

A dark, monochromatic photograph of a server room with rows of server racks and overhead lighting. A red circle is positioned above the first '4' in the title text.

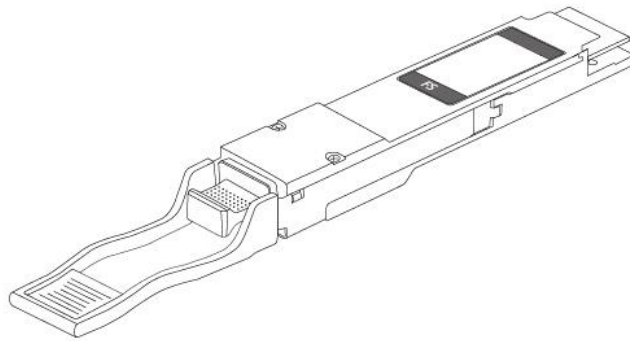
400G QSFP-DD Cable and Transceiver Modules Data Sheet

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Product overview

The FS® 400GBASE Quad Small Form-Factor Pluggable Double Density (QSFP-DD) portfolio offers customers a wide variety of super high-density transceiver modules and the flexibility of 400 Gigabit Ethernet connectivity options for data center, high- performance computing networks, enterprise core and distribution layers, and service provider applications. The QSFP-DD modules are our new generation of 400G transceiver modules based on a QSFP-DD form factor. (See Figure 1).



- QDD-SR8-400G
- QDD-FR4-400G
- QDD-DR4-400G-Si
- QDD-LR4-400G

Figure 1.

QSFP-DD 400G Optical modules

Features and benefits

- Hot-swappable input/output device that plugs into 400G Ethernet QSFP port
- Interoperable with other IEEE-compliant 400GBASE interfaces where applicable
- Certified and tested on Cisco, Arista, Juniper, Dell QSFP-DD ports for superior performance, quality, and reliability. For more details, refer to the [FS Assured Program for Transceivers](#)
- High-speed electrical interface compliant to IEEE 802.3bm

Table 1 describes the 400G QSFP-DD portfolio.

Table 1. 400G QSFP-DD portfolio

Product	Description	Connector type
QDD-SR8-400G	400GBASE SR8 QSFP-DD Transceiver, MTP/MPO, 100m over OM4 MMF	MTP/MPO-16 (16fibers)
QDD-FR4-400G	400GBASE FR4 QSFP-DD Transceiver, Duplex LC, 2km over SMF	Duplex LC
QDD-DR4-400G-Si	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF	MTP/MPO-12 (12 fibers)
QDD-DR4-400G	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF	MTP/MPO-12 (12 fibers)
QDD-LR4-400G	400GBASE LR4 QSFP-DD Transceiver, Duplex LC, 10km over SMF	Duplex LC
QDD-ER8-400G	400GBASE ER8 QSFP-DD Transceiver, Duplex LC, 40km over SMF	Duplex LC
QDD-PLR4-400G	400GBASE PLR4 QSFP-DD Transceiver, MTP/MPO, 10km over SMF	MTP/MPO-12 (12fibers)
QDD-LR8-400G	400GBASE LR8 QSFP-DD Transceiver, Duplex LC, 10km over SMF	Duplex LC
QDD-XDR4-400G	400GBASE XDR4 QSFP-DD Transceiver, MTP/MPO, 2km over SMF	MTP/MPO-12 (12 fibers)
OSFP-DR4-400G-Si	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF	MTP/MPO-12 (12fibers)
OSFP-LR8-400G	400GBASE LR8 QSFP-DD Transceiver, Duplex LC, 10Km over SMF	Duplex LC
OSFP-SR8-400G	400GBASE SR8 QSFP-DD Transceiver, MTP/MPO, 100m over MMF	MTP/MPO-16 (16fibers)
QSFP112-DR4-400G	400GBASE DR4 QSFP112 Transceiver, MTP/MPO, 500m over SMF	MTP/MPO-12 (12fibers)
QSFP112-SR4-100G	400GBASE SR4 QSFP112 Transceiver, MTP/MPO, 100m over MMF	MTP/MPO-12 (12fibers)
QSFPDD-ZR-400G	400GBASE ZR QSFP-DD Transceiver, Duplex LC, 80km over SMF	Duplex LC

Product	Description	Connector type
QSFP-400G-PCxxx (0.5M, 1M, 1.5M)	400GBASE QSFP112 Passive Copper Cable	-
QDD-400G-PCxxx (0.5M, 1M, 1.5M, 2M, 2.5M, 3M)	400GBASE QSFP-DD Passive Copper Cable	-
QDD-400G-ACxxx (1M, 2M, 3M, 5M, 7M)	400GBASE QSFP-DD Active Copper Cable	-
QSFP-400G-ACxxx (1M, 2M, 3M, 4M, 5M)	400GBASE QSFP112 Active Copper Cable	-
QDD-400G-2QPCxxx (0.5M, 1M, 1.5M, 2M, 2.5M, 3M)	400GBASE QSFP-DD to 2xQSFP56200G Passive Copper Splitter Cables	-
QDD-400G-4Q4xNACxxx (1M, 3M, 5M)	400GBASE QSFP-DD to 4xQSFP28100G Active Copper Splitter Cables	-
QDD-400G-4QPCxxx (0.5M, 1M, 1.5M, 2M, 2.5M, 3M)	400GBASE QSFP-DD to 4xQSFP56100G Passive Copper Splitter Cables	-
QDD-400G-8SPCxxx (0.5M, 1M, 1.5M, 2M, 2.5M, 3M)	400GBASE QSFP-DD to 8xSFP5650G Passive Copper Splitter Cables	-
QDD-400G-AOxxx (1M, 2M, 3M, 5M, 7M, 10M, 15M, 20M, 25M, 30M, 50M, 70M, 100M)	400GBASE QSFP-DD Active Optical Cables	-
QDD-400G-2QAOxxx (1M, 2M, 3M, 5M, 7M, 10M, 15M, 20M, 25M, 30M)	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables	-
QDD-400G-4QAOxxx (1M, 2M, 3M, 5M, 7M, 10M, 15M, 25M, 30M, 50M)	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables	-

QDD-SR8-400G

The QDD-SR8-400G Module supports link lengths of up to 70m (100m) over OM3 (OM4) Multimode Fiber with MTP/ MPO connectors. It is compliant to IEEE 802.3bs protocol and 400GAUI-8/CEI-56G-VSR-PAM4 standard. The 400 Gigabit Ethernet signal is carried over eight wavelengths. Multiplexing and demultiplexing of the eight wavelengths are managed within the device.

QDD-FR4-400G

The QDD-FR4-400G Module supports link lengths of up to 2km SMF with duplex LC connector. It is compliant to IEEE 802.3bs, 400GBASE-FR4 Spec of 100G Lambda MSA group, and 400GAUI-8/CEI-56G-VSR-PAM4 standards. The 400 Gigabit Ethernet signal is carried over four CWDM grid optical wavelengths. Multiplexing and demultiplexing of the four wavelengths are managed within the device.

QDD-DR4-400G-Si

The QDD-DR4-400G-Si Module supports link lengths of up to 500m SMF with MTP/MPO-12 connector. It is compliant with QSFP-DD MSA, IEEE 802.3bs protocol and 400GAUI-8 standards. The 400 Gigabit Ethernet signal is carried over four parallel lanes by one wavelength per lane. It can be used as 4x100G breakout to QSFP28-DR-100G.

QDD-DR4-400G

The 400GBASE-DR4 module supports link lengths of up to 500m SMF with MTP/MPO-12 connector. It is compliant with QSFP-DD MSA, IEEE 802.3bs protocol and 400GAUI-8 standards. The 400 Gigabit Ethernet signal is carried over four parallel lanes by one wavelength per lane. It can be used as 4x100G breakout to QSFP28-DR-100G. It is a cost-effective and lower power consumption solution for 400GBASE data center.

QDD-LR4-400G

The QDD-LR4-400G Module supports link lengths of up to 2km SMF with duplex LC connector. It is compliant to IEEE 802.3bs, 400GBASE-FR4 Spec of 100G Lambda MSA group, and 400GAUI-8/CEI-56G-VSR-PAM4 standards. The 400 Gigabit Ethernet signal is carried over four CWDM grid optical wavelengths. Multiplexing and demultiplexing of the four wavelengths are managed within the device.

QDD-ER8-400G

The QDD-ER8-400G Module supports link lengths of up to 40km over a standard pair of G.652 single mode fiber (SMF) with duplex LC connectors. It is compliant to IEEE 802.3cn protocol and 400GAUI-8, QSFP-DD HW Rev 5.0 and QSFP-DD CMIS Rev 4.0 standard. The 400 Gigabit Ethernet signal is carried over eight wavelengths. Multiplexing and demultiplexing of the eight wavelengths are managed within the device.

QDD-PLR4-400G

The QDD-PLR4-400G Module supports link lengths of up to 10km parallel SMF with MTP/MPO-12 connector. It is compliant to IEEE 802.3bs protocol and 400GAUI-8 standards. The 400 Gigabit Ethernet signal is carried over four parallel lanes by one wavelength per lane. It can be used as 4x100G breakout to QSFP28-LR-100G.

QDD-LR8-400G

The QDD-LR8-400G Module supports link lengths of up to 10km over a standard pair of G.652 single mode fiber (SMF) with duplex LC connectors. It is compliant to IEEE 802.3bs protocol and 400GAUI-8/CEI-56G-VSR-PAM4 standard. The 400 Gigabit Ethernet signal is carried over eight wavelengths. Multiplexing and demultiplexing of the eight wavelengths are managed within the device.

QDD-XDR4-400G

The QDD-XDR4-400G Module supports link lengths of up to 2km parallel SMF with MTP/MPO-12 connector. It is compliant to IEEE 802.3bs protocol and 400GAUI-8 standards. The 400 Gigabit Ethernet signal is carried over four parallel lanes by one wavelength per lane. It can be used as 4x100G breakout to QSFP28-FR-100G.

OSFP-DR4-400G-Si

The OSFP-DR4-400G-Si Module supports link lengths of up to 500m SMF with MTP/MPO-12 connector. It is compliant with OSFP MSA, CMIS 4.0 I2C Interface and 400GAUI-8 standards. The 400 Gigabit Ethernet signal is carried over four parallel 1310nm optical lanes by one wavelength per lane. It can be used as 4x100G breakout to QSFP28-DR-100G.

OSFP-LR8-400G

The OSFP-LR8-400G Module supports link lengths of up to 10km over single mode fiber (SMF) with duplex LC connector. It is compliant to ICMIS Rev 4.0, IEEE 802.3bs and OSFP MSA standard. The 400 Gigabit Ethernet signal is carried over eight wavelengths. Multiplexing and demultiplexing of the eight wavelengths are managed within the device.

OSFP-SR8-400G

The OSFP-SR8-400G Module supports up to 100m link lengths over multimode fiber (MMF) with MTP/MPO-16 connector. The 400 Gigabit Ethernet signal is carried over eight wavelengths. It is compliant with OSFP MSA, IEEE 802.3bs protocol and 400GAUI-8 standards, and is suitable for 400G Ethernet, Data Center and Cloud Networks.

QSFP112-DR4-400G

The 400GBASE-DR4 module supports link lengths of up to 500m SMF fiber (MMF) with MTP/MPO-12 connector. This transceiver is compliant with QSFP112 MSA, CMIS 5.0 Interface and 400GAUI-4 standards. It is suitable for 400G ethernet and data center interconnect applications.

QSFP112-SR4-400G

The 400GBASE-SR4 module supports link lengths of up to 100m over MMF with MTP/MPO-12 connector. This transceiver is compliant with QSFP112 MSA, CMIS 4.0 Interface and 400GAUI-4 standards. It is suitable for 400G ethernet and data center interconnect applications.

QSFP112-FR4-400G

The 400GBASE-FR4 module supports link lengths of up to 2km over SMF with Duplex LC connector. This transceiver is compliant with QSFP112 MSA, CMIS 4.0 Interface and 400GAUI-4 standards. The built-in digital diagnostics monitoring (DDM) allows access to real-time operating parameters. It is suitable for 400G ethernet and data center interconnect applications.

QSFPDD-ZR-400G

The 400GBASE-ZR transceiver supports link lengths of up to 80km using EDFA over SMF with duplex LC connectors. It provide 400Gb/s of optical bandwidth over a single optical wavelength using coherent, Dual Polarization-16QAM modulation. This transceiver is compliant with OIF 400ZR and QSFP-DD MSA standards. It is intended to be used in conjunction with a host platform to support 400G transmission over optical links in DCI applications.

QSFP-400G-PCxxx

QSFP-400G-PCxxx copper direct-attach cables (Figure 2) is a 4-channel parallel copper direct attach cable for storage,data center, and high performance computing connectivity. FS currently offers passive copper cables in lengths of x= 0.5, 1 and 1.5 meters.



Figure 2.

QSFP-400G-PCxxx cables

QDD-400G-PCxxx

QDD-400G-PCxxx copper direct-attach cables (Figure 3) primarily enables high-bandwidth 400G links and supports 400G Ethernet rate. It provides a QSFP-DD-to-QSFP-DD copper direct-attach solution. They are suitable for very short links and offer a cost-effective way to establish a 400-Gigabit link between QSFP-400G ports of switches/routers within racks and across adjacent racks. FS currently offers passive copper cables in lengths of $x= 0.5, 1, 1.5, 2, 2.5$ and 3 meters.



Figure 3.

QDD-400G-PCxxx cables

QSFP-400G-ACxxx

QSFP-400G-ACxxx copper direct-attach cables (Figure 4) primarily enables high-bandwidth 400G links and supports 400G Ethernet rate. It provides a QSFP112-to-QSFP112 copper direct-attach solution. They are suitable for very short links and offer a cost-effective way to establish a 400-Gigabit link between QSFP112-400G ports of switches/routers within racks and across adjacent racks. FS currently offers passive copper cables in lengths of $x= 1, 2, 3, 4$ and 5 meters.



Figure 4.

QSFP-400G-ACxxx cables

QDD-400G-ACxxx

QDD-400G-ACxxx copper direct-attach cables (Figure 5) primarily enables high-bandwidth 400G links and supports 400G Ethernet rate. It provides a QSFP-DD-to-QSFP-DD copper direct-attach solution. They are suitable for very short links and offer a cost-effective way to establish a 400-Gigabit link between QSFP-400G ports of switches/routers within racks and across adjacent racks. FS currently offers passive copper cables in lengths of $x= 1, 2, 3, 5$ and 7 meters.



Figure 5.

QDD-400G-ACxxx cables

QDD-400G-2QPCxxx

400G QSFPDD to two QSFP56-200G copper direct-attach breakout cable (Figure 6) assembly is designed to meet the high density requirements of standard and combo connector configurations. QSFP-DD pluggable solutions enable 400G transmission. It is fully compliant with SFF-8679, QSFP-DD MSA, IEEE802.3bj, and IEEE802.3cd standards. QSFP-DD to two QSFP56-200G QSFP56 cable assemblies are high performance, high bandwidth and cost effective interconnect solutions that support 400G standard applications with different data rates. FS currently offers passive copper cables in lengths of $x= 0.5, 1, 1.5, 2, 2.5$ and 3 meters.



Figure 6.

QDD-400G-2QPCxxx cables

QDD-400G-4Q4xNACxxx

400G QSFPDD to four QSFP28-100G AOC cable (Figure 7) assembly is designed to meet the high density requirements of standard and combo connector configurations. QSFP-DD pluggable solutions enable 400G transmission. It is fully compliant with SFF-8636, QSFP-DD MSA standards. QSFP-DD to 4xQSFP28 cable assemblies are high performance, high bandwidth and cost effective interconnect solutions that support 400G standard applications with different data rates. FS currently offers active optical cables in lengths of x=1, 2 and 3 meters.

**Figure 7.**

QDD-400G-4Q4xNACxxx cables

QDD-400G-4QPCxxx

400G QSFPDD to four QSFP56-100G copper direct-attach breakout cable (Figure 8) assembly is designed to meet the high density requirements of standard and combo connector configurations. QSFP-DD pluggable solutions enable 400G transmission. This hot-swappable transceiver integrates 8 transmit and 8 receive channels. 400G QSFPDD to four QSFP56-100G cable assemblies are high performance, high bandwidth and cost effective interconnect solutions that support 400G standard applications with different data rates. FS currently offers passive copper cables in lengths of x= 0.5, 1, 1.5, 2, 2.5 and 3 meters.

**Figure 8.**

QDD-400G-4QPCxxx cables

QDD-400G-8SPCxxx

400G QSFPDD to eight QSFP56-50G copper direct-attach breakout cable (Figure 9) assembly is designed to meet the high density requirements of standard and combo connector configurations. QSFP-DD pluggable solutions enable 400G transmission. QSFP-DD to 8xSFP56 cable assemblies are high performance, high bandwidth and cost effective interconnect solutions that support 400G standard applications with different data rates. FS currently offers passive copper cables in lengths of $x=0.5, 1, 1.5, 2, 2.5$ and 3 meters.



Figure 9.

QDD-400G-8SPCxxx cables

QDD-400G-AOxxx

400G QSFPDD active optical cables (Figure 10) are designed for use in 400 Gigabit Ethernet links over OM4 multimode fibers, and contain eight multi-mode fibers (MMF) optic transceivers per end, each operating at data rates of up to 53Gb/s. This active optical cable is compliant with IEEE 802.3cd, OIF-CEI-04.0, QSFP-DD MSA and QSFP-DD-CMIS-rev4p0. FS currently offers active optical cables in lengths of $x=1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 50, 70$ and 100 meters.



Figure 10.

QDD-400G-AOxxx cables

QDD-400G-2QAOxxx

400G QSFPDD to two QSFP56-200G AOC cable (Figure 11) is compliant with IEEE 802.3, QSFP-DD MSA, SFF-8024, SFF-8679, SFF-8665, OIF-CEI-04.0 and CMIS 4.0. The built-in digital diagnostics monitoring (DDM) allows access to real-time operating parameters. It provides connectivity between system units with a 400GbE connector on one side and two separate 200GbE connectors on the other side and is suitable for Data Center Applications. FS currently offers active optical cables in lengths of x=1, 2, 3, 5, 7, 10, 15, 20, 25 and 30 meters.

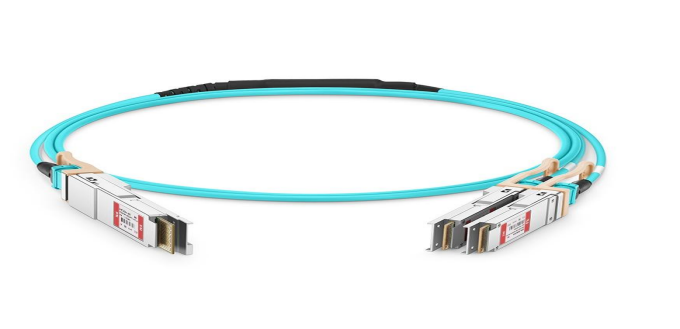


Figure 11.

QDD-400G-2QAOxxx cables

QDD-400G-4QAOxxx

400G QSFPDD to four QSFP56-100G AOC cable (Figure 12) is designed for use in 400 Gigabit Ethernet links over OM3 multimode fibers, each operating at data rates of up to 53.125Gbps per channel by PAM4 modulation. This breakout cable is compliant with IEEE 802.3cd, OIF-CEI, QSFP-DD MSA, QSFP-DD-CMIS, IEEE 802.3bs Annex120E SFF-8024, SFF-8679, SFF-8665 standards. FS currently offers active optical cables in lengths

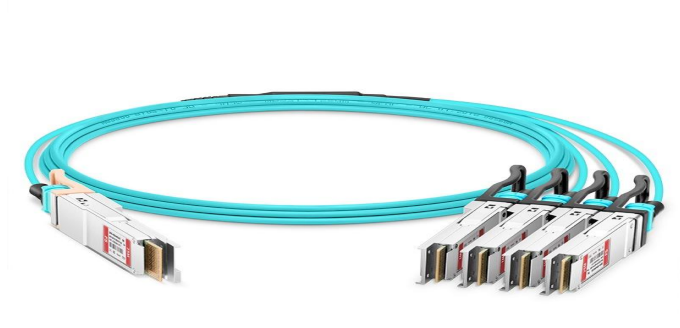


Figure 12.

QDD-400G-4QAOxxx cables

Product Specifications

Table 2 shows the key electrical characteristics for the 400G QSFP-DD modules.

Table 2. Electrical specifications

Product	Description	Nominal data rate (Gbs)	High-speed electrical	Link meter
QDD-SR8-400G	400GBASE SR8 QSFP-DD Transceiver, MTP/MPO, 100m over OM4 MMF	400Gbps	400G CAUI-8	100m
QDD-FR4-400G	400GBASE FR4 QSFP-DD Transceiver, Duplex LC, 2km over SMF	400Gbps	400G CAUI-8	2km
QDD-DR4-400G-Si	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF	425Gbps (4x106.25Gb/s)	400G CAUI-8	500m
QDD-DR4-400G	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF	425Gbps (4x106.25Gb/s)	400G CAUI-8	500m
QDD-LR4-400G	400GBASE LR4 QSFP-DD Transceiver, Duplex LC, 10km over SMF	400Gbps	400G CAUI-8	10km
QDD-ER8-400G	400GBASE ER4 QSFP-DD Transceiver, Duplex LC, 40km over SMF	425Gbps	400G CAUI-8	40km
QDD-PLR4-400G	400GBASE PLR4 QSFP-DD Transceiver, MTP/MPO, 10km over SMF	400Gbps	400G CAUI-8	10km
QDD-LR8-400G	400GBASE LR8 QSFP-DD Transceiver, Duplex LC, 10km over SMF	425Gbps	400G CAUI-8	10km
QDD-XDR4-400G	400GBASE XDR4 QSFP-DD Transceiver, MTP/MPO, 2km over SMF	400Gbps	400G CAUI-8	2km
OSFP-DR4-400G-Si	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF	425Gbps (4x106.25Gb/s)	400G CAUI-8	500m
OSFP-LR8-400G	400GBASE LR4 QSFP-DD Transceiver, Duplex LC, 10Km over SMF	400Gbps	400G CAUI-8	10km
OSFP-SR8-400G	400GBASE SR8 QSFP-DD Transceiver, MTP/MPO, 100m over MMF	425Gbps	400G CAUI-8	100m
QSFP112-DR4-400G	400GBASE DR4 QSFP112 Transceiver, MTP/MPO, 500m over SMF	425Gbps (4x106.25Gb/s)	400G CAUI-4	500m
QSFP112-SR4-400G	400GBASE SR4 QSFP112 Transceiver, MTP/MPO, 100m over MMF	425Gbps (4x106.25Gb/s)	400G CAUI-4	100m
QSFP112-FR4-400G	400GBASE FR4 QSFP112 Transceiver, Duplex LC, 2km over SMF	425Gbps (4x106.25Gb/s)	400G CAUI-4	2km

Product	Description	Nominal data rate (Gbs)	High-speed electrical	Link meter
QSFPDD-ZR-400G	400GBASE ZR QSFP-DD Transceiver, Duplex LC, 80km over SMF	425Gbps (8x53.125Gb/s)	400G CAUI-8	80km
QSFP-400G-PCxxx (0.5M, 1M, 1.5M)	400GBASE QSFP112 Passive Copper Cable	400Gbps	400G CAUI-8	0.5, 1, 1.5
QDD-400G-PCxxx (0.5M, 1M, 1.5M, 2M, 2.5M, 3M)	400GBASE QSFP-DD Passive Copper Cable	400Gbps	400G CAUI-8	0.5, 1, 1.5, 2, 2.5, 3
QDD-400G-ACxxx (1M, 2M, 3M, 5M, 7M)	400GBASE QSFP-DD Active Copper Cable	400Gbps	400G CAUI-8	1, 2, 3, 5, 7
QSFP-400G-ACxxx (1M, 2M, 3M, 4M, 5M)	400GBASE QSFP112 Active Copper Cable	425Gbps (4x106.25Gb/s)	400G CAUI-4	1, 2, 3, 4, 5
QDD-400G-2QPCxxx (0.5M, 1M, 1.5M, 2M, 2.5M, 3M)	400GBASE QSFP-DD to 2xQSFP56200G Passive Copper Splitter Cables	400Gbps	400G CAUI-8	0.5, 1, 1.5, 2, 2.5, 3
QDD-400G-4Q4xNACxxx (1M, 3M, 5M)	400GBASE QSFP-DD to 4xQSFP28100G Active Copper Splitter Cables	400Gbps	400G CAUI-8	1, 3, 5
QDD-400G-4QPCxxx (0.5M, 1M, 1.5M, 2M, 2.5M, 3M)	400GBASE QSFP-DD to 4xQSFP56100G Passive Copper Splitter Cables	400Gbps	400G CAUI-8	0.5, 1, 1.5, 2, 2.5, 3
QDD-400G-8SPCxxx (0.5M, 1M, 1.5M, 2M, 2.5M, 3M)	400GBASE QSFP-DD to 8xSFP5650G Passive Copper Splitter Cables	400Gbps	400G CAUI-8	0.5, 1, 1.5, 2, 2.5, 3
QDD-400G-AOxxx (1M, 2M, 3M, 5M, 7M, 10M, 15M, 20M, 25M, 30M, 50M, 70M, 100M)	400GBASE QSFP-DD Active Optical Cables	400Gbps	400G CAUI-8	1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 50, 70, 100
QDD-400G-2QAOxxx (1M, 2M, 3M, 5M, 7M, 10M, 15M, 20M, 25M, 30M)	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables	425Gbps(8x53.125Gb/s)	400G CAUI-8	1, 2, 3, 5, 7, 10, 15, 20, 25, 30
QDD-400G-4QAOxxx (1M, 2M, 3M, 5M, 7M, 10M, 15M, 25M, 30M, 50M)	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables	400Gbps	400G CAUI-8	1, 2, 3, 5, 7, 10, 15, 25, 30, 50

Table 3 shows the key optical characteristics for the 400G QSFP-DD modules.

Table 3. Optical specifications

Product	Description	Transmit Power (dBm) per lane		Receive Power (dBm) per lane		Transmit and Receive Wavelength (nm)
		Minimum	Maximum	Minimum	Maximum	
QDD-SR8-400G	400GBASE SR8 QSFP-DD Transceiver, MTP/MPO, 100m over OM4 MMF	-6	6	-7.9	4	850
QDD-FR4-400G	400GBASE FR4 QSFP-DD Transceiver, Duplex LC, 2km over SMF	-3.3	3.5	-7.3	3.5	1310
QDD-DR4-400G-Si	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF	-2.9	4	-5.9	4	1310
QDD-DR4-400G	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF	-2.9	4	-5.9	4	1310
QDD-LR4-400G	400GBASE LR4 QSFP-DD Transceiver, Duplex LC, 10km over SMF	-2.8	4	-9.1	4	1310
QDD-ER8-400G	400GBASE ER4 QSFP-DD Transceiver, Duplex LC, 40km over SMF	0.6	5.6	-16.1	3.4	1310
QDD-PLR4-400G	400GBASE PLR4 QSFP-DD Transceiver, MTP/MPO, 10km over SMF	-1.9	4.8	-8.2	5.8	1310
QDD-LR8-400G	400GBASE LR8 QSFP-DD Transceiver, Duplex LC, 10km over SMF	-2.8	5.3	-9.1	5.3	1310
QDD-XDR4-400G	400GBASE XDR4 QSFP-DD Transceiver, MTP/MPO, 2km over SMF	-2.4	4	-6.4	3.5	1310
OSFP-DR4-400G-Si	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF	-2.9	4	-5.9	5	1310

Product	Description	Transmit Power (dBm) per lane		Receive Power (dBm) per lane		Transmit and Receive Wavelength (nm)
		Minimum	Maximum	Minimum	Maximum	
OSFP-LR8-400G	400GBASE LR4 QSFP-DD Transceiver, Duplex LC, 10Km over SMF	-2.8	5.3	-9.1	6.3	1310
OSFP-SR8-400G	400GBASE SR8 QSFP-DD Transceiver, MTP/MPO, 100m over MMF	-6.5	4	-8.4	4	850
QSFP112-DR4-400G	400GBASE DR4 QSFP112 Transceiver, MTP/MPO, 500m over SMF	-2.9	4	-5.9	4	1310
QSFP112-SR4-400G	400GBASE SR4 QSFP112 Transceiver, MTP/MPO, 100m over MMF	-4.6	4	-6.4	4	850
QSFP112-FR4-400G	400GBASE FR4 QSFP112 Transceiver, Duplex LC, 2km over SMF	-3.3	3.5	-7.3	3.5	1310
QSFPDD-ZR-400G	400GBASE ZR QSFP-DD Transceiver, Duplex LC, 80km over SMF	-10	-6	-12	0	1528.77-1567.13

Table 4 shows the mechanical characteristics for the 400G QSFP-DD modules.

Table 4. Mechanical specifications

Parameter	Product	Weight
Module dimension with pull tab	(H x W x D) 9.3 x 12.95 x 149.71 mm	
Module weight (Max)	QDD-SR8-400G	45 g
	QDD-FR4-400G	45 g
	QDD-DR4-400G-Si	61.5 g
	QDD-DR4-400G	59.4 g
	QDD-LR4-400G	45 g
	QDD-ER8-400G	45 g
	QDD-PLR4-400G	45 g
	QDD-LR8-400G	45 g
	QDD-XDR4-400G	45 g
	OSFP-DR4-400G-Si	61.5 g
	OSFP-LR8-400G	150 g
	OSFP-SR8-400G	105 g
	QSFP112-DR4-400G	67.1g
	QSFP112-SR4-400G	47.4g
	QSFP112-FR4-400G	61.8g
	QSFPDD-ZR-400G	51.9g
	QSFP-400G-PC005	135 g
	QSFP-400G-PC01	174 g
	QSFP-400G-PC015	174 g
	QDD-400G-PC005	486 g
QDD-400G-PC01	666 g	
QDD-400G-PC015	666 g	
QDD-400G-PC02	832.5 g	

Parameter	Product	Weight
Module weight (Max)	QDD-400G-PC025	666 g
	QDD-400G-AC01	212 g
	QDD-400G-AC02	344 g
	QDD-400G-AC03	476 g
	QDD-400G-AC05	930 g
	QDD-400G-AC07	1522 g
	QSFP-400G-AC01	146 g
	QSFP-400G-AC02	212 g
	QSFP-400G-AC03	278 g
	QSFP-400G-AC04	420 g
	QSFP-400G-AC05	590 g
	QDD-400G-2QPC005	210 g
	QDD-400G-2QPC01	359.6 g
	QDD-400G-2QPC005	210 g
	QDD-400G-2QPC015	359.6 g
	QDD-400G-2QPC02	583.2g
	QDD-400G-2QPC025	310g
	QDD-400G-2QPC03	777.6 g
	QDD-400G-4Q4xNAC01	400 g
	QDD-400G-4Q4xNAC03	720 g
	QDD-400G-4Q4xNAC05	1040 g
	QDD-400G-4QPC005	240 g
	QDD-400G-4QPC01	368 g
	QDD-400G-4QPC015	368 g

Parameter	Product	Weight
Module weight (Max)	QDD-400G-4QPC02	630 g
	QDD-400G-PC03	1127 g
	QDD-400G-4QPC025	504 g
	QDD-400G-4QPC03	560 g
	QDD-400G-8SPC005	240 g
	QDD-400G-8SPC01	460 g
	QDD-400G-8SPC015	368 g
	QDD-400G-8SPC02	538.4 g
	QDD-400G-8SPC025	538.4 g
	QDD-400G-8SPC03	560 g
	QDD-400G-AO01	128 g
	QDD-400G-AO02	160 g
	QDD-400G-AO03	200 g
	QDD-400G-AO05	350 g
	QDD-400G-AO07	600 g
	QDD-400G-AO10	630 g
	QDD-400G-AO15	1300 g
	QSFP-DD-A020	1600 g
	QSFP-DD-A030	2100 g
	QSFP-DD-A050	3200 g
	QSFP-DD-A070	4700 g
	QSFP-DD-A0100	6300 g
	QDD-400G-2QA001	160 g
	QDD-400G-2QA002	200 g

Parameter	Product	Weight
Module weight (Max)	QSFP-DD-A030	2100 g
	QDD-400G-2QA003	274 g
	QDD-400G-2QA005	350 g
	QDD-400G-2QA007	600 g
	QDD-400G-2QA010	1250 g
	QDD-400G-2QA015	1880 g
	QDD-400G-2QA020	2510 g
	QDD-400G-2QA025	2960 g
	QDD-400G-2QA030	3420 g
	QDD-400G-4QA001	200 g
	QDD-400G-4QA002	300 g
	QDD-400G-4QA003	350 g
	QDD-400G-4QA005	380 g
	QDD-400G-4QA007	530 g
	QDD-4Q56A010	700 g
	QDD-400G-4QA015	1050 g
	QDD-400G-4QA025	1750 g
	QDD-400G-4QA030	3100 g
	QDD-400G-4QA050	3200 g
	QDD-4Q56A010	700 g
QDD-400G module operation temperature	0 to 70° C	
Active optical cable	0 to 70° C	
Copper cable operation temperature	0 to 70° C	
Storage temperature	-40 to 85° C	

Warranty

- Standard warranty: 5 years
- For more information for FS Returns & Refunds policy, visit <https://www.fs.com/policies/warranty.html> or https://www.fs.com/policies/day_return_policy.html

Ordering information

Table 5 provides the ordering information for QSFP-DD 400G modules and related cables.

Table 5. Ordering information

Part number	Description
QSFP-DD optics modules	
QDD-SR8-400G	400GBASE SR8 QSFP-DD Transceiver, MTP/MPO, 100m over OM4 MMF
QDD-FR4-400G	400GBASE FR4 QSFP-DD Transceiver, Duplex LC, 2km over SMF
QDD-DR4-400G-Si	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF
QDD-DR4-400G	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF
QDD-LR4-400G	400GBASE LR4 QSFP-DD Transceiver, Duplex LC, 10km over SMF
QDD-ER8-400G	400GBASE ER4 QSFP-DD Transceiver, Duplex LC, 40km over SMF
QDD-PLR4-400G	400GBASE PLR4 QSFP-DD Transceiver, MTP/MPO, 10km over SMF
QDD-LR8-400G	400GBASE LR8 QSFP-DD Transceiver, Duplex LC, 10km over SMF
QDD-XDR4-400G	400GBASE XDR4 QSFP-DD Transceiver, MTP/MPO, 2km over SMF
OSFP-DR4-400G-Si	400GBASE DR4 QSFP-DD Transceiver, MTP/MPO, 500m over SMF
OSFP-LR8-400G	400GBASE LR4 QSFP-DD Transceiver, Duplex LC, 10Km over SMF
OSFP-SR8-400G	400GBASE SR8 QSFP-DD Transceiver, MTP/MPO, 100m over MMF
QSFP112-DR4-400G	400GBASE DR4 QSFP112 Transceiver, MTP/MPO, 500m over SMF
QSFP112-SR4-400G	400GBASE SR4 QSFP112 Transceiver, MTP/MPO, 100m over MMF
QSFP112-FR4-400G	400GBASE FR4 QSFP112 Transceiver, Duplex LC, 2km over SMF
QSFPDD-ZR-400G	400GBASE ZR QSFP-DD Transceiver, Duplex LC, 80km over SMF

Part number	Description
QSFP-DD direct-attach copper modules	
QSFP-400G-PC005	400GBASE QSFP112 Passive Copper Cable, 0.5-meter
QSFP-400G-PC01	400GBASE QSFP112 Passive Copper Cable, 1-meter
QSFP-400G-PC015	400GBASE QSFP112 Passive Copper Cable, 1.5-meter
QDD-400G-PC005	400GBASE QSFP-DD Passive Copper Cable,0.5-meter
QDD-400G-PC01	400GBASE QSFP-DD Passive Copper Cable, 1-meter
QDD-400G-PC015	400GBASE QSFP-DD Passive Copper Cable, 1.5-meter
QDD-400G-PC02	400GBASE QSFP-DD Passive Copper Cable, 2-meter
QDD-400G-PC025	400GBASE QSFP-DD Passive Copper Cable, 2.5-meter
QDD-400G-PC03	400GBASE QSFP-DD Passive Copper Cable, 3-meter
QDD-400G-AC01	400GBASE QSFP-DD Active Copper Cable, 1-meter
QDD-400G-AC02	400GBASE QSFP-DD Active Copper Cable, 2-meter
QDD-400G-AC03	400GBASE QSFP-DD Active Copper Cable, 3-meter
QDD-400G-AC05	400GBASE QSFP-DD Active Copper Cable, 5-meter
QDD-400G-AC07	400GBASE QSFP-DD Active Copper Cable, 7-meter
QSFP-400G-AC01	400GBASE QSFP112 Active Copper Cable, 1-meter
QSFP-400G-AC02	400GBASE QSFP112 Active Copper Cable, 2-meter
QSFP-400G-AC03	400GBASE QSFP112 Active Copper Cable, 3-meter
QSFP-400G-AC04	400GBASE QSFP112 Active Copper Cable, 4-meter
QSFP-400G-AC05	400GBASE QSFP112 Active Copper Cable, 5-meter
QDD-400G-2QPC005	400GBASE QSFP-DD to 2xQSFP56200G Passive Copper Splitter Cables, 0.5-meter
QDD-400G-2QPC01	400GBASE QSFP-DD to 2xQSFP56200G Passive Copper Splitter Cables, 1-meter
QDD-400G-2QPC015	400GBASE QSFP-DD to 2xQSFP56200G Passive Copper Splitter Cables, 1.5-meter
QDD-400G-2QPC02	400GBASE QSFP-DD to 2xQSFP56200G Passive Copper Splitter Cables, 2-meter
QDD-400G-2QPC025	400GBASE QSFP-DD to 2xQSFP56200G Passive Copper Splitter Cables, 2.5-meter

Part number	Description
QDD-400G-2QPC03	400GBASE QSFP-DD to 2xQSFP56200G Passive Copper Splitter Cables, 3-meter
QDD-400G-4Q4xNAC01	400GBASE QSFP-DD to 4xQSFP28100G Active Copper Splitter Cables, 1-meter
QDD-400G-4Q4xNAC03	400GBASE QSFP-DD to 4xQSFP28100G Active Copper Splitter Cables, 3-meter
QDD-400G-4Q4xNAC05	400GBASE QSFP-DD to 4xQSFP28100G Active Copper Splitter Cables, 5-meter
QDD-400G-4QPC005	400GBASE QSFP-DD to 4xQSFP56100G Passive Copper Splitter Cables, 0.5-meter
QDD-400G-4QPC01	400GBASE QSFP-DD to 4xQSFP56100G Passive Copper Splitter Cables, 1-meter
QDD-400G-4QPC015	400GBASE QSFP-DD to 4xQSFP56100G Passive Copper Splitter Cables, 1.5-meter
QDD-400G-4QPC02	400GBASE QSFP-DD to 4xQSFP56100G Passive Copper Splitter Cables, 2-meter
QDD-400G-4QPC025	400GBASE QSFP-DD to 4xQSFP56100G Passive Copper Splitter Cables, 2.5-meter
QDD-400G-4QPC03	400GBASE QSFP-DD to 4xQSFP56100G Passive Copper Splitter Cables, 3-meter
QDD-400G-8SPC005	400GBASE QSFP-DD to 8xSFP5650G Passive Copper Splitter Cables, 0.5-meter
QDD-400G-8SPC01	400GBASE QSFP-DD to 8xSFP5650G Passive Copper Splitter Cables, 1-meter
QDD-400G-8SPC015	400GBASE QSFP-DD to 8xSFP5650G Passive Copper Splitter Cables, 1.5-meter
QDD-400G-8SPC02	400GBASE QSFP-DD to 8xSFP5650G Passive Copper Splitter Cables, 2-meter
QDD-400G-8SPC025	400GBASE QSFP-DD to 8xSFP5650G Passive Copper Splitter Cables, 2.5-meter
QDD-400G-8SPC03	400GBASE QSFP-DD to 8xSFP5650G Passive Copper Splitter Cables, 3-meter
QDD-400G-AO01	400GBASE QSFP-DD Active Optical Cables, 1-meter
QDD-400G-AO02	400GBASE QSFP-DD Active Optical Cables, 2-meter
QDD-400G-AO03	400GBASE QSFP-DD Active Optical Cables, 3-meter
QDD-400G-AO05	400GBASE QSFP-DD Active Optical Cables, 5-meter
QDD-400G-AO07	400GBASE QSFP-DD Active Optical Cables, 7-meter
QDD-400G-AO10	400GBASE QSFP-DD Active Optical Cables, 10-meter
QDD-400G-AO15	400GBASE QSFP-DD Active Optical Cables, 15-meter
QSFP-DD-A020	400GBASE QSFP-DD Active Optical Cables, 20-meter
QSFP-DD-A025	400GBASE QSFP-DD Active Optical Cables, 25-meter

Part number	Description
QSFP-DD-A030	400GBASE QSFP-DD Active Optical Cables, 30-meter
QSFP-DD direct-attach copper modules	
QSFP-DD-A050	400GBASE QSFP-DD Active Optical Cables, 50-meter
QSFP-DD-A070	400GBASE QSFP-DD Active Optical Cables, 70-meter
QSFP-DD-A0100	400GBASE QSFP-DD Active Optical Cables, 100-meter
QDD-400G-2QAO01	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 1-meter
QDD-400G-2QAO02	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 2-meter
QDD-400G-2QAO03	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 3-meter
QDD-400G-2QAO05	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 5-meter
QDD-400G-2QAO07	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 7-meter
QDD-400G-2QAO10	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 10-meter
QDD-400G-2QAO15	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 15-meter
QDD-400G-2QAO20	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 20-meter
QDD-400G-2QAO25	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 25-meter
QDD-400G-2QAO30	400GBASE QSFP-DD to 2xQSFP56200G Active Optical Cables, 30-meter
QDD-400G-4QAO01	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 1-meter
QDD-400G-4QAO02	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 2-meter
QDD-400G-4QAO03	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 3-meter
QDD-400G-4QAO05	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 5-meter
QDD-400G-4QAO07	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 7-meter
QDD-4Q56A010	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 10-meter
QDD-400G-4QAO15	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 15-meter
QDD-400G-4QAO25	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 25-meter
QDD-400G-4QAO30	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 30-meter
QDD-400G-4QAO50	400GBASE QSFP-DD to 4xQSFP56100G Active Optical Cables, 50-meter

I Regulatory and standards compliance

Standards

- OIF CEI-56G-VSR-PAM4
- QSFP-DD MSA hardware Rev 4.1, QSFP-DD hardware specification for QSFP double-density 8X pluggable transceiver
- 400G-FR4 MSA: 100G Lambda MSA Group
- 400G-LR4 MSA: 100G Lambda MSA Group
- GR-20-CORE: Generic Requirements for Optical Fiber and Optical Fiber Cable
- GR-326-CORE: Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies
- GR-468-CORE: Generic Requirements for Optoelectronic Devices Used in Telecommunications Equipment
- GR-1435-CORE: Generic Requirements for Multifiber Optical Connectors
- Common Management Specification (CMIS) Rev 4.0
- IEEE Std 802.3™-2018 IEEE Standard for Ethernet
- IEEE 802.3ba CL88
- IEEE 802.3bs 400GAUI-8 Annex 120E
- IEEE 802.3cd CL136
- IEEE 802.3cu CL140

Safety

- Modules are compliant with Laser Class 1 as defined in IEC 60825-1, IEC 60825-2 and Comply with 21 CFR 1040.10 and 1040.11

Table 6. Laser class for the QSFPDD-400G optical modules

Product	Laser class
QDD-SR8-400G	1
QDD-FR4-400G	1
QDD-DR4-400G-Si	1
QDD-DR4-400G	1
QDD-LR4-400G	1
QDD-ER8-400G	1
QDD-PLR4-400G	1
QDD-LR8-400G	1


Product	Laser class
QDD-XDR4-400G	1
OSFP-DR4-400G-Si	1
OSFP-LR8-400G	1
OSFP-SR8-400G	1
QSFP112-DR4-400G	1
QSFP112-SR4-400G	1
QSFP112-FR4-400G	1
QSPFDD-ZR-400G	1

Additional information

For more information about 400GBASE QSFP-DD optics and copper modules, contact your account manager or visit <https://www.fs.com/c/fiber-optic-transceivers-9>

Document history

New or revised topic	Described in	Date
400GBASE QSPFDD-400G Modules Data Sheet	Updated all	1/3/2022
400GBASE QSPFDD-400G Modules Data Sheet	Add QDD-DR4-400G module	4/26/2023
400GBASE QSPFDD-400G Modules Data Sheet	Change Part Number	2/2/2024



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