DELL EMC NETWORKING TRANSCEIVERS AND CABLES

Features and benefits

- Hot-swappable for simplified maintenance (no power- down required for installation or replacement)
- Smallest and lowest-power 10GbE, 25GbE, 40GbE, 100GbE, 2×100GbE and 400GbE optical form factors in the industry.
- Optical interoperability of SFP, SFP+, SFP28 with selected QSFP and QSFP-DD modules
- Offers pay-as-you-use model for lower total cost of ownership (TCO) and ease of technology migration
- Reliability ensured by rigorous optics validation, qualification and certification
- Dell EMC product specification encoding feature allows Dell EMC Networking platforms to recognize certified and supported transceivers
- Guaranteed to work with Dell EMC Networking platforms over temperature and process variations with optimal performance

Dell EMC provides optical and cabling options for each Ethernet speed. Long- and short-range optical connectivity options are suited to a wide range of data center and campus applications. For the shortest connections, passive copper direct attach cable (DAC) is a simple and cost-effective solution.

1GbE solutions

1GbE SFP optical transceivers include short-reach (SX), long-reach (LX) and extended long-reach (ZX). A 1000BASE-T transceiver facilitates twisted-pair copper connections.

10GbE solutions

10GbE SFP+ optical transceivers include short-reach-lite (USR), short-reach (SR), long-reach (LR) and extended long-reach (ER and ZR). The 10GbE SFP+ receptacle will also recognize 1GbE SFP transceivers. An LRM transceiver supports links up to 220m over older OM1 and OM2 grade multimode fiber. A 10GBASE-T transceiver facilitates twisted-pair copper connections.

25GbE solutions

25GbE SFP28 optical transceivers include short-reach (SR), extended short-reach (ESR) and long-reach (LR) variations. In 25GbE networking environments, the 100GbE ports can be broken out into four 25GbE lanes by use of either active optical (AOC) or passive copper (DAC) breakout cables.

40GbE solutions

40GbE (4×10GbE) QSFP+ optical transceivers include short-reach (SR4), long-reach (LR4) and extended long-reach (ER4). In many cases, 1GbE SFP and 10GbE SFP+ optics can be readily inserted, recognized, and utilized in the 40GbE QSFP+ receptacle through the use of a (QSA28) pluggable adapter. The adapter supports standard SFP and SFP+ optics in a QSFP+ socket providing backwards compatibility, while the 40GbE port for future bandwidth expansion.

40GbE QSFP+ ports support both optical and passive copper (DAC) breakout cables where the four 10GbE lanes are broken out into four individual 10GbE SFP+ interfaces. This solution can be deployed with a single active optical cable (AOC) with integrated QSFP+ and SFP+ transceivers or using a passive fiber breakout cable.

Dell EMC enables cost-savings through the reuse of a legacy 10GbE fiber plant to support newer 40GbE connections with our 40GbE duplex (multimode) fiber solutions. These solutions use wavelength multiplexing (SM4) and/or directional multiplexing (BIDI) to transport 40GbE over a single (multimode) fiber pair.

100GbE solutions

100GbE (4×25GbE) QSFP28 optical transceivers include short-reach (SR4), intermediate-reach (CWDM4), long-reach (LR4) and extended long-reach (ER4-lite). Standard 10GbE SFP+ and 25GbE SFP28 optics can be readily inserted, recognized, and utilized in the 100GbE QSFP28 receptacle using a (QSA28) pluggable adapter. Although this reduces the effective throughput of the 100GbE port to 25GbE, it provides an immediate low-cost transceiver solution while preserving the option for later bandwidth expansion.

100GbE QSFP28 ports support both optical and passive copper breakout cables. Each of the four 25 GbE lanes can be broken out into four individual SFP28 interfaces. This solution can be deployed with a single active optical cable (AOC) with integrated QSFP28 and SFP28 transceivers or by a passive fiber breakout cable/multiplexer.

Dual 100GbE solutions

To maximize front panel density, some Dell EMC switches support QSFP28-DD (double density) modules which transport two 100GbE data streams while consuming the same face plate area as a single 100GbE QSFP28 module. For multimode fiber distances of 100 meters or less a pluggable transceiver module can be used. Point-to-point DACs and AOCs will facilitate shorter links as well as breakout applications.

400GbE solutions

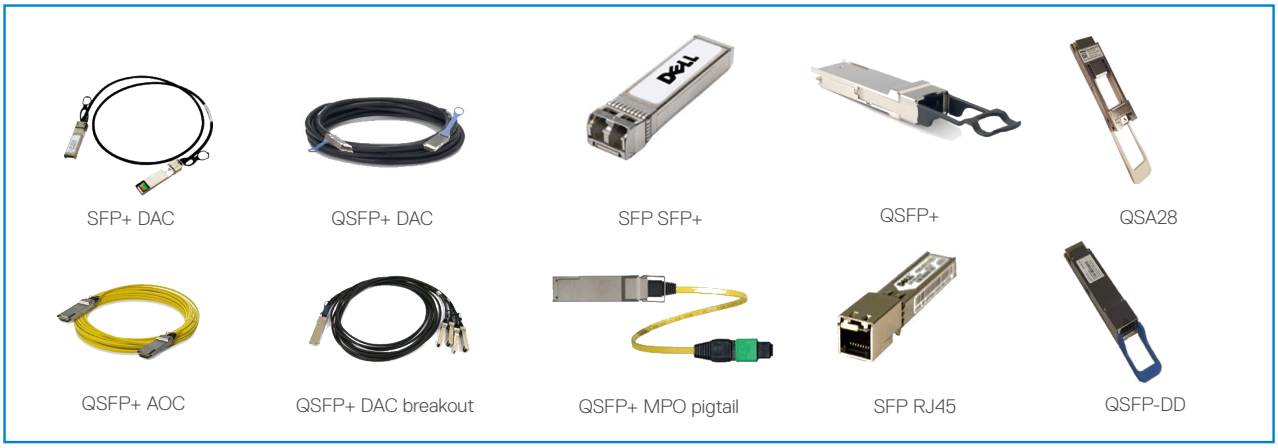
Our newest family of optical transceivers are 400GbE QSFP56-DD. These transceivers may be short-reach (SR8, SR4.2-ON) over multimode fiber or intermediate-reach (FR4, EDR4) over single mode fiber. Point-to-point DACs and AOCs are available.

400GbE (8 × 50G PAM4) ports on one switch may be connected to 100GbE QSFP28 (4 × 25G NRZ) by taking advantage of the gearboxes embedded in the pluggable modules. As a result, a 400GbE QSFP56-DD EDR4 module may be broken out over single-mode fiber to feed four 100GbE QSFP28 FR modules. Likewise, a 400GbE QSFP56-DD SR4.2-ON module may be broken out over multimode fiber to feed four 100GbE QSFP28 BIDI-ON modules. An active copper cable also facilitates 400GbE QSFP56-DD to four 100GbE QSFP28 breakouts.

Testing and warranties

Dell EMC Networking applies a rigorous process in qualifying and maintaining all optics to guarantee a strict adherence to IEEE standards, as well as stringent reliability testing to guarantee a consistent and trustworthy solution.

All optics and cables released by Dell EMC Networking have passed a comprehensive optical analytics check as well as an extensive dynamic test suite. Dell EMC-labeled optics are warrantied alongside the Dell EMC switches in which they are deployed.



Dell EMC Networking transceivers and cables. See tables for product details.

DELL EMC TRANSCEIVERS

Model	Connector Type	Wave-length(s) (nm)	Transmission Medium	Distance (max.)	Transmitter Power (dBm)	Receiver Power (dBm)	Power Dissipation (max.; W)	Notes
Fast Ethernet (100 Mb/s) SFP transceivers								
SFP-100M-FX	duplex LC	1310	MMF FDDI MMF OM1 MMF OM2 MMF OM3 MMF OM4	2 km	-15.0 to -20.0	-31.0 to -14.0	1.1	operates up to 85°C
Gigabit Ethernet SFP transceivers								
SFP-1G-SX	duplex LC	850	MMF OM1 MMF OM2 MMF OM3 MMF OM4	300 m 550 m 550 m 550 m	-9.0 to -2.5	-18.0 to 0.0	0.5	operates up to 85°C
SFP-1G-LX	duplex LC	1310	SMF	10 km	-9.5 to -3.0	-19.0 to -3.0	1.1	operates up to 85°C
SFP-1G-ZX	duplex LC	1310	SMF	80 km	0.0 to +5.0	-22.0 to 0.0	1.1	
SFP-1G-T	RJ-45	N/A	CAT5	100 m	N/A	N/A	1.5	operates up to 85°C

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Model	Connector Type	Wave-length(s) (nm)	Transmission Medium	Distance (max.)	Transmitter Power (dBm)	Receiver Power (dBm)	Power Dissipation (max.; W)	Notes
8G Fibre Channel SFP+ transceivers								
SFP-8GFC-SW	duplex LC	850	MMF OM1 MMF OM2 MMF OM3 MMF OM4	21 m 50 m 120 m 150 m	-8.2 to -2.0	-14.2 to 0.0	0.8	may operate at lower optical power in 4GFC and 2GFC modes
SFP-8GFC-LW	duplex LC	1310	SMF	10 km	-8.4 to +0.5	-16.8 to +0.5	1.2	may operate at lower optical power in 4GFC and 2GFC modes
10-Gigabit Ethernet SFP+ transceivers								
SFP-10G-USR	duplex LC	850	MMF OM1 MMF OM2 MMF OM3 MMF OM4	10 m 25 m 100 m 150 m	-5.0 to -1.0	-11.1 to +0.5	1.0	
SFP-10G-SR	duplex LC	850	MMF FDDI MMF OM1 MMF OM2 MMF OM3 MMF OM4	26 m 33 m 82 m 300 m 400 m	-7.3 to -1.0	-9.9 to -1.0	1.0	
SFP-10G-LRM	duplex LC	1310	MMF FDDI MMF OM1 MMF OM2 MMF OM3 MMF OM4	220 m	-6.5 to -0.5	-10.5 to +0.5	1.0	
SFP-10G-LR	duplex LC	1310	SMF	10 km	-8.2 to +0.5	-14.4 to +0.5	1.5	
SFP-10G-ER	duplex LC	1550	SMF	40 km	-4.7 to +4.0	-15.8 to -1.0	1.5	
SFP-10G-ZR	duplex LC	1550	SMF	80 km	0.0 to +4.0	-22.0 to -7.0	1.5	
SFP-10G-T-DWDM	duplex LC	1528.7 to 1568.7	SMF	80 km	-1.0 to +3.0	-18.0 to -7.0	1.7	tunable; assumes receiver OSNR > 26 dB
SFP-10G-T	RJ-45	N/A	CAT6A (10G) CAT5A (1G)	30 m 100 m	N/A	N/A	2.5	
16G Fibre Channel SFP+ transceivers								
SFP-16GFC-SW	duplex LC	850	MMF OM3 MMF OM4	100 m 125 m	-7.8 to 0.0	-13.5 to 0.0	1.0	
SFP-16GFC-LW	duplex LC	1310	SMF	10 km	-5.0 to +2.0	-15.0 to +2.0	1.2	operates up to 85°C
Quad 16G Fibre Channel QSFP+ transceivers								
QSFP-64GFC-SW4	MPO-12	850	MMF OM3 MMF OM4	100 m 125 m	-6 to +1.0 /lane	-13.0 to +2.4 /lane	2.5	compatible with 4 × 16GFC, 4 × 8GFC or 4 × 4GFC
25-Gigabit Ethernet SFP28 transceivers								
SFP28-25G-SR	duplex LC	850	MMF OM3 MMF OM4	70 m 100 m	-8.4 to +2.4	-10.3 to +2.4	1.2	capable of 10^{-12} BER over 30 m of OM3 or 40 m of OM4 when FEC is disabled
SFP28-25G-ESR	duplex LC	850	MMF OM3 MMF OM4	200 m 300 m	-8.4 to +2.4	-11.9 to +3.0	1.2	
SFP28-25G-LR	duplex LC	1310	SMF	10 km	-7.0 to +2.0	-11.3 to +2.0	1.5	
Quad 32G Fibre Channel QSFP28 transceivers								
Q28-128GFC-SW4	MPO-12	850	MMF OM3 MMF OM4	70 m 100 m	-8.5 to +2.4 /lane	-10.4 to +2.4 /lane	3.5	compatible with 4 × 32GFC or 4 × 16GFC breakout
40-Gigabit Ethernet QSFP+ transceivers								
QSFP-40G-SR4	MPO-12	850	MMF OM3 MMF OM4	100 m 150 m	-7.6 to +2.4 /lane	-9.0 to +2.4 /lane	1.5	can operate in 1 × 4 breakout mode
QSFP-40G-ESR4	MPO-12	850	MMF OM3 MMF OM4	300 m 400 m	-6.3 to -1.0 /lane	-13.3 to -1.0 /lane	1.5	can operate in 1 × 4 breakout mode

*to be available
All transceivers operate at 0 to 70°C unless otherwise indicated.
Transceivers comply with appropriate standards and MSAs including IEEE 802.3ab, 802.3z, 802.3ae, 802.3ba, 802.3bm and 802.3cc.

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Model	Connector Type	Wavelength(s) (nm)	Transmission Medium	Distance (max.)	Transmitter Power (dBm)	Receiver Power (dBm)	Power Dissipation (max.; W)	Notes
40-Gigabit Ethernet QSFP+ transceivers								
QSFP-40G-LM4	duplex LC	1271 1291 1311 1331	MMF OM3 MMF OM4 SMF	140 m 160 m 1 km	-7.0 to +4.3 /lane (MMF) -10.0 to +2.3 /lane (SMF)	-10.0 to +4.3 /lane (MMF) -13.7 to +2.3 /lane (SMF)	3.5	
QSFP-40G-SM4	duplex LC	850 880 910 940	MMF OM3 MMF OM4 MMF OM5	200 m 250 m 350 m	-7.6 to +3.0 /lane	-9.0 to +3.0 /lane	2.0	not compliant with SWDM4 40GbE MSA
QSFP-40G-BIDI	duplex LC	850 900	MMF OM3 MMF OM4 MMF OM5	100 m 150 m 200 m	-4.0 to +5.0 /lane	-7.5 to +5.0 /lane	3.5	+10°C minimum operating temperature
QSFP-40G-PSM4-LR	MPO-12	1310	SMF	10 km	-5.5 to +1.5 /lane	-12.6 to +1.5 /lane	3.5	can operate in 1 × 4 breakout mode
QSFP-40G-LR4	duplex LC	1271 1291 1311 1331	SMF	10 km	-7.0 to +2.3 /lane	-13.7 to +2.3 /lane	3.5	
QSFP-40G-ER4	duplex LC	1271 1291 1311 1331	SMF	40 km	2.7 to +4.5 /lane	-21.2 to -4.5 /lane	3.5	links longer than 30 km are considered engineered links
Dual 40-Gigabit Ethernet QSFP28-DD transceivers								
Q28DD-80G-2SR4	MPO-12DD	850	MMF OM3 MMF OM4	100 m 150 m	-8.4 to +2.4 /lane	-10.3 to +2.4 /lane	3.5	MPO-12DD is a two-row double density MPO-12; can be broken out into 2 × 40GbE or 8 × 10GbE
100-Gigabit Ethernet QSFP28 transceivers								
Q28-100G-FR	duplex LC	1310	SMF	2 km	-2.4 to +4.0	-6.4 to +4.5	4.0	single wavelength transmitter; compatible with Q56DD-400G-DR4 for 1 × 4 breakout
Q28-100G-SR4	MPO-12	850	MMF OM3 MMF OM4	70 m 100 m	-8.4 to +2.4 /lane	-10.3 to +2.4 /lane	3.5	can operate in 1 × 4 breakout mode; 10^{-12} BER over 30 m of OM3 or 40 m of OM4 when FEC disabled
Q28-100G-ESR4	MPO-12	850	MMF OM3 MMF OM4	170 m 300 m	-8.3 to +2.4 /lane	-10.3 to +2.4 /lane	3.5	can operate in 1 × 4 breakout mode
Q28-100G-BIDI	duplex LC	850 910	MMF OM3 MMF OM4 MMF OM5	70 m 100 m 150 m	-6.0 to +4.0 /lane	-7.9 to +4.0 /lane	3.5	compatible with Cisco 100G-BIDI transceivers
Q28-100G-BIDI-ON*	duplex LC	850 910	MMF OM3 MMF OM4 MMF OM5	70 m 100 m 150 m	-6.0 to +4.0 /lane	-7.9 to +4.0 /lane	3.5	compatible with Q56DD-400G-SR4.2-ON for 1 × 4 breakout
Q28-100G-SWDM4	duplex LC	850 880 910 940	MMF OM3 MMF OM4 MMF OM5	75 m 100 m 150 m	-7.5 to +3.4 /lane	-9.4 to +3.4 /lane	3.5	
Q28-100G-CWDM4	duplex LC	1271 1291 1311 1331	SMF	2 km	-6.5 to +2.5 /lane	-11.5 to +2.5 /lane	3.5	
Q28-100G-LR4	duplex LC	1296 1300 1305 1309	SMF	10 km	-4.3 to +4.5 /lane	-10.6 to +4.5 /lane	3.5	

*to be available
All transceivers operate at 0 to 70ºC unless otherwise indicated.

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Model	Connector Type	Wavelength(s) (nm)	Transmission Medium	Distance (max.)	Transmitter Power (dBm)	Receiver Power (dBm)	Power Dissipation (max.; W)	Notes
100-Gigabit Ethernet QSFP28 transceivers								
Q28-100G-ER4-lite	duplex LC	1296 1300 1305 1309	SMF	40 km (with FEC)	2.9 to +4.5 /lane	-20.9 to -4.9 /lane	4.5	specifications for use with FEC, max. distance is 30 km (Rx min. -16.9 dBm) without FEC
Q28-100G-DWDM2-xx	duplex LC	1530.33 to 1561.42	SMF	80 km	-11.0 to -8.0 /lane	-2.0 to +6.0 /lane	5.0	Use only with EDFA + dispersion compensator; OSNR ≥ 31 dB; center wavelength is on 100 GHz ITU grid
QSA-Q28-S28	SFP+ or SFP28	N/A	N/A	N/A	N/A	N/A	N/A	adaptor to use SFP+ or SFP28 modules in QSFP+ QSFP28 receptacles
Dual 100-Gigabit Ethernet QSFP28-DD transceivers								
Q28DD-200G-2SR4	MPO-12DD	850	MMF OM3 MMF OM4	70 m 100 m	-8.4 to +2.4 /lane	-10.3 to +2.4 /lane	5.0	MPO-12DD is a two-row double density MPO-12; capable of 10^{-12} BER over 30 m of OM3 or 40 m of OM4 when FEC is disabled
400-Gigabit Ethernet QSFP56-DD transceivers								
Q56DD-400G-SR8	MPO-12DD	850	MMF OM3 MMF OM4	70 m 100 m	-6.0 to +4.0 /lane	-8.4 to +4.0 /lane	12.0	MPO-12DD is a two-row double density MPO-12
Q56DD-400G-SR4.2-ON*	MPO-12	850 910	MMF OM3 MMF OM4 MMF OM5	70 m 100 m 150 m	-6.2 to +4.0 /lane	-8.2 to +4.0 /lane	10.0	compatible with Q28-100G-BIDI-ON for 1 × 4 breakout
Q56DD-400G-EDR4	MPO-12	1310	SMF	2 km	-2.4 to +4.0 /lane	-6.4 to +4.5 /lane	12.0	compatible with Q28-100G-FR for 1 × 4 breakout
Q56DD-400G-FR4	duplex LC	1271 1291 1311 1331	SMF	2 km	-3.3 to +3.5 /lane	-7.3 to +3.5 /lane	12.0	

DELL EMC PASSIVE OPTICAL CABLES

Model	Available lengths (m)	Connection	Transmission medium	Notes
Passive optical cables				
CBL-MTP12-OM4-xM	1, 3, 5, 7, 10, 25	MPO-12 to MPO-12	MMF OM4	
CBL-LC-OM4-xM	1, 2, 3, 5, 10, 30	LC to LC	MMF OM4	
CBL-MTP12-4LC-OM4-xM	1, 3, 5, 7	MPO-12 to 4 × LC	MMF OM4	
CBL-MPO12-4LC-SMF-5M	5	MPO-12 to 4 × LC	SMF	
CBL-MPO12DD-2MPO12-OM4-xM	1, 3, 5, 7	MPO-12DD to 2 × MPO-12	MMF OM4	
CBL-MPO12DD-OM4-xM	1, 3, 5, 7	MPO-12DD to MPO-12DD	MMF OM4	

*to be available
All transceivers operate at 0 to 70ºC unless otherwise indicated.

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DELL EMC ACTIVE OPTICAL CABLES (AOC), ACTIVE COPPER CABLES (ACC) AND DIRECT ATTACH CABLES (DAC)

Model	Available Lengths (m)	Connection	Transmission Medium	Power Dissipation per end (max.; W)	Notes
10-Gigabit Ethernet Active Optical and Direct Attach Cable					
DAC-SFP-10G-xM	0.5, 1, 2, 3, 5, 7	SFP+ to SFP+	copper		
AOC-SFP-10G-xM	2, 3, 5, 7, 10, 15, 20	SFP+ to SFP+	optical	1.5	
25-Gigabit Ethernet Active Optical and Direct Attach Cable					
DAC-SFP-25G-xM*	1, 2, 3, 5	SFP28 to SFP28	copper		1, 2, 3 m can operate without FEC
AOC-SFP-25G-xM*	7, 10, 15, 20	SFP28 to SFP28	optical	1.5	operates with FEC
40-Gigabit Ethernet Active Optical and Direct Attach Cable					
DAC-QSFP-40G-xM	0.5, 1, 2, 3, 5, 7	QSFP+ to QSFP+	copper		
AOC-QSFP-40G-xM	3, 10	QSFP+ to QSFP+	optical	1.5	
DAC-QSFP-4SFP-10G-xM	0.5, 1 , 2, 3, 5, 7	QSFP+ to 4 × SFP+	copper		
AOC-QSFP-4SFP-10G-xM	10, 30	QSFP+ to 4 × SFP+	optical	1.5, 1.0	supports 4×10G or 4×1G
DAC-QSFP-4RJ45-1G-1M	1	QSFP+ to 4 × RJ-45	copper	1.5	active copper
Dual 40-Gigabit Ethernet Active Optical Cable					
AOC-Q28DD-2Q-40G-xM	7	QSFP28-DD to 2 × QSFP+	optical		
AOC-Q28DD-8SFP-10G-xM	7, 10	QSFP28-DD to 8 × SFP+	optical		
100-Gigabit Ethernet Active Optical and Direct Attach Cable					
DAC-QSFP-100G-xM	0.5, 1 , 2, 3, 5	QSFP28 to QSFP28	copper		
AOC-QSFP-100G-xM	3, 7, 10, 30	QSFP28 to QSFP28	optical	3.5	
DAC-QSFP-4SFP28-25G-xM	1, 2, 3	QSFP28 to 4 × SFP28	copper		
AOC-QSFP- 4SFP28-25G-xM	10, 15, 30	QSFP28 to 4 × SFP28	optical	3.5, 1.5	
Dual 100-Gigabit Ethernet Active Optical and Direct Attach Cable					
DAC-Q28DD-200G-xM	0.5, 1, 2, 3	QSFP28-DD to QSFP28-DD	copper		
AOC-Q28DD-200G-xM	5, 10, 20	QSFP28-DD to QSFP28-DD	optical	5.0	
DAC-Q28DD-2Q28-100G-xM	1, 2, 3	QSFP28-DD to 2 × QSFP28	copper		
AOC-Q28DD-2Q28-100G-xM	5, 7, 15	QSFP28-DD to 2 × QSFP28	optical	5.0, 3.5	
DAC-Q28DD-8S28-25G-xM	1, 2, 3	QSFP28-DD to 8 × SFP28	copper		
AOC-Q28DD-8S28-25G-xM	7, 10	QSFP28-DD to 8 × SFP28	optical	5.0, 1.2	
400-Gigabit Ethernet Active Optical, Active Copper and Direct Attach Cable					
DAC-Q56DD-400G-xM	0.5, 1, 2	QSFP56-DD to QSFP56-DD	copper		
ACC-Q56DD-400G-xM*	3, 5, 7	QSFP56-DD to QSFP56-DD	active copper	8.5	
AOC-Q56DD-400G-xM	10, 15	QSFP56-DD to QSFP56-DD	optical	10.0	
ACC-Q56DD-4Q28-100G-xM*	3, 5, 7	QSFP56-DD to 4 × QSFP28	active copper	8.0; 3.5	

PRODUCT SUPPORT *

10GbE transceivers	SFP-10G-USR	SFP-10G-SR	SFP-10G-LRM	SFP-10G-LR	SFP-10G-ER	SFP-10G-ZR	SFP-10G-T-DWDM	SFP-10G-T
Z9100		✓		✓	✓	✓	✓	✓
Z9264	✓	✓		✓	✓	✓	✓	✓
Z9332	✓*	✓*		✓*	✓*	✓*	✓*	✓*
S6100		✓		✓	✓	✓	✓	✓
S6010	✓	✓		✓	✓	✓	✓	✓
S6000		✓		✓	✓	✓	✓	✓
S41x8	✓	✓	✓**	✓	✓	✓	✓	✓***
S4248	✓	✓		✓	✓	✓	✓	✓***
S4112	✓	✓		✓	✓		✓	✓***
S5000		✓	✓	✓	✓	✓	✓	✓***
S4048		✓		✓	✓	✓	✓	✓***
8132/64; N4032/64	✓	✓	✓	✓	✓	✓		
X4012	✓	✓		✓	✓	✓		
S5048	✓	✓		✓	✓	✓	✓	✓
S5148	✓	✓		✓	✓	✓	✓	✓
S52xx	✓	✓		✓	✓	✓	✓	
N20xx/30xx	✓	✓	✓	✓	✓	✓		
S3048	✓	✓	✓	✓	✓	✓	✓	
S3100	✓	✓	✓	✓	✓	✓	✓	
N3132/2128	✓	✓		✓	✓	✓		
N1500	✓	✓		✓	✓	✓		
N1100	✓	✓		✓	✓	✓		
X1052	✓	✓		✓	✓			
MX 25G PTM		✓						
VRTX R1-2210		✓		✓				
FN IOM		✓	✓	✓			✓	
MXL IO Agg.		✓	✓	✓	✓		✓	
M8024K		✓	✓	✓				
M6220		✓	✓	✓				
M6348		✓	✓	✓				
10Gb passthru-K		✓		✓				
C7000 comb. line card		✓		✓	✓			
C7000 SFP+ line card		✓	✓	✓	✓			
C9010	✓	✓	✓	✓	✓	✓	✓	
C7000 QSFP+ ports	✓	✓	✓	✓	✓	✓		

* to be supported in upcoming release
** only supported on S4148FE
*** population of SFP-10G-T transceivers may be limited due to power constraints.

PRODUCT SUPPORT*

25GbE transceivers	SFP28-25G-SR	SFP28-25G-ESR	SFP28-25G-LR
Z9100	✓	✓	✓
Z9264	✓	✓	✓
Z9332	✓*	✓*	✓*
S6100	✓	✓	✓
S41x8	✓		
S4248	✓		
S5048	✓	✓	✓
S5148	✓	✓	✓
S52xx	✓	✓	✓
MX 25G PTM	✓		

40GbE transceivers	QSFP-40G-SR4	QSFP-40G-ESR4	QSFP-40G-LM4	QSFP-40G-SM4	QSFP-40G-BIDI	QSFP-40G-PSM4-LR	QSFP-40G-LR4	QSFP-40G-ER4
Z9100	✓	✓	✓	✓	✓	✓	✓	✓
Z9264	✓	✓	✓	✓	✓	✓	✓	
Z9500	✓	✓	✓	✓	✓	✓	✓	✓
S6100	✓	✓	✓	✓	✓	✓	✓	✓
S6010	✓	✓	✓	✓	✓	✓	✓	✓
S6000	✓	✓	✓	✓	✓	✓	✓	✓
Z9100	✓	✓	✓	✓	✓	✓	✓	✓
Z9264	✓	✓	✓	✓	✓	✓	✓	✓
Z9332	✓	✓	✓	✓	✓	✓	✓	✓
S6100	✓	✓	✓	✓	✓	✓	✓	✓
S6010	✓	✓	✓	✓	✓	✓	✓	✓
S6000	✓	✓	✓	✓	✓	✓	✓	✓
S41x8	✓	✓	✓	✓	✓	✓	✓	✓
S4248	✓	✓	✓	✓	✓	✓	✓	✓
S4112	✓	✓	✓	✓	✓	✓	✓	✓
S5000	✓	✓	✓	✓	✓		✓	✓
S4048	✓	✓	✓	✓	✓	✓	✓	✓
8132/64; N4032/64	✓						✓	
S5048	✓	✓	✓	✓	✓	✓	✓	✓
S5148	✓	✓	✓	✓	✓	✓	✓	✓
S52xx	✓	✓	✓	✓	✓	✓	✓	✓
N3132PX	✓	✓					✓	
MXL IO Agg.	✓		✓	✓	✓		✓	
MX9116n	✓	✓	✓	✓	✓		✓	
MX5108n	✓	✓	✓	✓	✓		✓	
C9010	✓	✓	✓	✓	✓	✓	✓	✓
C7000 QSFP+ ports	✓	✓						

PRODUCT SUPPORT

100GbE transceivers	Q28-100G-FR	Q28-100G-SR4	Q28-100G-ESR4	Q28-100G-BIDI	Q28-100G-BIDI-ON	Q28-100G-SWDM4	Q28-100G-CWDM4	Q28-100G-LR4	Q28-100G-ER4-lite	Q28-100G-DWDM2
Z9100	✓	✓	✓	✓	✓*	✓	✓	✓	✓	✓
Z9264	✓	✓	✓	✓	✓*	✓	✓	✓	✓	
Z9332	✓	✓	✓	✓	✓*	✓	✓	✓	✓	
S6100	✓	✓	✓	✓	✓*	✓	✓	✓	✓	✓
S41x8	✓	✓	✓	✓	✓*	✓	✓	✓	✓	
S4248	✓	✓	✓	✓	✓*	✓	✓	✓	✓	
S4112	✓	✓		✓	✓*	✓	✓	✓		✓
S5048	✓	✓	✓	✓	✓*	✓	✓	✓	✓	✓
S5148	✓	✓	✓	✓	✓*	✓	✓	✓	✓	
S52xx	✓	✓	✓	✓	✓*	✓	✓	✓	✓	
MX9116n	✓	✓	✓	✓*	✓*	✓	✓	✓	✓	
MX5108n	✓	✓	✓	✓*	✓*	✓	✓	✓	✓*	

Dual 100GbE / 40GbE transceivers	Q28DD-200G-2SR4	Q28DD-80G-2SR4
Z9332	✓	✓
S5248	✓	✓
MX9116n	✓	✓*

400GbE transceivers	Q56DD-400G-SR8	Q56DD-400G-SR4.2-ON	Q56DD-400G-EDR4	Q56DD-400G-FR4
Z9332	✓	✓*	✓	✓

ORDERING INFORMATION

Model	Product description
Fast Ethernet (100 Mb/s) SFP transceivers	
SFP-100M-FX	100MbE SFP optical module, up to 2 km over 2 parallel MMFs
Gigabit Ethernet SFP transceivers	
SFP-1G-SX	1GbE SFP optical module, short-reach, up to 500 m over 2 parallel MMFs
SFP-1G-LX	1GbE SFP optical module, long-reach, up to 10 km over 2 parallel SMFs
SFP-1G-ZX	1GbE SFP optical module, extended-reach, up to 80 km over 2 parallel SMFs
SFP-1G-T	1GbE SFP electrical 1000BASE-T module, up to 100 m over single CAT5 cable.
8G Fibre Channel SFP+ transceivers	
SFP-8GFC-SW	8GFC SFP+ optical module, short-reach, up to 150 m over 2 parallel MMFs
SFP-8GFC-LW	8GFC SFP+ optical module, long-reach, up to 10 km over 2 parallel SMFs
10-Gigabit Ethernet SFP+ transceivers	
SFP-10G-USR	10GbE SFP+ optical module, ultra-short-reach, up to 150 m over 2 parallel MMFs
SFP-10G-SR	10GbE SFP+ optical module, short-reach, up to 400 m over 2 parallel MMFs
SFP-10G-SR-12	10GbE SFP+ optical module, short-reach, up to 400 m over 2 parallel MMFs, package of 12
SFP-10G-LRM	10GbE SFP+ optical module, long-reach multi-mode, up to 220 m over 2 parallel FDDI, OM1 or OM2 MMFs
SFP-10G-LR	10GbE SFP+ optical module, long-reach, up to 10 km over 2 parallel SMFs
SFP-10G-ER	10GbE SFP+ optical module, extended-reach, up to 40 km over 2 parallel SMFs
SFP-10G-ZR	10GbE SFP+ optical module, extended-reach, up to 80 km over 2 parallel SMFs
SFP-10G-T-DWDM	10GbE SFP+ optical module, tunable DWDM, extended-reach, up to 80 km over 2 parallel SMFs
SFP-10G-T	10GbE SFP+ electrical 10GBASE-T module, up to 30 m over single CAT6A cable

*Supported in upcoming software release

ORDERING INFORMATION

Model	Product description
16G Fibre Channel SFP+ transceivers	
SFP-16GFC-SW	16GFC SFP+ optical module, short-reach, up to 125 m over 2 parallel MMFs
SFP-16GFC-LW	16GFC SFP+ optical module, long-reach, up to 10 km over 2 parallel SMFs
Quad 16G Fibre Channel QSFP+ transceivers	
QSFP-64GFC-SW4	Quad 16GFC QSFP+ optical module, short-reach, up to 100 m over 8 parallel MMFs
25-Gigabit Ethernet SFP28 transceivers	
SFP28-25G-SR	25GbE SFP28 optical module, short-reach, up to 100 m over 2 parallel MMFs
SFP28-25G-ESR	25GbE SFP28 optical module, extended- short-reach, up to 300 m over 2 parallel MMFs
SFP28-25G-LR	25GbE SFP28 optical module, long-reach, up to 10 km over 2 parallel SMFs
Quad 32G Fibre Channel QSFP28 transceivers	
Q28-128GFC-SW4	Quad 32GFC QSFP28 optical module, short-reach, up to 100 m over 8 parallel MMFs
40-Gigabit Ethernet QSFP+ transceivers	
SFP-40G-SR4	40GbE QSFP+ optical module, short-reach, up to 150 m over 8 parallel MMFs
QSFP-40G-ESR4	40GbE QSFP+ optical module, extended short-reach, up to 400 m over 8 parallel MMFs
QSFP-40G-LM4	40GbE QSFP+ optical module, WDM, short-reach, up to 160 m over 2 parallel MMFs
QSFP-40G-SM4	40GbE QSFP+ optical module, SWDM, short-reach, up to 300 m over 2 parallel MMFs
QSFP-40G-BIDI	40GbE QSFP+ optical module, bi-directional, short-reach, up to 160 m over 2 parallel MMFs
QSFP-40G-PSM4-LR	40GbE QSFP+ optical module, long-reach, up to 10 km over 8 parallel SMFs
QSFP-40G-LR4	40GbE QSFP+ optical module, long-reach, up to 10 km over 2 parallel SMFs
QSFP-40G-ER4	40GbE QSFP+ optical module, extended-reach, up to 40 km over 2 parallel SMFs
Dual 40-Gigabit Ethernet QSFP+ transceivers	
Q28DD-80G-2SR4	Dual 40GbE QSFP28-DD optical module, short-reach, up to 150 m over 16 parallel MMFs
100-Gigabit Ethernet QSFP28 transceivers	
Q28-100G-FR	100GbE QSFP28 optical module, intermediate-reach, up to 2 km over 2 parallel SMFs, single wavelength
Q28-100G-SR4	100GbE QSFP28 optical module, short-reach, up to 100 m over 8 parallel MMFs
Q28-100G-ESR4	100GbE QSFP28 optical module, extended short-reach, up to 300 m over 8 parallel MMFs
Q28-100G-SWDM4	100GbE QSFP28 optical module, SWDM, short-reach, up to 150 m over 2 parallel MMFs
Q28-100G-BIDI	100GbE QSFP28 optical module, bi-directional, short-reach, up to 150 m over 2 parallel MMFs - Cisco compatible
Q28-100G-BIDI-ON*	100GbE QSFP28 optical module, bi-directional, short-reach, up to 150 m over 2 parallel MMFs - open networking
Q28-100G-CWDM4	100GbE QSFP28 optical module, intermediate-reach, up to 2 km over 2 parallel SMFs
Q28-100G-LR4	100GbE QSFP28 optical module, long-reach, up to 10 km over 2 parallel SMFs
Q28-100G-ER4-lite	100GbE QSFP28 optical module, extended-reach, up to 35 km over 2 parallel SMFs
Q28-100G-DWDM2-xx	100GbE QSFP28 optical module, DWDM, up to 80 km over 2 parallel SMFs
QSA-Q28-S28	100GbE QSFP28 to 25GbE SFP28 adapter
Dual 100-Gigabit Ethernet QSFP28-DD transceivers	
Q28DD-200G-2SR4	Dual 100GbE QSFP28-DD optical module, short-reach, up to 100 m over 16 parallel MMFs
100-Gigabit Ethernet CXP transceivers	
Q56DD-400G-SR8	400GbE QSFP56-DD optical module, short-reach up to 100 m over 16 parallel MMFs
Q56DD-400G-SR4.2-ON*	400GbE QSFP56-DD optical module, short-reach up to 150 m over 8 parallel MMFs - open networking
Q56DD-400G-EDR4	400GbE QSFP56-DD optical module, intermediate-reach up to 2 km over 8 parallel SMFs
Q56DD-400G-FR4	400GbE QSFP56-DD optical module, intermediate-reach up to 2 km over 2 parallel SMFs

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