Spec Sheet

Dell 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, 400GbE and 800GbE 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 product specification encoding feature allows Dell Networking platforms to recognize certified and supported transceivers
- Guaranteed to work with Dell Networking platforms over temperature and process variations with optimal performance

Dell Technologies 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), and long-reach (LX).A 1000BASE-T transceiver facilitates twisted-pair copper connections.

10GbE solutions

10GbE SFP+ optical transceivers include short-reach (SR), long-reach (LR) and extended long-reach (ER and ZR). The 10GbE SFP+ receptacle will also recognize 1GbE SFP transceivers. A 10Gbase-T transceiver facilitates twisted-pair copper connections.

The 10GBase-T with rate adaptive feature can run at 10G on the host side and can be negotiated to any speed at far end link partner or line side.

25GbE solutions

25GbE SFP28 optical transceivers include short-reach (SR), extended short-reach (ESR) and long-reach (LR) variations. In 25GbE networking environments, the 100 and 400GBE ports can be broken out into four 25GbE lanes by use of either active optical (AOC) or passive copper (DAC) breakout cables. You can utilize 25GbE optics in 100GbE and 400GbE ports using a (QSA28) pluggable adapter.

40GbE solutions

40GbE (4×10GbE) QSFP+ optical transceivers include short-reach (SR4), and long-reach (LR4). In many cases, 1GbE SFP and 10GbE SFP+ optics can be readily inserted, recognized, and utilized in the 40GbE QSFP+ receptacle using 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 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), extended short-reach (ESR4), 2km intermediate reach (FR1), 10km long-reach (LR1), multimode SR1.2 (BiDi), multimode short-reach (SWDM4, 40/100GbE dual rate PSM4, 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. The hermetically sealed LR4 can be used for liquid immersion use cases.

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 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.

200GbE solutions

There's a new 200G optic being released in FY25, QSFP56 short-reach SR4. This module can transport 50GbE over 4 lanes.

400GbE solutions

Our newest family of optical transceivers are 400GbE QSFP56-DD. These transceivers may be short-reach (SR4.2-ON, SR8, and VR4) over multimode fiber or intermediate-reach (FR4, EDR4, LR4, LDR4, and Open ZR+) 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. SR4.2-ON module may be broken out over multimode fiber to feed four 100GbE QSFP28 SR1.2 modules. An active Ethernet cable also facilitates 400GbE QSFP56-DD to four 100GbE QSFP28 breakouts. Open ZR+ can transport 1x400GbE over 120 km up to 1,000 km (please reach out to PDM before selling this optic due to required use of EDFA and/or MUX, DEMUX.

800GbE

The new 800GbE transceivers are OSFP112. These transceivers may be short reach (2VR4) multimode fiber or intermediate reach (2EDR4) single mode fiber. The 800G O112 2VR4/2EDR4 utilizes 2xMPO12/APC receptacles and supports 1x800, 2x400, 4x200, and 8x100 modes of operation. Point to point DACs (1-4) and 800G to 2x400G Q112 breakout cables (1-4M) will also be available.

Testing and warranties

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

SFP+ DAC

QSFP+ DAC

SFP SFP+

QSFP+

QSA28

QSFP+

QSFP+ DAC breakout

QSFP+ MPO pigtail

SFP RJ45

QSFP-DD

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

Model	Connector Type	Wavelength(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-T	RJ-45	N/A	CAT5	100 m	N/A	N/A	1.5	operates up to 85°C
10-Gigabit Ethernet SFP+ transceivers								
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-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	RJ-45	N/A	CAT6A (10G) CAT5A (1G)	30 m 100 m	N/A	N/A	<2.5	

Model	Connector Type	Wavelength(s) (nm)	Transmission Medium	Distance (max.)	Transmitter Power (dBm)	Receiver Power (dBm)	Power Dissipation (max.; W)	Notes
SFP-10G-T LOW POWER	RJ-45	N/A	CAT6A (10G) CAT5A (1G)	30 m 100 m	N/A	N/A	<2.0	
SFP-10G-T Rate Adaptive	RJ-45	N/A	CAT6A (10G) CAT5A (1G)	30 m 100 m	N/A	N/A	2.4	Rate adaptive equates at host side running at 10G and line side can negotiate to 10G, 5G, 2.5G, 1G, and 100M
16G Fibre Channel SFP+ transceivers								
SFP-16GFC-SW (EOL)	duplex LC	850	MMF OM3 MMF OM4	100 m 125 m	-7.8 to 0.0	-13.5 to 0.0	1.0	
25-Gigabit Ethernet SFP28 transceivers								
SFP28-25G-SR (Supports both FEC and NO-FEC operations)	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-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

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-SR1.2	duplex LC	850 908	MMF OM3 MMF OM4 MMF OM5	70 m 100 m 150 m	-6.2 to +4 / lane	-7.9 to +4/ lane	3.5	Can only interop w/ another SR1.2 and 400G-SR4.2; substitute use of 100G-BiDi but will not interop
Q28-100G-SR4 (Supports FEC and NO-FEC operations)	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-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-LR1	duplex LC	1310	SMF	10 km	-1.4 to +4.5	-7.7 to +4.5	<4.0	Can interop with 100G-FR1/LR1, 400G-EDR4/LDR4
Q28-100G-LR4 (Gen 3)	duplex LC	1296 1300 1305 1309	SMF	10 km	-4.3 to +4.5 /lane	-10.6 to +4.5 /lane	<4.0	
Q28-100G-LR4 (Gen 4)	duplex LC	1296 1300 1305 1309	SMF	10 km	-4.3 to +4.5 /lane	-10.6 to +4.5 /lane	<4.0	Similar spec as Gen 3, but this one can be submerged in liquid
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

Model	Connector Type	Wavelength(s) (nm)	Transmission Medium	Distance (max.)	Transmitter Power (dBm)	Receiver Power (dBm)	Power Dissipation (max.; W)	Notes
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/40G-PSM4-IR	MPO-12	1310	SMF	40G - 10 km 100G - 2 km	-8.2 to +0.5 /lane	-14.4 to +0.5 /lane	3.5	Will eventually be replaced by Q28-100G/40G PSM4-10; 4x10G or 4x25G breakout modes supported
Q28-100G/40G-PSM4-10	MPO-12	1310	SMF	40G - 10 km 100G - 10 km	40G: -8.2 to +0.5 / lane 100G: -7.0 to +2.0 / lane	40G: -14.4 to +0.5 / lane 100G: -13.3 to +2.0 /lane	3.5	Will eventually replace Q28-100G/40G PSM4-IR
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
Q28-100G-SR4-G2	MPO12	850nm	MMF	100m	-8.4 to 2.4	-10.3 to 2.4	3.5	
Q28-100G-FR (Gen 3) - low power	LC	1310	SMF	2km	-2.4 to 4.0	-6.4 to 4.5	3.5	
100-Gigabit Ethernet SFP56-DD transceivers								
S56DD-100G-FR	duplex LC	1311	SMF	2km	-2.4 to +4.0	-6.4 to +4.5	3.5	
S56DD-100G-LR	duplex LC	1311	SMF	10km	-1.4 to +4.5	-7.7 to +4.5	3.5	
S56DD-100G-SR1.2	duplex LC	850 910	MMF OM3 MMF OM4 MMF OM5	70 m 100 m 100 m	-6.2 to +4 / lane	-8.2 to +4 / lane	3.5	

Model	Connector Type	Wavelength(s) (nm)	Transmission Medium	Distance (max.)	Transmitter Power (dBm)	Receiver Power (dBm)	Power Dissipation (max.; W)	Notes
Dual 100-Gigabit Ethernet QSFP28-DD transceivers								
Q28DD-200G/ 80G-2SR4	MPO-12-DD	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. Compatible with Q28-100G-SR4-G2 or QSFP+-40G-SR4 for 1x2 break out. Compatible with SFP28-25G- SR-G2 or SFP+-10G-SR for 1x8 break out.
200-Gigabit Ethernet QSFP56-DD transceivers								
Q56-200G-SR4	MPO-12	850	MMF OM3 MMF OM4	70 m 100 m	-6.0 to +4.0 /lane	-8.4 to +4.0 /lane	4.5	Can interop with another 200G-SR4 or 400G-SR8
400-Gigabit Ethernet QSFP56-DD transceivers								
400G-Q56DD-VR4	MPO-12/ APC	850	MMF OM3 MMF OM4	30 m 50 m	-4.6 to +4.0 /lane	-6.4 to +4.0 /lane	8.0	Electrical interface: 8x50G PAM4; Media interface: 4x100G PAM4; 1x400G, 4x100G, & 2x200G modes supported; Please note connector is APC (angled), which is different from UPC
400G-Q56DD-SR4.2-ON (Gen 2)	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	13.5 (4x100G port mode with media- fec option= custom) 12.0 (1x400G or 4x100G port mode with media- fec option=ieee)	Compatible with Q28-100G-SR1.2 for 1x4 breakout

Model	Connector Type	Wavelength(s) (nm)	Transmission Medium	Distance (max.)	Transmitter Power (dBm)	Receiver Power (dBm)	Power Dissipation (max.; W)	Notes
400G-Q56DD-SR4.2-ON (Gen 3)	MPO-12	850 908	MMF OM3 MMF OM4 MMF OM5	70 m 100 m 150 m	-6.2 to +4.0 /lane	-8.2 to +4.0 /lane	12.0	Can interop with 100G-SR1.2 or another SR4.2 in 4x100G or 1x400G modes
400G- Q56-DD-SR4.2-ON (Gen 4)	MPO-12	850 908	MMF OM3 MMF OM4 MMF OM5	70 m 100 m 150 m	-6.2 to +4.0 /lane	-8.2 to +4.0 /lane	12.0	Can interop with 100G-SR1.2 or another SR4.2 in 4x100G or 1x400G modes
400G-Q56DD-SR8 (Gen 2)	MPO-16	850	MMF OM3 MMF OM4	70 m 100 m	-6.5 to +4.0 /lane	-8.4 to +4.0 /lane	8.5	Can interop with 200G-SR4 in 2x200G mode and support 1x400G & 4x100G
400G-Q56DD-EDR4 (Gen 2)	MPO-12	1310	SMF	2 km	-2.4 to +4.0 /lane	-6.4 to +4.5 /lane	10.0	Compatible with Q28-100G-FR for 1×4 breakout
400G-Q56DD-EDR4 (Gen 3)	MPO-12	1310	SMF	2 km	-2.9 to +4.0 /lane	-5.9 to +4.0 /lane	8.0	Updated EDR4 (Gen 2) version: 2x200G, 1x400G, & 4x100G modes are supported and lower wattage; Can interop with DR4 (500 m)/DR4+ (2 km)
400G-Q56DD-FR4 (Gen 2)	duplex LC	1271 1291 1311 1331	SMF	2 km	3.3 to +3.5 /lane	-7.3 to +3.5 /lane	10.0	
400G-Q56DD-LR4	duplex LC	1271 1291 1311 1331	SMF	10 km	-2.8 to +4.0 /lane	-9.1 to +4.0 /lane	10.0	
400G-Q56DD-LDR4	MPO-12	1310	SMF	10 km	-1.4 to +4.5 /lane	-7.7 to +4.5 /lane	10.0	Compatible with Q28-100G-LR for 1x4 break out

Model	Connector Type	Wavelength(s) (nm)	Transmission Medium	Distance (max.)	Transmitter Power (dBm)	Receiver Power (dBm)	Power Dissipation (max.; W)	Notes
400G-Q56DD-ZR+*	duplex LC	tunable DWDM	SMF	1000 km	-15.0 to -8.0	12.0 to 0	21.0	This optic is qualified on a case-by-case basis. Reach out to Networking PLM to specify customer use case for guidance. SONiC OS ONLY. Customers are required to use additional equipment: EDFA (optical amplifier) and/or MUX/DEMUX
800-Gigabit Ethernet QSFP112 transceivers								
800G-O112-EDR8	OS-FP112-IHS, DSP	1310	SMF	2km	-3.1 to 4.0	-7.1 to 4.0	14.5	
800G-O112-DR8-LPO	OS-FP112-IHS, LPO	1310	SMF	500m	-2.9 to 4.0	-5.9 to 4.0	8.5	
800G-O112-2DR4-LPO	OS-FP112-IHS, LPO	1310	SMF	500m	-2.9 to 4.0	-5.9 to 4.0	8.5	
800G-O112-2VR4	2xMPO-12	850	MMF OM3 MMF OM4	30 m 50 m	-4.6 to +4.0 /lane	-6.4 to +4.0 /lane	16.0	Supported breakout modes: 1x800, 2x400 (physical), 4x200 (virtual), and 8x100 (physical).
800G-O112-2EDR4	2xMPO-12	1310	SMF	2 km	-2.9 to +4.0 /lane	-5.9 to +4.0 /lane	16.0	Supported breakout modes: 1x800, 2x400 (physical), 4x200 (virtual), and 8x100 (physical).
800G-O112-2FR4*	Duplex LC	1271 1291 1311 1331	SMF	2 km	-3.2 to 4.4 /lane	-7.2 to 4.4 /lane	14.5	
800G-O112-VR8	MPO-16	850	MMF OM3 MMF OM4 MMF OM5	30 m 50 m 50 m	-4.6 to +4.0 /lane	-6.3 to +4.0 /lane	15.0	
800G-O112-2DR4-DSPLPO	2xMPO-12/APC	1310	SMF	2 km	-2.4 to 4.0	-6.4 to 4.5	16.0	Suppored with 400G-Q112-DR4-LPO Optic on server side.

**Supported in upcoming software release*

Dell passive optical cables

Model	Available lengths (m)	Connection	Transmission medium	Notes
Passive optical cables				
CBL-MPO16-APC-OM4-xM	2, 3, 4, 5	MPO-16/APC to MPO-16/APC	MMF OM4	
CBL-MPO16-APC-SMF-xM	2, 3, 4, 5	MPO-16/APC to MPO-16/APC	SMF	
CBL-MPO16APC-2xMPO12UPC-MMF-5m	5, 10, 30	MPO-16/APC to 2 x MPO-12/UPC	MMF	
CBL-MPO16APC-2xMPO12APC-OM4-MMF-5m	5, 7	MPO-16/APC to 2 x MPO-12/APC	MMF	
CBL-MPO12-OM4-xM	1, 3, 5, 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-MPO12-4LC-OM4-xM	3, 5, 7, 15	MPO-12 to 4 × LC	MMF OM4	
CBL-MPO12-4LC-SMF-5M	5	MPO-12 to 4 × LC	SMF	
CBL-MPO12DD-2MPO12-OM4-xM	3, 7	MPO-12DD to 2 × MPO-12	MMF OM4	
CBL-MPO12DD-OM4-xM	3, 7	MPO-12DD to MPO-12DD	MMF OM4	
CBL-MPO12-APC-OM4-xM	2, 3, 4, 5	MPO-12/APC to MPO12/APC	MMF OM4	
CBL-MPO12-APC-SMF-xM	2, 3, 4, 5	MPO-12/APC to MPO-12/APC	SMF	

** Supported in upcoming software release*
All transceivers operate at 0 to 70ºC unless otherwise indicated.

Dell Active Optical Cables (AOC), Active Electrical Cables (AEC), 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	1, 2, 3, 5, 7	SFP+ to SFP+	copper		
AOC-SFP-10G-xM	2, 3, 5, 10, 15	SFP+ to SFP+	optical	1.5	
25-Gigabit Ethernet Active Optical and Direct Attach Cable					
DAC-SFP-25G-xM	2, 2.5, 3, 5	SFP28 to SFP28	copper		1, 2, 3 m can operate without FEC
AOC-SFP-25G-xM	2, 10, 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, 3, 5, 7	QSFP+ to QSFP+	copper		
AOC-QSFP-40G-xM	10	QSFP+ to QSFP+	optical	1.5	
DAC-QSFP-4SFP-10G-xM	1, 3, 5	QSFP+ to 4 × SFP+	copper		
AOC-QSFP-4SFP-10G-xM	30	QSFP+ to 4 × SFP+	optical	1.5, 1.0	Supports 4×10G or 4×1G

Model	Available Lengths (m)	Connection	Transmission Medium	Power Dissipation per end (max.; W)	Notes
Dual 40-Gigabit Ethernet Active Optical Cable					
AOC-Q28DD-8SFP-10G-xM	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		
DAC-S56DD-Q56-SFF-100G-xM	1, 2, 3	S56DD to Q56	copper		Q56 end is compliant to SFF-8636 coding
AOC-QSFP-100G-xM	3, 7, 10, 30	QSFP28 to QSFP28	optical	3.5	
DAC-QSFP-4SFP28-25G-xM	2, 3, 5	QSFP28 to 4 × SFP28	copper		
AOC-QSFP- 4SFP28- 25G-xM	10	QSFP28 to 4 × SFP28	optical	3.5, 1.5	
Dual 100-Gigabit Ethernet Active Optical and Direct Attach Cable					
DAC-Q28DD-2Q28- 100G-xM	2, 3	QSFP28-DD to 2 × QSFP28	copper		
AOC-Q28DD-2Q28- 100G-xM	5, 15	QSFP28-DD to 2 × QSFP28	optical	5.0, 3.5	
DAC-Q28DD-8S28-25G-xM	2, 3	QSFP28-DD to 8 × SFP28	copper		
AOC-Q28DD-8S28-25G-xM	10	QSFP28-DD to 8 × SFP28	optical	5.0, 1.2	
200-Gigabit Ethernet Active Optical and Direct Attach cable					
DAC-Q28DD-200G-xM	0.5, 1, 2, 3	Q28DD to Q28DD	copper		
AOC-Q28DD-200G-xM	5, 10, 20	Q28DD to Q28DD	optical	<4.0	
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		
DAC-Q56DD-4Q56-SFF-100G-xM	1, 2, 3	Q56DD to Q56	copper		Q56 end is compliant to SFF-8636 coding
DAC-Q56DD-2Q56-SFF-200G-xM	1, 2, 3	Q56DD to Q56	copper		Q56 end is compliant to SFF-8636 coding
DAC-Q56DD-2Q56-CMIS-200G-xM	1, 2, 3, 4, 5	Q56DD to Q56	copper		Q56 200GbE breakout end can plug into Broadcom 57608 NIC only; Supports 1x400 or 2x200
DAC-Q56DD-8xSFP56-xM	2.5	Q56DD to S56	copper		
AOC-Q56DD-400G-xM	10, 15, 30	QSFP56-DD to QSFP56- DD	optical	10.0	
AOC-[400G-Q56DD]-[200G-2Q56]-xM	3, 5, 10, 30	Q56DD to 2 x QSFP56	optical	8.5; 4.5	

Model	Available Lengths (m)	Connection	Transmission Medium	Power Dissipation per end (max.; W)	Notes
AOC-Q56DD-4Q28-100G-xM	3, 7, 15, 30	Q56DD to Q28	optical	8.0, 2.5	
AEC-Q56DD-400G-xM	3, 5	QSFP56-DD to QSFP56- DD	active copper	8.5	
AEC-Q56DD-4Q28- 100G-xM	3	**QSFP56-DD to**			
4 × QSFP28	active copper	8.0; 3.5			
800-Gigabit Ethernet Active Optical and Direct Attach Cable					
DAC-O112-800G-xM	1, 2, 3, 4	OSFP112 to OSFP112	copper		
DAC-O112-800G2x400G-Q112-xM	1, 2, 3, 4	OSFP112 to QSFP112	copper		QSFP112 400G breakout end can plug into Broadcom 57608 NIC only; Supports 1x400 only
AEC-O112-800G-xM*	2, 3, 4	OSFP112 to OSFP112	Copper cable	10.0	

** Supported in upcoming software release*

Product Support

10GbE	SFP-10G-SR	SFP-10G-LR	SFP-10G-ER	SFP-10G-ZR	SFP-10G-T
Z9100	✓	✓	✓	✓	✓
Z9264F	✓	✓	✓	✓	✓
Z9332F	✓	✓	✓	✓	✓
Z9664F	✓	✓	✓	✓	✓
Z9432	✓	✓	✓	✓	✓
S5232F	✓	✓	✓	✓	✓
S5448F	✓	✓	✓	✓	✓
S6100	✓	✓	✓	✓	
S6010	✓	✓	✓	✓	✓
S4348F	✓	✓	✓		✓
S41x8x	✓	✓	✓	✓	✓
S4248	✓	✓	✓	✓	✓
S4112	✓	✓	✓	✓	✓
S4048x	✓	✓	✓	✓	✓
S5048	✓	✓	✓	✓	
S52xx	✓	✓	✓	✓	✓
S3048	✓	✓	✓	✓	✓
S3100	✓	✓	✓	✓	
N3224/N3248x	✓	✓	✓	✓	✓
S3248T	✓	✓	✓	✓	✓
N32xx		✓	✓		✓
E3248x	✓	✓	✓	✓	✓
E3224F	✓	✓	✓		✓
N20xx/N30xx	✓	✓	✓	✓	✓
MX9116n	✓	✓	✓	✓	✓
S5148	✓	✓	✓	✓	✓

Product Support

25GbE transceivers	SFP28-25G-SR	SFP28-25G-ESR	SFP28-25G-LR
Z9100	✓	✓	✓
Z9264F	✓	✓	✓
Z9332F	✓	✓	✓
Z9432F	✓	✓	✓
S5232F	✓	✓	✓
S5448F	✓	✓	✓
S41x8	✓	✓	✓
S4248	✓	✓	✓
S4112	✓	✓	✓
S52xxF	✓	✓	✓
N32xx	✓	✓	✓
MX9116n	✓	✓	✓
MX5108n	✓	✓	✓

**** Population of SFP-10G-T transceivers may be limited due to power constraints.*

Product Support

40GbE transceivers	SR4	ESR4*	LM4*	SM4	BIDI	PSM4-LR*	LR4	ER4*
Z9264	✓	✓	✓	✓	✓	✓	✓	
Z9100	✓	✓	✓	✓	✓	✓	✓	
Z9332	✓	✓	✓	✓	✓	✓	✓	✓
Z9432	✓	✓	✓	✓	✓	✓	✓	✓
Z9664F	✓	✓	✓	✓	✓	✓		✓
S52xx	✓	✓	✓	✓	✓	✓	✓	✓
S54xx	✓	✓	✓	✓	✓	✓	✓	
S6100	✓	✓	✓	✓	✓	✓	✓	✓
S4348F	✓				✓		✓	
S41x8	✓	✓	✓	✓	✓	✓	✓	✓
S4248x	✓	✓	✓	✓	✓	✓	✓	✓
S4112x	✓	✓	✓	✓	✓	✓	✓	✓
S4048x	✓	✓	✓	✓	✓	✓	✓	✓
S5048	✓	✓	✓	✓	✓	✓	✓	✓
S52xx	✓	✓	✓	✓	✓	✓	✓	✓
N22XX	✓	✓	✓	✓	✓		✓	
N32XX	✓	✓	✓	✓	✓		✓	
S3248T	✓			✓	✓		✓	
E3248	✓			✓	✓		✓	
MX9116n	✓	✓	✓	✓	✓		✓	
MX5108n	✓	✓	✓	✓	✓		✓	
MXL IO Agg.	✓		✓	✓	✓		✓	
C7000	✓							
C9010	✓	✓	✓	✓	✓	✓	✓	✓

*EOL

Ordering Information

100GbE transceivers	SR4	ESR4	SWDM4	BIDI	SR1.2	CWDM4	FR	PSM4-10	PSM4-IR	LR1	LR4	ER4-lite	QSA-QSFP28-SFP28
Z9100	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓
Z9264	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Z9332	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Z9432	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Z9664	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S52xx	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S5448X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S6100	✓	✓	✓	✓		✓					✓	✓	✓
S4348F	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S41x8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S4248	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
S4112	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
S4048													✓
S5048	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
S52XXF	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
N32xx	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
S3248T	✓	✓	✓					✓	✓	✓			✓
E32xx	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
MX9116n	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
MX5108n		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S5148	✓	✓	✓	✓		✓					✓	✓	
S5000													✓
S6000													✓
Z9500													✓

Ordering Information

Dual 100GbE / 40GbE transceivers	S56DD-100G-FR	S56DD-100G-LR	S56DD-100G-SR1.2	Q28DD-80G-2SR4	Q28DD- 200G-2SR4
Z9332F		✓		✓	✓
Z9432F				✓	✓
Z9664F				✓	✓
S5448F	✓	✓	✓	✓	✓
S5248				✓	✓
MX9116n				✓	✓
MX7116n				✓	✓

200GbE transceivers	Q56-200G-SR4
Z9432F	✓
Z9332F	
Z9664F	✓

400GbE transceivers	400G-Q56-DD-SR4.2-ON	400G-Q56DD-EDR4	400G-Q56DD-VR4	400G-Q56DD-FR4	400G-Q56DD-LDR4	400G-Q56DD-LR4	400G-Q56DD-SR8
Z9332F	✓	✓		✓	✓	✓	
Z9432F	✓	✓	✓	✓	✓	✓	✓
Z9664F	✓	✓	✓	✓	✓	✓	✓
S5448	✓	✓		✓	✓	✓	
MX8116n	✓						

800GbE transceivers	800G-O112-2VR4	800G-O112-2EDR4	800G-O112-2FR4	800G-O112-2DR4-DSPLPO	800G-O112-EDR8	800G-O112-VR8	800G-O112-DR8-LPO	800G-O112-2DR4 LPO
Z9864F	✓	✓	✓	✓	✓	✓		

**Supported in upcoming software releases*

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.
10-Gigabit Ethernet SFP+ transceivers	
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-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	10GbE SFP+ electrical 10GBASE-T module, up to 30 m over single CAT6A cable

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
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
40-Gigabit Ethernet QSFP+ transceivers	
SFP-40G-SR4	40GbE QSFP+ optical module, short-reach, up to 150 m over 8 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
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

Model	Product description
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
400-Gigabit Ethernet QSFP56-DD transceivers	
400G-Q56DD-SR8	400GbE QSFP56-DD optical module, short-reach up to 100 m over 16 parallel MMFs
400G-Q56DD-SR4.2-ON	400GbE QSFP56-DD optical module, short-reach up to 150 m over 8 parallel MMFs - open networking
400G-Q56-DD-VR4	400GbE QSFP56-DD optical module, MPO12/APC, very short-reach up to 50 m OM4/30 m OM3 MMF
400G-Q56-DD-LR4	400GbE QSFP56-DD optical module, LC duplex, long-reach up to 10 km SMF
400G-Q56-DD-LDR4	400GbE QSFP56-DD optical module, MPO12, long-reach up to 10 km SMF
400G-Q56-DD-ZR+	400GbE QSFP56-DD optical module, open ZR+, LC duplex, reach up to 1000 km SMF
400G-Q56DD-EDR4	400GbE QSFP56-DD optical module, intermediate-reach up to 2 km over 8 parallel SMFs
400G-Q56DD-FR4	400GbE QSFP56-DD optical module, intermediate-reach up to 2 km over 2 parallel SMFs
800-Gigabit Ethernet OSFP112 transceivers	
800G-O112-2EDR4	800GbE OSFP112 optical module, 2xMPO12, extended-reach up to 2 km SMF
800G-O112-2VR4	800GbE OSFP112 optical module, 2xMPO12/APC, very short-reach up to 50 m OM4/30 m OM3 MMF
800G-O112-2FR4*	800GbE OSFP112 optical module, LC duplex, reach up to 2km SMF
800G-O112-VR8	800GbE OSFP112 optical module, MPO-16, reach up to 50m OM5
800G-O112-2DR4-DSPLPO	800GbE OSFP112 optical module, 2xMPO12/APC, reach up to 2km

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