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-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

1.2 40GBASE Converter Modules

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

Note:

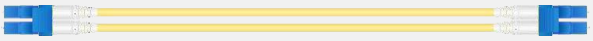
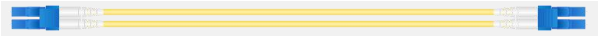
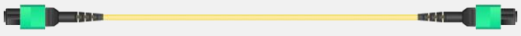
1. ≤4m cable length is required if QSFP+ to SFP+ Converter Module is applied with 10G passive DAC.
2. ≤2m cable length is required if QSFP+ to SFP+ Converter Module is applied with 40G to 4x10G passive DAC.

1.3 40GBASE QSFP+ DACs / AOCs

Image	Part Number	Description
	QSFP-PCxx	40G QSFP+ Passive DAC, 0.5-7m
	QSFP-ACxx	40G QSFP+ Active DAC, 1-10m
	QSFP-AOxx	40G QSFP+ AOC Cable, 1-50m
	Q-4SPCxx	40G QSFP+ to 4x10G SFP+ Passive DAC Cable, 0.5-7m
	Q-4SAOxx	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 **QSFP-CSR4-40G**	MTP/MPO-12	MMF	 OM4/OM3 MTP/MPO-12 Fiber Type B
QSFP-BIDI-40G	LC duplex	MMF	 OM3/OM4 LC-LC Duplex
QSFP-PIR4-40G	MTP/MPO-12	SMF	 OS2 MTP/MPO-12 Fiber Type B
QSFP-LX4-40G	LC duplex	SMF/MMF	 OM3 LC-LC Duplex  OS2 LC-LC Duplex
QSFP-IR4-40G **QSFP-LR4-40G**	LC duplex LC duplex	SMF SMF	 OS2 LC-LC Duplex
QSFP-PLR4-40G	MTP/MPO-12	SMF	 OS2 MTP/MPO-12 Fiber Type B
QSFP-ER4-40G	LC duplex	SMF	 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	<1.3W	-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) -10 (SMF)	4.3 (MMF) 2.3 (SMF)	-10 (MMF) -12.7 (SMF)	4.3 (MMF) 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

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-ACxx	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	/
Q-4SPCxx	40Gbps	QSFP+ to 4 SFP+	Passive Copper Cable	0.5-7m	30AWG for ≤3m, 28AWG for 4/5m
Q-4SAOxx	40Gbps	QSFP+ to 4 SFP+	Active Optical Cable	1-30m	/
Q-8LCAOxx	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

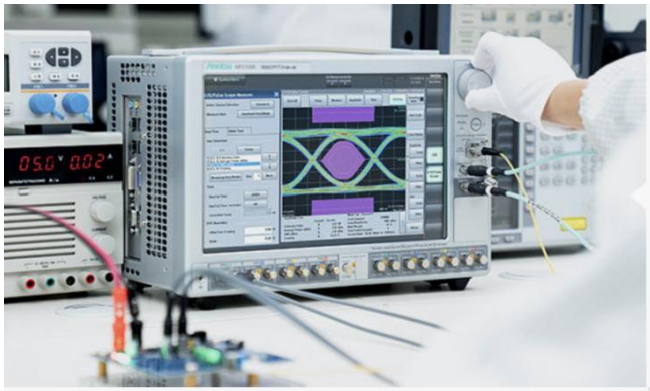
Mellanox SN2100

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

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The information in this document is subject to change without notice. FS has made all efforts to ensure the accuracy of the information, but all information in this document does not constitute any kind of warranty.

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