

# DELL EMC NETWORKING TRANSCEIVERS AND CABLES



## Features and benefits

- Hot-swappable for simplified maintenance (no power-down required for installation or replacement)
- Some of the smallest and lowest-power 10GbE, 25GbE, 40GbE and 100GbE optical form factors in the industry
- Optical interoperability with SFP, SFP+ and selected QSFP 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 under 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) and long-reach (LR) variations. In 25GbE networking environments, the 100GbE ports on our Z9100-ON, S6100-ON, S4124-ON and S4148-ON switches can be broken out into four 25GbE lanes by use of either active optical (AOC) or passive copper (DAC) breakout cables.

### 40GbE solutions

40GbE (4x10GbE) 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 (QSA) pluggable adapter. The adapter supports standard SFP and SFP+ optics in a QSFP+ socket providing backwards compatibility, while preserving 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 through the use of a passive fiber breakout cable/multiplexer.

Dell EMC enables cost-savings through the reuse of a legacy 10GbE fiber plant to support new 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.

### 50GbE solutions

50GbE is a relatively new specification utilizing half-populated QSFP28 modules. In 50GbE networking environments, the 100GbE ports on our Z9100-ON, S6100-ON, S4124-ON and S4148-ON switches can be broken out into two pairs of 2x25GbE through a QSFP28 to 2xQSFP28† passive copper direct attach breakout cable (breakout DAC). (The QSFP28† is a half-populated QSFP28 with 2x25GbE lanes.)

### 100GbE solutions

100GbE (4x25GbE) QSFP28 optical transceivers include short-reach (SR4), intermediate-reach (CWD4), 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 through the use of 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 25GbE 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 through the use of a passive fiber breakout cable/multiplexer.

### 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-labeled optics are warranted alongside the Dell EMC switches in which they are deployed.



SFP+ DAC



QSFP+ DAC



QSFP+ AOC



QSFP+ DAC breakout



SFP SFP+



QSFP+



QSFP+ MPO pigtail



SFP RJ45

## DELL EMC TRANSCEIVERS

Model	Connector type	Wavelength(s) (nm)	Transmission medium	Distance (max.)	Transmitter power (dBm)	Receiver power (dBm)	Power dissipation (max.; W)	Notes
<b>Fast Ethernet (100 Mb/s ) SFP transceivers</b>								
SFP-100M-FX	duplex LC	1310	MMF FDDI MMF OM1 MMF OM2 MMF OM3 MMF OM4	2 km	-15.0 to -20.0	≥-30.0	1.0	
<b>Gigabit Ethernet SFP transceivers</b>								
SFP-1G-SX	duplex LC	850	MMF OM1 MMF OM2 MMF OM3 MMF OM4	300 m 500 m 500 m 500 m	-9.0 to -2.5	≥-19.0	1.0	
SFP-1G-LX	duplex LC	1310	SMF	10 km	-9.5 to -3.0	≥-19.0	1.0	
SFP-1G-ZX	duplex LC	1310	SMF	80 km	0.0 to +5.0	≥-22.0	1.5	
SFP-1G-BX10-U	simplex LC	1310	SMF	10 km	-9.0 to -3.0	-20.0 to -3.0	1.0	
SFP-1G-BX10-D	simplex LC	1490	SMF	10 km	-9.0 to -3.0	-20.0 to -3.0	1.0	
SFP-1G-BX40-U	simplex LC	1310	SMF	40 km	-2.0 to +3.0	-24.0 to 0.0	1.0	
SFP-1G-BX40-D	simplex LC	1490	SMF	40 km	-2.0 to +3.0	-24.0 to 0.0	1.0	
SFP-1G-BX80-U	simplex LC	1490	SMF	80 km	-2.0 to +3.0	-26.0 to -1.0	1.0	
SFP-1G-BX80-D	simplex LC	1550	SMF	80 km	-2.0 to +3.0	-26.0 to -1.0	1.0	
SFP-1G-T	RJ-45	N/A	CAT5	100 m	N/A	N/A	1.5	
<b>8G Fibre Channel SFP+ transceivers</b>								
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	1.0	
SFP-8GFC-LW	duplex LC	1310	SMF	10 km	-8.4 to +0.5	-13.8 to +0.5	1.2	
<b>10-Gigabit Ethernet SFP+ transceivers</b>								
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	-9.9 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	-8.4 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	-24.0 to -7.0	1.5	
SFP-10G-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-BX10-U*	simplex LC	1330	SMF	10 km	-8.0 to +0.5	-14.8 to +0.5	1.0	
SFP-10G-BX10-D*	simplex LC	1270	SMF	10 km	-8.0 to +0.5	-14.8 to +0.5	1.0	
SFP-10G-BX40-U*	simplex LC	1330	SMF	40 km	0.0 to +5.0	-21.2 to -9.0	1.5	
SFP-10G-BX40-D*	simplex LC	1270	SMF	40 km	0.0 to +5.0	-21.2 to -9.0	1.5	
SFP-10G-T	RJ-45	N/A	CAT6A (10G) CAT5A (1G)*	30 m 100 m*	N/A	N/A	2.5	

\*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.

## DELL EMC TRANSCEIVERS

Model	Connector type	Wavelength(s) (nm)	Transmission medium	Distance (max.)	Transmitter power (dBm)	Receiver power (dBm)	Power dissipation (max.; W)	Notes
<b>16G Fibre Channel SFP+ transceivers</b>								
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	-17.0 to +2.0	1.2	
<b>Quad 16G Fibre Channel QSFP+ transceivers</b>								
QSFP-64GFC-SW4	MPO-12	850	MMF OM3 MMF OM4	100 m 125 m	-7.8 to 0.0 /lane	-13.5 to 0.0 /lane	2.5	compatible with 4 × 16GFC, 4 × 8GFC or 4 × 4GFC
<b>25-Gigabit Ethernet SFP28 transceivers</b>								
SFP-25G-SR	duplex LC	850	MMF OM3 MMF OM4	70 m 100 m	-9.1 to 0.0	-11.0 to 0.0	1.2	
SFP28-25G-ESR*	duplex LC	850	MMF OM3 MMF OM4	200 m 300 m	-7.3 to 0.0	-11.9 to 0.0	1.2	
SFP28-25G-LR	duplex LC	1310	SMF	10 km	-7.0 to +2.0	-13.3 to +2.0	1.2	
<b>Quad 32G Fibre Channel QSFP28 transceivers</b>								
Q28-128GFC-SW4	MPO-12	850	MMF OM3 MMF OM4	85 m 100 m	-8.5 to +2.4 /lane	-10.4 to +2.4 /lane	3.5	compatible with 4 × 32GFC or 4 × 16GFC
<b>40-Gigabit Ethernet QSFP+ transceivers</b>								
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	-4.3 to -1.0 /lane	-11.1 to -1.0 /lane	1.5	can operate in 1 × 4 breakout mode
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	300 m 300 m	-4.8 to +2.4 /lane	-4.8 to +7.0 /lane	1.5	
QSFP-40G-BIDI	duplex LC	850 900	MMF OM3 MMF OM4	100 m 150 m	-4.0 to +5.0 /lane	-10.0 to +5.0 /lane	3.5	
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
QSA-QSFP-SFP+	SFP+	N/A	N/A	N/A	N/A	N/A	N/A	adaptor to use SFP+ modules in QSFP+ receptacles

\*to be available  
All transceivers operate at 0 to 70°C unless otherwise indicated.

## DELL EMC TRANSCEIVERS

Model	Connector type	Wavelength(s) (nm)	Transmission medium	Distance (max.)	Transmitter power (dBm)	Receiver power (dBm)	Power dissipation (max.; W)	Notes
<b>100-Gigabit Ethernet QSFP28 transceivers</b>								
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
Q28-100G-ESR4*	MPO-12	850	MMF OM3 MMF OM4	200 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-SWDM4*	duplex LC	850 880 910 940	MMF OM3 MMF OM4	75 m 100 m	-7.6 to +3.4 /lane	-10.1 to +3.4 /lane	3.5	
Q28-100G-PSM4-IR	MPO-12	1310	SMF	2 km	-5.5 to +2.0 /lane	-10.2 to +2.0 /lane	3.5	can operate in 1 × 4 breakout mode
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	
Q28-100G-ER4-lite*	duplex LC	1296 1300 1305 1309	SMF	35 km (with FEC)	-1.9 to +4.5 /lane	-17.7 to -4.6 /lane	5.0	specifications for use with FEC, max. distance is 30 km without FEC
QSA-Q28-S28*		N/A	N/A	N/A	N/A	N/A	N/A	adaptor to use SFP28 modules in QSFP28 receptacles
<b>100-Gigabit Ethernet CXP transceivers</b>								
CXP-100G-SR10	MPO-24	850	MMF OM3 MMF OM4	100 m 150 m	-7.6 to +2.4 /lane	-9.5 to +2.4 /lane	3.0	

\*to be available  
All transceivers operate at 0 to 70°C unless otherwise indicated.

## DELL EMC ACTIVE OPTICAL CABLES (AOC) AND DIRECT ATTACH CABLES (DAC)

Model	Available lengths (m)	Connection	Transmission medium	Power dissipation per end (max.; W)	Notes
<b>10-Gigabit Ethernet Active Optical and Direct Attach Cable</b>					
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	
<b>25-Gigabit Ethernet Active Optical and Direct Attach Cable</b>					
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
<b>40-Gigabit Ethernet Active Optical and Direct Attach Cable</b>					
DAC-QSFP-40G-xM	0.5, 1, 2, 3, 5, 7	QSFP+ to QSFP+	copper		
AOC-QSFP-40G-xM	3, 10, 50	QSFP+ to QSFP+	optical	1.5	
DAC-QSFP-4SFP-10G-xM	0.5, 1, 2, 3, 5, 7	QSFP+ to 4 x SFP+	copper		
AOC-QSFP-4SFP-10G-xM	10, 30	QSFP+ to 4 x SFP+	optical	1.5	supports 4x10G or 4x1G
DAC-QSFP-4RJ45-1G-1M	1	QSFP+ to 4 x RJ-45	copper	1.5	active copper
<b>100-Gigabit Ethernet Active Optical and Direct Attach Cable</b>					
DAC-QSFP-100G-xM	1, 2, 3, 5	QSFP28 to QSFP28	copper		1, 2, 3 m can operate without FEC
AOC-QSFP-100G-xM	3, 7, 10, 30, 50	QSFP28 to QSFP28	optical	3.5	operates with FEC
DAC-QSFP-2QSFP28-50G-xM	1, 2, 3	QSFP28 to 2 x QSFP28†	copper		QSFP28† modules are half-populated
DAC-QSFP-4SFP28-25G-xM	1, 2, 3	QSFP28 to 4 x SFP28	copper		1, 2, 3 m can operate without FEC
AOC-QSFP-4SFP28-25G-xM*	10, 15, 30	QSFP28 to 4 x SFP28	optical	3.5	operates with FEC

## DELL EMC PASSIVE OPTICAL CABLES

Model	Available lengths (m)	Connection	Transmission medium	Notes
<b>Passive optical cables</b>				
CBL-MPO12-OM4-xM	1, 3, 5, 7, 10, 25, 50, 75, 100	MPO-12 to MPO-12	MMF OM4	
CBL-LC-OM4-xM*	1, 2, 3, 5, 10, 30, 50, 100	LC to LC	MMF OM4	
CBL-MPO12-4LC-OM4-xM	1, 3, 5, 7	MPO-12 to 4 x LC	MMF OM4	
CBL-MPO12-4LC-SMF-5M	5	MPO-12 to 4 x LC	SMF	
CBL-MPO24-OM4-5M	5	MPO-24 to MPO-24	MMF OM4	
<b>Breakout boxes</b>				
64x breakout box-OM4	1.5	16 x MPO-12 to 64 x LC	MMF OM4	
64x breakout box-SMF	1.5	16 x MPO-12 to 64 x LC	SMF	
48x breakout box-OM4	1.5	12 x MPO-12 to 48 x LC	MMF OM4	

## PRODUCT SUPPORT \*

10-GbE transceivers	SFP-10G- USR	SFP-10G- SR	SFP-10G-LR	SFP-10G- LRM	SFP-10G-ER	SFP-10G-ZR	SFP-10G-T- DWDM	SFP-10G- T10
Z9100-ON	✓	✓	✓		✓	✓	✓	✓
S6100-ON	✓	✓	✓		✓	✓	✓	✓
S6010-ON		✓	✓		✓	✓	✓	✓
S5000		✓	✓		✓	✓	✓	✓
S4048T		✓	✓		✓	✓	✓	✓
S4128-ON / S4148-ON	✓	✓	✓	✓***	✓	✓		
S4048 / S4048-ON		✓	✓		✓	✓	✓	✓**
N4000	✓	✓	✓	✓	✓	✓		
X4012	✓	✓	✓		✓	✓		
N2128-ON	✓	✓	✓		✓	✓		
N3132-ON	✓	✓	✓		✓	✓		
S31XX	✓	✓	✓	✓	✓	✓	✓	
S5048		✓*	✓*		✓*	✓*	✓*	✓**
S5148		✓*	✓*		✓*	✓*	✓*	✓**
N20XX / N30XX	✓	✓	✓	✓	✓	✓		
S3048-ON	✓	✓	✓	✓	✓	✓	✓	
X1052	✓	✓	✓		✓			
MXL & IO Agg		✓	✓	✓	✓		✓	
VRTX IOA & MXL		✓	✓					
FN IOM pass-through		✓	✓	✓			✓	
M8024-K		✓	✓	✓				
M6220		✓	✓	✓				
M6348		✓	✓	✓				
10Gb Pass-thru-K		✓	✓					
C-Series 36pt 1000BASE-T (and PoE) Comb Line Card: 2 10Gb SFP+ ports		✓	✓		✓			
C-Series 8 pt 10Gb SFP+ Line Card		✓	✓	✓	✓			
C9010	✓	✓	✓	✓	✓	✓	✓	

\* supported in upcoming software release

\*\*population of SFP-10G-T transceivers in switch may be limited due to power constraints.

\*\*\* only supported on S4148FE

# PRODUCT SUPPORT\*

40 GbE transceivers		QSFP-40G-SR4	QSFP-40G-ESR4	QSFP-40G-LR4	QSFP-40G-PSM4-LR	QSFP-40G-LM4	QSA-QSFP-SFP+	QSFP-40G-SM4	QSFP-40G-BIDI	
TOR switches	Z9100-ON	✓	✓	✓	✓	✓	✓	✓	✓*	
	S6100-ON	✓	✓	✓	✓	✓	✓	✓	✓*	
	S6010-ON	✓	✓	✓	✓	✓	✓	✓	✓*	
	S5000	✓	✓	✓		✓	✓	✓	✓*	
	S40T48	✓	✓	✓	✓	✓	✓	✓	✓*	
	S4810/S4810-ON	✓	✓	✓	✓			✓	✓*	
	S4124-ON/S4148-ON	✓	✓	✓	✓	✓	✓*	✓		
	S4048/S4048-ON	✓	✓	✓	✓	✓	✓	✓	✓*	
	8100/N4000	✓	✓	✓				✓*		
	N3132-ON	✓	✓	✓						
	S5048	✓	✓	✓	✓	✓	✓	✓	✓*	
	S5148	✓*	✓*	✓*	✓*	✓*	✓*	✓*	✓*	
	X4012	Not applicable								
	1GbE TOR	N20XX / N30XX, S3048 / S3048-ON, 35XX, 28XX, X10XX, X1052	Not applicable							
M100e, VRTX and FN blade switches	MXL & IO Agg	✓	✓					✓		
	VRTX IOA & MXL	Not applicable								
	FN IOM pass-through	Not applicable								
	M8024-K	Not applicable								
	M6220	Not applicable								
	M6348	Not applicable								
	10Gb Pass-thru-K	Not applicable								
	M8428-K	Not applicable								
C-Series Line Cards	C-Series 48pt 1000Base-T Line Card	Not applicable								
	C-Series 48pt 1000Base-T PoE Line	Not applicable								
	C-Series 48pt 1Gb SFP Line Card	Not applicable								
	C-Series 36pt 1000BASE-T (and PoE) Comb Line Card: 2 10Gb SFP+ ports	Not applicable								
	C-Series 36pt 1000BASE-T (and PoE) Comb Line Card: 8pt 1Gb SFP	Not applicable								
	C-Series 4 pt 10Gb XFP Line Card	Not applicable								
	C-Series 8 pt 10Gb XFP Line Card	Not applicable								
	C-Series 8 pt 10Gb SFP+ Line Card	Not applicable								
	C-Series Line Card QSFP+ ports	✓	✓							
	C9010	✓	✓	✓	✓	✓	✓	✓	✓	

\*Supported in upcoming software release

## PRODUCT SUPPORT

100GbE transceivers	Q28-100G-SR4	Q28-100G-LR4	Q28-100G-PSM4-IR	CXP-100G-SR10	Q28-100G-CWDM4	Q28-100G-SWDM4	QSA-Q28-S28	Q28-100G-ER4-lite	Q28-100G-ESR4
Z9100-ON	✓	✓	✓		✓	✓*	✓*	✓*	✓*
S6100-ON	✓	✓	✓	✓	✓	✓*	✓*	✓*	✓*
S4124-ON/ S4148-ON	✓	✓	✓		✓	✓*	✓*		

25GbE transceivers	SFP28-25G-SR	SFP28-25G-ESR	SFP28-25G-LR
S4124-ON / S4148-ON	✓	✓*	✓
Z9100-ON	✓	✓*	✓
S6100-ON			✓

## ORDERING INFORMATION

Model	Product description
<b>Fast Ethernet (100 Mb/s ) SFP transceivers</b>	
SFP-100M-FX	100MbE SFP optical module, up to 2 km over 2 parallel MMFs
<b>Gigabit Ethernet SFP transceivers</b>	
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-BX10-U	1GbE SFP optical module, bi-directional, long-reach, up to 10 km over single SMF - U version
SFP-1G-BX10-D	1GbE SFP optical module, bi-directional, long-reach, up to 10 km over single SMF - D version
SFP-1G-BX40-U	1GbE SFP optical module, bi-directional, extended-reach, up to 40 km over single SMF - U version
SFP-1G-BX40-D	1GbE SFP optical module, bi-directional, extended-reach, up to 40 km over single SMF - D version
SFP-1G-BX80-U	1GbE SFP optical module, bi-directional, extended-reach, up to 80 km over single SMF - U version
SFP-1G-BX80-D	1GbE SFP optical module, bi-directional, extended-reach, up to 80 km over single SMF - D version
SFP-1G-T	1GbE SFP electrical 1000BASE-T module, up to 100 m over single CAT5 cable.
<b>8G Fibre Channel SFP+ transceivers</b>	
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
<b>10-Gigabit Ethernet SFP+ transceivers</b>	
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-DWDM	10GbE SFP+ optical module, tunable DWDM, extended-reach, up to 80 km over 2 parallel SMFs
SFP-10G-BX10-U*	10GbE SFP+ optical module, bi-directional, long-reach, up to 10 km over single SMF - U version
SFP-10G-BX10-D*	10GbE SFP+ optical module, bi-directional, long-reach, up to 10 km over single SMF - D version
SFP-10G-BX40-U*	10GbE SFP+ optical module, bi-directional, extended-reach, up to 40 km over single SMF - U version
SFP-10G-BX40-D*	10GbE SFP+ optical module, bi-directional, extended-reach, up to 40 km over single SMF - D version
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
<b>16G Fibre Channel SFP+ transceivers</b>	
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
<b>Quad 16G Fibre Channel QSFP+ transceivers</b>	
QSFP-64GFC-SW4	Quad 16GFC QSFP+ optical module, short-reach, up to 100 m over 8 parallel MMFs
<b>25-Gigabit Ethernet SFP28 transceivers</b>	
SFP-25G-SR	25GbE SFP28 optical module, short-reach, up to 100 m over 2 parallel MMFs
SFP-25G-SR-NOF*	25GbE SFP28 optical module, short-reach, FEC-free operation up to 40 m over 2 parallel MMFs
<b>Quad 32G Fibre Channel QSFP28 transceivers</b>	
Q28-128GFC-SW4	Quad 32GFC QSFP28 optical module, short-reach, up to 1xx m over 8 parallel MMFs
<b>40-Gigabit Ethernet QSFP+ transceivers</b>	
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
QSA-QSFP-SFP	40GbE QSFP+ to 10GbE SFP+ adapter
<b>100-Gigabit Ethernet QSFP28 transceivers</b>	
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 100 m over 2 parallel MMFs
Q28-100G-PSM4-IR	100GbE QSFP28 optical module, intermediate-reach, up to 2 km over 8 parallel SMFs
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
QSA-Q28-S28*	100GbE QSFP28 to 25GbE SFP28 adapter
<b>100-Gigabit Ethernet CXP transceivers</b>	
CXP-100G-SR10	100GbE CXP optical module, short-reach, up to 150 m over 20 parallel MMFs

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