QSFP+ 4×10Gb/s Pluggable Transceiver
- SFF-8436: QSFP+ 4×10Gb/s Pluggable Transceiver
- IEEE 802.3ae Amendment of IEEE Std 802.3ae-2002
- IEEE 802.3ba Amendment of IEEE Std 802.3-2008
- IEEE 802.3bm 40GBASE-ER4
- OTN OTU3 C4S1-2D1
- RoHS-6 Directive 2011/65/EU
- Infiniband QDR (SR4)

## 4.2 Safety

- IEC60825-1 Class 1 laser safety compliant
- Class B EMC, IEC 61000-4-2 Anti Electro-Static Discharge and IEC61000-4-3 Radiation Resistant

# 5. Certification

# 6. Warranty

- 5 Years Lifetime Warranty

# 7. Test Center

Each fiber optical transceiver has been tested in host device on site in FS Assured Program to ensure full compatibility with over 200 vendors.

## 7.1 Compatibility Test



Cisco Nexus 93180YC-EX



Juniper EX4650



Arista 7160-48YC6



Dell EMC Networking Z9100-ON



Mellanox SN2100



Huawei S6720-30L-HI-24S

See more in FS Test Assured Program at https://www.fs.com/support/test-assured-program.html.

## 7.2 Performance Test

FS transceivers are tested on professional testing machine and brand switches for performance, quality, and reliability in our test center before shipped out with the latest and advanced networking equipment.



### 1. TX/RX Signal Quality Testing

Equipped with the all-in-one tester integrated 4ch BERT & sampling oscilloscope, and variable optical attenuator to ensure the input and output signal quality.

- Eye Pattern Measurements: Jitter, Mask Margin, etc
- Average Output Power
- OMA
- Extinction Ratio
- Receiver Sensitivity
- BER Curve

### 2. Reliability and Stability Testing

Subject the transceivers to dramatic changes in temperature on the thermal shock chamber to ensure reliability and stability of the transceivers.

- Commercial: 0 °C to 70 °C
- Extended: -5 °C to 85 °C
- Industrial: -40 °C to 85 °C






### 3. Transfer Rate and Protocol Testing

Test the actual transfer data rate and the transmission ability under different protocols with Network Master Pro.

- Ethernet
- Fibre Channel
- SDH/SONET
- CPRI

### 4. Optical Spectrum Evaluation

Evaluate various important parameters with the Optical Spectrum Analyzer to meet the industry standards.

- Center Wavelength, Level
- OSNR
- SMSR
- Spectrum Width

