

Highlights

- Compact Quad Small Form-factor Pluggable (QSFP28) products for high density 100Gb Ethernet applications
- Hot swappable, field serviceable modular interfaces for Extreme Networks switches with 100Gb QSFP28 ports
- Compatible with industry Multi-Source Agreements for QSFP28 pluggable modules
- Flexible solutions to adapt to a wide range of connectivity requirements
- 100Gb connectivity options for data center, high performance computing, and enterprise LAN
- Wide range of media types supported including multi-mode fiber and single mode fiber for high performance 100Gb solutions
- Direct attach cable solutions for passive copper and active optical applications
- Parallel fiber options for high density 25Gb Ethernet and 50Gb Ethernet aggregation solutions over both multi-mode and single mode fiber infrastructures
- Cost effective 100Gb connectivity solutions ranging from 0.5m to 10km
- Highest quality transceiver technology to ensure long life cycle and reliability
- Tested for reliability in Extreme Networks switches
- Standards compliant and optical interoperability with compliant devices



ExtremeSwitching™ 100Gb Ethernet QSFP28 Transceivers and Cables

Product Overview

The Extreme Networks Quad Small Factor Pluggable 28 (QSFP28) portfolio for supporting 100Gb Ethernet provides a wide range of flexible connectivity options for high performance data center and LAN networking. Fiber optic transceivers for multi-mode fiber (MMF) and single mode fiber (SMF) as well as an array of cost effective direct attach solutions using active optical and passive copper technologies are offered. Options to breakout QSFP28 interfaces to 4 x 25Gb Ethernet and 2 x 50Gb Ethernet provide high density aggregation solutions using the compact, high performance QSFP28 interface.

100Gb Ethernet QSFP28 SR4 MMF

- 100GBASE-SR4 optical transceiver for use on OM3 or OM4 multi-mode fiber
- Up to 70m with OM3 and up to 100m with OM4 MMF
- QSFP28 transceiver with male (pinned) MPO (8 fiber) connector
- 100Gb Ethernet over parallel multi-mode fiber and 100Gb Ethernet to 4 x 25Gb Ethernet applications
- 10332 MPO to 4 x duplex LC breakout OM4 MMF patch cord can be used for 4 x 25Gb Ethernet breakout applications

100Gb Ethernet QSFP28 SWDM4 MMF

- 100Gb SWDM4 short wavelength division multiplex optical transceiver for use on duplex (2 fiber) OM3, OM4, or OM5 wide band multi-mode fiber
- Up to 75m with OM3, up to 100m with OM4, up to 150m with OM5 MMF
- QSFP28 transceiver with duplex LC (2 fiber) connector

100Gb Ethernet QSFP28 LR4 10km SMF

- 100GBASE-LR4 4 lane wave division multiplex optical transceiver for use with single mode fiber
- Up to 10km reach using G.652 single mode fiber
- QSFP28 transceiver with duplex LC (2 fiber) connector

100Gb Ethernet QSFP28 CWDM4, 2km SMF

- 100Gb QSFP28 CWDM4 optical transceiver for use with single mode fiber
- 100Gb QSFP28 4 Lane wave division multiplex transceiver compatible with the CWDM4 Consortium specification for CWDM4 optical transceivers
- Up to 2km reach with G.652 SMF
- QSFP28 transceiver with duplex LC (2 fiber) connector

100Gb Ethernet QSFP28 CWDM4-Lite, 500m SMF

- 100Gb QSFP28 CWDM4-Lite 4 Lane wave division multiplex transceiver
- Reduced transceiver operating temperature range 15° - 55° C
- Up to 500m reach with G.652 SMF
- QSFP28 transceiver with duplex LC (2 fiber) connector

100Gb Ethernet QSFP28 Parallel Single Mode (PSM4), 2km SMF

- 100Gb, Parallel Single Mode PSM4, 2km SMF, QSFP28, MPO (8 fiber)
- Integrated 3m SMF pigtail cable with male (pinned) MPO (8 fiber) connector
- 100Gb Ethernet over parallel single mode fiber and 100Gb Ethernet to 4 x 25Gb Ethernet applications
- 10327 MPO to 4 x duplex LC breakout SMF patch cord can be used for 4 x 25Gb Ethernet breakout applications

100Gb Ethernet QSFP28 Active Optical Cables (AOC)

- Active optical direct attach cables with integrated 100Gb Ethernet QSFP28 transceivers
- 100Gb AOC cable lengths from 5m to 20m

100Gb Ethernet Passive Copper Direct Attach Cables (DAC)

- Passive copper direct attach cables with integrated 100Gb Ethernet QSFP28 transceivers
- 100Gb DAC cable lengths from 0.5m to 5m

100Gb Ethernet QSFP28 - 4 x 25Gb SFP28 Ethernet AOC

- Active optical direct attach cables (AOC) with integrated 100Gb Ethernet QSFP28 transceiver and 4 x SFP28 25Gb Ethernet transceivers
- 100Gb to 4 x 25Gb AOC cable lengths from 5m to 20m

100Gb Ethernet QSFP28 - 4 x 25Gb SFP28 Ethernet Passive Copper DAC

- Passive copper direct attach cables with integrated 100Gb Ethernet QSFP28 transceiver and 4 x SFP28 25Gb Ethernet transceivers

100Gb Ethernet QSFP28 - 2 x 50Gb QSFP28 Ethernet Passive Copper DAC

- Passive copper direct attach cables with integrated 100Gb Ethernet QSFP28 transceiver and 2 x QSFP28 50Gb (two lane) Ethernet transceivers

100Gb Ethernet QSFP28 - 2 x 50Gb QSFP28 Ethernet Active Optical Cable (AOC)

- Active optical direct attach cables with integrated 100Gb Ethernet QSFP28 transceiver and 2 x QSFP28 50Gb (two lane) Ethernet transceivers
- 100Gb to 2 x 50Gb AOC cable lengths from 5m to 20m



Figure 1: 100Gb Ethernet Parallel Single Mode (PSM4), 2km, SMF



Figure 2: 100Gb Ethernet QSFP28 - 4 x 25Gb Ethernet SFP28 AOC

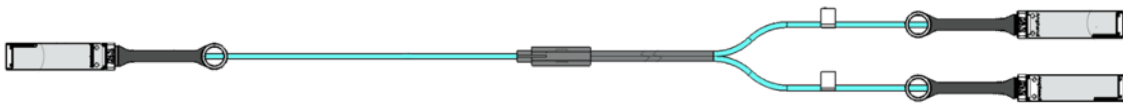


Figure 3: 100Gb Ethernet QSFP28 - 2 x 50Gb Ethernet QSFP28 AOC

Product Specifications

Product Name	Cable Type	Connector	Distance*	Wavelength nm	Tx Power Min/Max dBm	Rx Power Min/Max dBm	Notes
Optical Transceivers							
100Gb QSFP28 SR4	OM3 / OM4 MMF Parallel 8/12 Fiber Cable	MPO (8 fiber) Male (pinned)	70m OM3 100m OM4	850	-8.4 - 2.4	-10.3 - 2.4	FEC IEEE 802.3 Clause 91 required on host switch for max distance Use with 10332 for 4 x 25Gb breakout
100Gb QSFP28 SWDM4	OM3 / OM4 / OM5 MMF Duplex Fiber Cable	Duplex LC	75m OM3 100m OM4 150m OM5	4 x WDM Lanes 850 / 880 / 910 / 940	-7.5 - 2.4	-9.4 - 2.4	FEC IEEE 802.3 Clause 91 required on host switch for max distance
100Gb QSFP28 LR4	SMF	Duplex LC	10km	4 x WDM Lanes 1295 / 1300 / 1304 / 1309	-4.3 - 4.5	-10.6 - 4.5	
100Gb QSFP28 CWDM4	SMF	Duplex LC	2km	4 x WDM Lanes 1271 / 1291 / 1311 / 1331	-6.5 - 2.5	-10.6 - 4.5	FEC IEEE 802.3 Clause 91 required on host switch for max distance
100Gb QSFP28 PSM4	SMF Parallel 8/12 Fiber Cable	Integrated 3m pigtail with MPO (8 fiber) Male (pinned)	2km	1310	-9.4 - 2	-12.7 - 2	MPO with APC
100Gb QSFP28 CWDM4-lite	SMF	Duplex LC	500m	4 x WDM Lanes 1271 / 1291 / 1311 / 1331	-7.5 - 2.5	-11 - 2.5	Reduced transceiver operating temperature range 15° - 55° C FEC IEEE 802.3 Clause 91 required on host switch for max distance
Direct Attach Active Optical Cables (AOC)							
100Gb, AOC QSFP28	Integrated MMF cable assembly	Integrated 2 x QSFP28 transceivers	Fixed 5m, 7m, 10m, and 20m lengths	850			100Gb to 100Gb
100Gb AOC QSFP28 x 4 SFP28	Integrated MMF cable assembly	Integrated QSFP28 and 4 x SFP28 transceivers	Fixed 5m, 7m, 10m, and 20m lengths	850			100Gb to 4 x 25Gb breakout Breakout 1m for SFP+ transceivers
100Gb, AOC QSFP28-2x 50Gb QSFP28	Integrated MMF cable assembly	Integrated QSFP28 and 2 x QSFP28 transceivers	Fixed 5m, 7m, 10m, and 20m lengths	850			100Gb to 2 x 50Gb breakout Breakout 1m QSFP28 transceivers
Direct Attach Passive Copper Cables (DAC)							
100Gb, DAC QSFP28-QSFP28	Integrated Twinax copper cable assembly	Integrated 2 x QSFP28 transceivers	Fixed 0.5m, 1m, 3m, 5m lengths				100Gb to 100Gb
100Gb, DAC QSFP28-4xSFP28	Integrated Twinax copper cable assembly	Integrated QSFP28 and 4 x SFP28 transceivers	Fixed 1m, 3m, 5m lengths				100Gb to 4 x 25Gb breakout Breakout full length of cable
100Gb, DAC QSFP28-2x 50Gb QSFP28	Integrated Twinax copper cable assembly	Integrated QSFP28 and 2 x QSFP28 transceivers	Fixed 1m, 3m, 5m lengths				100Gb to 2 x 50Gb breakout 2x25Gb lanes for 50Gb Breakout full length of cable
Fiber Optic Patch Cords							
MPO to 4xLC Breakout - MMF	OM4 MMF	MPO (8 fiber) unpinned to 4 x duplex LC	5m				For MMF fiber breakout
MPO to 4xLC Breakout - SMF	SMF	MPO (8 fiber) unpinned to 4 x duplex LC	10m				For SMF fiber breakout MPO with APC

* Transmission distance is provided as a nominal guide only. To determine achievable distances, refer to the device optical specifications and the specifications of your fiber installation

Standards and Compliance

IEEE

802.3 100GBASE-LR4

802.3 100GBASE-SR4

802.3 100GBASE-CR4

Multi-Source Agreements (MSA)

SFF-8436 QSFP+ 10 Gbps 4x Pluggable Transceiver

SFF-8636 Common Management Interface

SFF-8665 QSFP28 Pluggable Transceiver Solution

SFF-8679 QSFP28 Base Electrical Specification

CWDM4 MSA Technical Specification

100G SWDM4 MSA Technical Specifications

Operating Conditions

0° – 70° C (Case Temperature)

15° – 55° C (Case Temperature) for CWDM4-Lite

Optical Safety

FDA/CDRH Class 1 laser product

EN60825-1:2007 Class 1 Safety of laser products

Environmental Compliance

EU RoHS 2011/65/EU

EU WEEE 2012/19/EU

China RoHS SJ/T 11262-2006

Taiwan RoHS CNS 15663(2013.7)

EMI/EMC Standards

North American EMC for ITE

FCC CFR 47 part 15 Class A (USA)

ICES-003 Class A (Canada)

European EMC Standards

EN 55032:2015 Class A

EN 55024:2010

EN 61000-3-2,2014 (Harmonics)

EN 61000-3-3 2013 (Flicker)

EN 300 386 v1.6.1 (EMC Telecommunications)

2014/30/EU EMC Directive

International EMC Certifications

CISPR 32:2015, Class A (International Emissions)

AS/NZS CISPR32:2015

CISPR 24:2010 Class A (International Immunity)

IEC 61000-4-2:2008/EN 61000-4-2:2009 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A

IEC 61000-4-3:2010/EN 61000-4-3:2006 +A1:2008 +A2:2010 Radiated Immunity 10V/m, Criteria A

IEC 61000-4-4:2012. / EN 61000-4-4:2012 Transient Burst, 1 kV, Criteria A

IEC 61000-4-5:2014 /EN 61000-4-5:2014 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A

IEC 61000-4-6:2013/EN 61000-4-6:2014 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A

IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C

Note: QSFP28 products meet the above specifications when installed in Extreme Networks equipment.

Ordering Information

Part Number	Product Name	Description
100Gb Optical Transceivers and Direct Attach Cables		
10401	100Gb QSFP28 SR4 MMF	100Gb, 100GBASE-SR4, 70m OM3 / 100m OM4 MMF, QSFP28, MPO (8 fiber)
10406	100Gb QSFP28 SWDM4 MMF	100Gb, 100GBASE-SWDM4, 75m OM3 / 100m OM4 / 150m OM5 MMF, QSFP28, Duplex LC (2 Fiber)
10332	MPO to 4xLC OM4 MMF 5m	MPO to 4xLC OM4 MMF patch cord, 5m (for use with 10401 QSFP28 SR4 4x25Gb breakout)
10403	100Gb QSFP28 LR4 10km	100Gb, 100GBASE-LR4, 10km SMF, QSFP28, LC
10404	100Gb QSFP28 CWDM4	100Gb, CWDM4, 2km SMF, QSFP28, LC
10450	100Gb QSFP28 CWDM4-Lite	100Gb, CWDM4-Lite 15° - 55° C, 500m, SMF, QSFP28, LC
10405	100Gb QSFP28 PSM4	100Gb, Parallel Single Mode PSM4, 2km SMF, QSFP28, MPO (8 fiber)
10327	MPO to 4xLC Breakout Patch Cord, SM, 10m	MPO to 4xLC Breakout Patch Cord, SM, 10m (for use with 10405 100Gb QSFP28 PSM4 transceiver for 4x25Gb breakout)
10434	100Gb, AOC QSFP28 5m	100Gb, QSFP28-QSFP28 Active optical cable, 5m
10435	100Gb, AOC QSFP28 7m	100Gb, QSFP28-QSFP28 Active optical cable, 7m
10436	100Gb, AOC QSFP28 10m	100Gb, QSFP28-QSFP28 Active optical cable, 10m
10437	100Gb, AOC QSFP28 20m	100Gb, QSFP28-QSFP28 Active optical cable, 20m
10441	100Gb AOC QSFP28 x 4 SFP28 5m	100Gb, QSFP28- 4xSFP28 (4x25Gb) Active optical breakout cable, 5m
10442	100Gb AOC QSFP28 x 4 SFP28 7m	100Gb, QSFP28- 4xSFP28 (4x25Gb) Active optical breakout cable, 7m
10443	100Gb AOC QSFP28 x 4 SFP28 10m	100Gb, QSFP28- 4xSFP28 (4x25Gb) Active optical breakout cable, 10m
10444	100Gb AOC QSFP28 x 4 SFP28 20m	100Gb, QSFP28- 4xSFP28 (4x25Gb) Active optical breakout cable, 20m
10410	100Gb, DAC QSFP28-QSFP28 0.5m	100Gb, QSFP28-QSFP28 Direct attach passive copper cable, 0.5m
10411	100Gb, DAC QSFP28-QSFP28 1m	100Gb, QSFP28-QSFP28 Direct attach passive copper cable, 1m
10413	100Gb, DAC QSFP28-QSFP28 3m	100Gb, QSFP28-QSFP28 Direct attach passive copper cable, 3m
10414	100Gb, DAC QSFP28-QSFP28 5m	100Gb, QSFP28-QSFP28 Direct attach passive copper cable, 5m
10421	100Gb, DAC QSFP28-4xSFP28 1m	100Gb, QSFP28-4 x SFP28 (4x25Gb) Direct attach passive copper breakout, 1m
10423	100Gb, DAC QSFP28-4xSFP28 3m	100Gb, QSFP28-4 x SFP28 (4x25Gb) Direct attach passive copper breakout, 3m
10424*	100Gb, DAC QSFP28-4xSFP28 5m	100Gb, QSFP28-4 x SFP28 (4x25Gb) Direct attach passive copper breakout, 5m
10426	100Gb, DAC QSFP28-2xQSFP28 1m	100Gb, QSFP28-2 x QSFP28 (2x50Gb) Direct attach passive copper breakout, 1m
10428	100Gb, DAC QSFP28-2xQSFP28 3m	100Gb, QSFP28-2 x QSFP28 (2x50Gb) Direct attach passive copper breakout, 3m
10429	100Gb, DAC QSFP28-2xQSFP28 5m	100Gb, QSFP28-2 x QSFP28 (2x50Gb) Direct attach passive copper breakout, 5m
10446	100Gb, AOC QSFP28-2xQSFP28 5m	100Gb, QSFP28-2 x QSFP28 (2x50Gb) Active optical cable breakout, 5m
10447	100Gb, AOC QSFP28-2xQSFP28 7m	100Gb, QSFP28-2 x QSFP28 (2x50Gb) Active optical cable breakout, 7m
10448	100Gb, AOC QSFP28-2xQSFP28 10m	100Gb, QSFP28-2 x QSFP28 (2x50Gb) Active optical cable breakout, 10m
10449	100Gb, AOC QSFP28-2xQSFP28 20m	100Gb, QSFP28-2 x QSFP28 (2x50Gb) Active optical cable breakout, 20m

*10424 100Gb DAC passive copper DAC breakout cable can also be used for 40Gb Ethernet to 4 x 10Gb Ethernet breakout.

See the ExtremeXOS Hardware/Software Compatibility and Recommendation Matrices document for a full list of supported devices and ExtremeXOS recommendations.

Warranty

QSFP28 transceiver products have a one year hardware warranty - For warranty details, visit <http://www.extremenetworks.com/go/warranty>.



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