

Fiber Optic Transceiver Breakout

Cable Ordering Guide: Cisco Nexus

PANDUIT™

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Step 1:

Identify your breakout cable assembly by performance level, fiber type and connector end for your application

Did you know?

- As you increase data rates, reach decreases
- Only 10% of data centers exceed 100m
- Every connection introduces dB loss which further reduces the distance

Performance Level	Fiber Type	Cisco Transceiver Part Number: End 1	Cisco Transceiver Part Number: End 2	Scenario References*
400G to 100G (x4)	SMF	QDD-400G-DR4-S 500m Reach Parallel G.652 Singlemode Fiber MPO-12 Male Connector	QSFP 100G-FR-S (x4) OR QSFP-100G-DR-S (x4) 500m Reach Duplex G.652 Singlemode Fiber Duplex LC Connector	Table 3 or 4
100G to 25G (x4)	MMF	QSFP-100G-SR4-S 70m OM3, 100m OM4/OM5 Reach Parallel Multimode Fiber MPO-12 Male Connector	SFP-25G-SR-S (x4) OR SFP-10/25G-CSR (x4) 70m OM3, 100m OM4/OM5 Reach Duplex Multimode Fiber Duplex LC Connectors	Table 1 or 2
100G to 25G (x4)	SMF	QSFP-100G-PSM4-S 500m Reach Parallel G.652 Singlemode Fiber MPO-12 Male Connector	SFP-10/25G-LR-S (x4) 500m Reach (limited by QSPF-100G-PSM4-S) Duplex G.652 Singlemode Fiber Duplex LC Connector	Table 3 or 4
40G to 10G (x4)	SMF	QSFP-4X10G-LR-S 10km Reach Parallel G.652 Singlemode Fiber MPO-12 Male Connector	SFP-10G-LR-S (x4) OR SFP-10/25G-LR-S (x4) 10km Reach Duplex G.652 Singlemode Fiber Duplex LC Connector	Table 3 or 4
	MMF	QSFP-40G-SR4 100m OM3, 150m OM4/OM5 Reach Parallel Multimode Fiber MPO-12 Male Connector QSFP-40G-CSR4 300m OM3, 400m OM4/OM5 Reach Parallel Multimode Fiber MPO-12 Male Connector	SFP-10G-SR-S (x4) 100m OM3, 150m OM4/OM5 Reach OR SFP-10/25G-CSR-S (x4) 300m OM3, 400m OM4/OM5 Reach Duplex Multimode Fiber Duplex LC Connector	Table 1 or 2

*Scenario References: Tables 1 and 3 utilize breakout cassettes, Tables 2 and 4 utilize breakout harness cabling.

Step 1: (continued)

Identify your breakout cable assembly by performance level, fiber type and connector end for your application



QDD-400G-DR4-S

Description

The **QDD-400G-DR4-S** module supports link lengths of up to 500m parallel singlemode fiber (SMF) with MPO-12 connector. It is compliant to IEEE 802.3bs protocol and 400GAUI-8/CEI-56G-VSR-PAM4 standards. The 400 GbE signal is carried over four parallel lanes by one wavelength per lane. It can be used as 4x100G breakout to QSFP28-100G-FR-S. FEC is performed on the host platform.



QSFP-100G-FR-S

The **QSFP-100G-FR-S** module supports link lengths of up to 2km over a standard pair of G.652 singlemode fiber (SMF) with duplex LC connectors. The 100 GbE signal is carried over a single wavelength using onboard PAM4 modulation and FEC. QSFP-100G-FR-S can also be used in applications meant for IEEE 100GBASE-DR, such as interoperability with IEEE 400GBASE-DR4 via fiber break-out cables up to 500m.



QSFP-100G-SR4-S

The **QSFP-100G-SR4-S** module supports 100GBASE-SR4 Ethernet over link lengths of up to 100m over parallel multimode fiber (MMF). The maximum reach over OM4 is 100m and 70m over OM3 multimode fiber (MMF). The SR4-S module accepts MPO-12 connectors and can interoperate with 4 individual 25G SR-S modules via a fiber breakout cable. It is primarily used in data center and enterprise applications.



QSFP-100G-DR-S

The **QSFP-100G-DR-S** module supports link lengths of up to 500m over a standard pair of G.652 singlemode fiber (SMF) with duplex LC connectors. The 100 GbE signal is carried over a single wavelength using onboard PAM4 modulation and FEC. QSFP-100G-DR-S interoperates with 400G transceivers that comply with IEEE 400GBASE-DR4, such as Cisco's QSFP-400G-DR4-S, via fiber break-out cables.



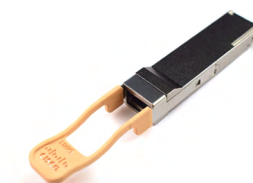
QSFP-100G-PSM4-S

The **QSFP-100G-PSM4-S** module supports 100 GbE link lengths of up to 500m over G.652 singlemode fiber (SMF). It accepts angle-polished MPO-12 connectors and can interoperate with 4 individual 25G LR-S modules via a fiber breakout cable. PSM4-S complies with the PSM4 MSA and is primarily used in data center applications.



QSFP-40G-CSR4

The **QSFP-40G-CSR4** module extends the reach of the IEEE 40GBASE-SR4 interface to 300m on laser-optimized OM3, and 400m on OM4/OM5 multimode parallel fiber. Each 10 Gb lane of this module is compliant to IEEE 10GBASE-SR specifications. This module can be used for native 40G optical links over 12-fiber parallel cables with MPO/MTP female connectors or in a 4x10G breakout mode with parallel to duplex fiber breakout cables for connectivity to four 10GBASE-SR interfaces. Cisco QSFP-40G-CSR4 is optimized to guarantee interoperability over the complete specification range of 10GBASE-SR.



QSFP-40G-SR4

The **QSFP-40G-SR4** module supports link lengths of 100 and 150m, respectively, on laser-optimized OM3, and OM4/OM5 multimode fibers (MMF). It primarily enables high-bandwidth 40G optical links over 12-fiber parallel fiber terminated with MPO/MTP multifiber female connectors. It can also be used in a 4x10G breakout mode for interoperability with 10GBASE-SR and SFP-10/25G-CSR-S (in 10G mode) interfaces up to 100 and 150m on OM3, and OM4/OM5 fibers, respectively. The worry-free 4x10G mode operation is enabled by the optimization of the transmit and receive optical characteristics of the Cisco QSFP-40G-SR4 to prevent receiver overload or unnecessary triggering of alarm thresholds on the 10GBASE-SR and SFP-10/25G-CSR-S (in 10G mode) receiver, and at the same time is completely interoperable with all standard 40GBASE-SR4 interfaces. The 4x10G connectivity is achieved using an external 12-fiber parallel to 2-fiber duplex breakout cable, which connects the 40GBASE-SR4 module to four 10GBASE-SR optical interfaces. Cisco QSFP-40G-SR4 is optimized to guarantee interoperability with any IEEE 40GBASE-SR4 and in 4x10G mode with the 10GBASE-SR and SFP-10/25G-CSR (in 10G mode).

Step 1: (continued)

Identify your breakout cable assembly by performance level, fiber type and connector end for your application

Description



QSFP-4X10G-LR-S

The **QSFP-4X10G-LR-S** module supports link lengths of up to 10km on G.652 singlemode fiber (SMF). It enables high-bandwidth 40G optical links over 12-fiber parallel fiber terminated with MPO/MTP multifiber female connectors. Cisco QSFP-4X10G-LR-S is optimized to guarantee interoperability in 4x10G mode over the full specification range of 10GBASE-LR and the SFP-10/25G-LR-S (in 10G mode). QSFP-4X10G-LR-S does not support FCoE.



SFP-25G-SR-S

The **SFP-25G-SR-S** module supports a link length of 70/100m on OM3/4 multimode fiber (MMF). This module requires RS-FEC on the host ports.



SFP-10/25G-CSR

The **SFP-10/25G-CSR** module supports a link length of up to 300/400m over OM3/4 at 10G, and up to 300/400m over OM3/4 at 25G*. It also supports link lengths of 82m over OM2 at 10G, and up to 70m over OM2 at 25G. This module requires RS-FEC on the host port for full reach operation at 25G. Using BASE-R FEC the module can support 70/100m over OM3/4 and without FEC it can support 30/50m over OM3/4 at 25G*. For 10G operation FEC is not required.



SFP-10/25G-LR-S

The **SFP-10/25G-LR-S** module supports a link length of 10km on standard singlemode fiber (SMF) G.652 at both 10G and 25G. This module requires RS-FEC on the host ports for operation at 25G.



10GBASE-SR

The **10GBASE-SR** module supports a link length of 26m on standard Fiber Distributed Data Interface (FDDI) grade multimode fiber (MMF). Using 2000 MHz*km MMF (OM3), up to 300m link lengths are possible. Using 4700 MHz*km MMF (OM4), up to 400m link lengths are possible.



10GBASE-LR

The **10GBASE-LR** module supports a link length of 10km on standard G.652 singlemode fiber (SMF).

Cisco Resources:

Cisco Optics-to-Device Compatibility Matrix visit, <https://tmgmatrix.cisco.com/>.

Cisco Optics-Innovation for the 400G era and beyond, visit www.cisco.com/go/optics

Step 2:

Identify the enclosure system(s) that meet your application needs. Universal wired fiber cassettes provide optimal interoperability across fiber cabling systems.

For more information about universal wired fiber cassettes, see our [video](#).

HD Flex™ Fiber Enclosures

The HD Flex™ Fiber Cabling System is the highest density solution designed to set you free by removing the barriers of architecture, deployment, scalability and maintenance challenges.



- Provides up to 144 fibers (72 duplex ports) per RU of density
- Enclosures and panels are adaptable between 4, 6 and 12-port configurations
- Split tray feature allows each half of the tray to be pulled out independently

For more information about the HD Flex™ Fiber Cabling System, reference the system brochure ([FBCB46](#)) or visit panduit.com/hdflex.

QuickNet™ Patch Panels

Panduit QuickNet™ Patch Panels provide the flexibility to deployment both copper and fiber connectivity in the same RU.



- High-density patch panels conserve valuable rack space with 96 fibers (48 duplex ports) per RU
- Available in flat or angled patch panels to facilitate proper bend radius control and minimize the need for horizontal cable managers

For more information about the QuickNet™ Fiber Cabling System, reference the QuickNet™ Data Center Application Guide ([FBAG01](#)).

Opticom™ Fiber Enclosures

Opticom™ Fiber Enclosures accept pre-terminated, splice-on, and field terminated fiber connectivity.



- Slide-out, tilt-down drawer provides up to 96 LC fibers per RU
- Integral bend radius control and cable management for fiber optic patch cords

For more information about the Opticom™ Fiber Enclosures, reference the spec sheet ([RKSP39](#)).

PanMPO™ Fiber Connector

The PanMPO™ Fiber Connector is a unique, patented MPO design that specifically addresses today's needs for fast and efficient Ethernet and Fibre Channel migration to help maximize return on cabling infrastructure investment and minimize downtime. Protect your investments today; minimizing installed cost of high-speed data center engineered links securing your position as a next-generation data center prepared to face future demands.

- Easy migration from serial duplex (SR/SR/BiDi) to parallel (SR4.x) while maintaining compliance with cabling standards (TIA and ISO/IEC)
- Connector cleaning – the pin retraction feature allows for complete cleaning of the MPO surface
- Link certification – the gender changing ability of PanMPO™ on test leads allows for multiple test scenarios without the need for multiple test lead styles (which increase test variability)
- Mistake proofing – PanMPO™ Patch Cords can be reconfigured for gender and polarity in the field

For more information on the PanMPO™ Fiber Connector, visit panduit.com/panmipo.

Signature Core™ Fiber Optic Cabling System

Signature Core™ OM4+ Fiber Optic Cabling Systems extend the reach of standards-based Ethernet, BiDi, and Shortwave Wavelength Division Multiplexing (SWDM). Both are fully compliant and interoperable with standards based OM3, OM4 and OM5 solutions.

- Signature Core™ OM4+ Cabling extends reach on average by 20% compared to standard OM4
- Signature Core™ Fiber Media solutions allow for design flexibility (more connectors in the channel)

For more information on the Signature Core™ Fiber Optic Cabling System, visit panduit.com/signaturecore.

Step 3:

Select the components to build out your end-to-end fiber connectivity channel.

Note: Tables 1 and 3 utilize breakout cassettes, Tables 2 and 4 utilize breakout harness cabling.

Table 1: Multimode Fiber (MMF) PanMPO™ – 12 to 4xLC Duplex with Breakout Cassettes

Interconnects	Fiber Adapter Panels	Enclosures	Trunk Cable	Enclosures	Cassettes	Patch Cords
MPO12 (Female/Female)  FZTR^7N7NYNF*	HD Flex  FHMP-6-BCG QuickNet  FQMAP66CG Opticom  FAPH0612CGMPO	Enclosures FLEX1U06 QAPP24BL FCE1U	PanMPO – OM4 Method B (Male/Female)  FYZT^78Y001F*	Enclosures FLEX1U06 QAPP24BL FCE1U	Cassettes FHC3ZO-08-10B FQ3ZO-08-10B FC3XN-16-10NMBN^^	Duplex LC  FZ2E^LNLNSNM*

*Interconnects, trunk cable and patch cords are available in a variety of lengths, feet or meters; select the part numbers for additional information.

^Interconnects, trunk cable and patch cords are available in P= OFNO (Plenum), R = ONFR (Riser), L = LSZH or B = Euroclass B2ca.

^^Cassettes offers 2-MPO12 inputs to 8 –LC Duplex outputs.

Table 2: Multimode Fiber (MMF) PanMPO™ – 12 to 4xLC Duplex Breakout Harness Cabling

Interconnects	Fiber Adapter Panels	Enclosures	Trunk Cable	Enclosures	Fiber Adapter Panels	Harnesses
PanMPO – OM4 Method B (Female/Female)  FZTR^7N7NYNF*	HD Flex 		PanMPO – OM4 Method B (Male/Male)  FZTY^88Y001F*	HD Flex 		Duplex LC  FZ8R^7NQSVNF*
	FHMP-6-BCG	FLEX1U06		FLEX1U06	FHMP-6-BCG	
	QuickNet 			QuickNet 		
	FQMAP66CG	QAPP24BL		QAPP24BL	FQMAP66CG	
	Opticom 			Opticom 		
	FAPH0612CGMPO	FCE1U		FCE1U	FAPH0612CGMPO	

*Interconnects, trunk cables and harnesses are available in a variety of lengths, feet or meters; select the part numbers for additional information.

^Interconnects, trunk cables and harnesses are available in P= OFNO (Plenum), R = ONFR (Riser), L = LSZH or B = Euroclass B2ca.



Step 3: (continued)

Select the components to build out your end-to-end fiber connectivity channel.

Table 3: Singlemode Fiber (SMF) PanMPO™ – 12 to 4xLC Duplex with Breakout Cassettes

Interconnects	Fiber Adapter Panels	Enclosures	Trunk Cable	Enclosures	Cassettes	Patch Cords
PanMPO – OM4 Method B (Female/Female)  F9TR^7N7NANF*	HD Flex 		PanMPO – OS2 Method B (Male/Female)  F8TY^78A001F*	HD Flex 		Duplex LC  F92E^LNLNSNM*
	FHMP-6-ABL FLEX1U06			FLEX1U06 FHC39N-08-10A		
	QuickNet 			QuickNet 		
	FQMAP65BL QAPP24BL			QAPP24BL FQ39N-08-10A		
	Opticom 			Opticom 		
	FAPH0612BLMPO FCE1U			FCE1U FC39N-16-10NMAN^^		

*Interconnects, trunk cable and patch cords are available in a variety of lengths, feet or meters; select the part numbers for additional information.

^Interconnects, trunk cable and patch cords are available in P= OFNO (Plenum), R = ONFR (Riser), L = LSZH or B = Euroclass B2ca.

^^Cassettes offers 2-MPO12 inputs to 8 –LC Duplex outputs.

Table 4: Singlemode Fiber (SMF) PanMPO™ – 12 to 4xLC Duplex Breakout Harness Cabling

Interconnects	Fiber Adapter Panels	Enclosures	Trunk Cable	Enclosures	Fiber Adapter Panels	Harnesses
PanMPO – OS2 Method A (Female/Female)  F9TR^7N7NANF*	HD Flex 		PanMPO – OS2 Method A (Male/Female)  F9TY^78A001F*	HD Flex 		Duplex LC  F98R^5NQSQNF*
	FHMP-6-ABL FLEX1U06			FLEX1U06 FHMP-6-ABL		
	QuickNet 			QuickNet 		
	FQMAP65BL QAPP24BL			QAPP24BL FQMAP65BL		
	Opticom 			Opticom 		
	FAPH0612BLMPO FCE1U			FCE1U FAPH0612BLMPO		

*Interconnects, trunk cables and harnesses are available in a variety of lengths, feet or meters; select the part numbers for additional information.

^Interconnects, trunk cables and harnesses are available in P= OFNO (Plenum), R = ONFR (Riser), L = LSZH or B = Euroclass B2ca.



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Cisco Optics-to-Device Compatibility Matrix visit, <https://tmgmatrix.cisco.com/>

Cisco Optics-Innovation for the 400G era and beyond, visit www.cisco.com/go/optics