

CABLING GUIDE

High Speed Parallel Optics Cabling Applications

V1.0

TABLE OF CONTENTS



High Speed Parallel Optics	3
Transceiver MPO Interfaces	3
Direct Connect Scenarios.....	4
Breakout Cabling.....	7
Breakout Cassette	13
MPO to MPO Cable Multi-mode Fiber	20
MPO to MPO Cable Single-mode Fiber	21
MPO to MPO Breakout Cables OM4 Multi-mode Fiber	22
MPO to LC Breakout Cables.....	23
LC Patch Cables	24
Breakout Cassettes.....	25
1U 4-Bay Chassis.....	26

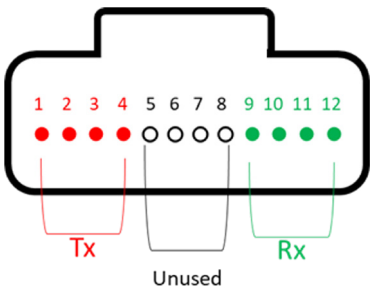
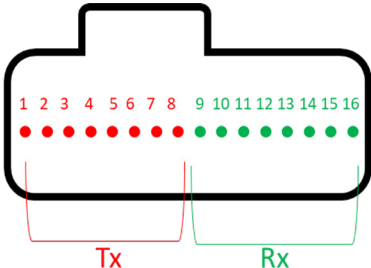
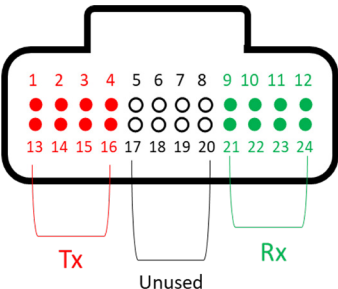
High Speed Parallel Optics

Many modern fiber networks aggregate multiple lower data-rate local signals (10G, 25G, etc.) to a consolidated high-speed 40G, 100G, 200G, or 400G network element port for transport from site-to-site.

These high speed 40G, 100G, 200G, & 400G transceivers can be either directly connected or broken out to utilize multiple parallel optical lanes and wavelengths on multiple fibers to achieve their increased throughput via MPO connectors.

While it's important to understand that MPO-type connections require an understanding of polarity and connectivity options for successful deployment, the throughput, bandwidth, and stability benefits offered are highly desired by network operators.

Transceiver MPO Interfaces

MPO-12	MPO-16	MPO-24
		
4 lane interfaces use 4 fiber pairs for Transmit and Receive. Multi-mode and Single-mode options 40G, 100G, 200G, and 400G transceivers.	Uses 8 fiber pairs for Transmit and Receive. Multi-mode, 400G transceivers.	Uses 8 fiber pairs for Transmit and Receive. Multi-mode, 200G transceivers.
Transceivers		
QSFP+ SR4 QSFP+ PSM4 QSFP28 SR4 QSFP28 PLR4 QSFP56 SR4 QSFP-DD SR4.2 QSFP-DD / OSFP DR4 QSFP-DD DR4+ QSFP-DD PLR4 (DR4++)	QSFP-DD SR8	QSFP28-DD 2xSR4

Direct Connect Scenarios

MPO-12 Transceivers

Direct connecting two MPO-12 transceivers requires considerations for transceiver polarity. To ensure the proper pairing of the transmit and receive, Type B (also called cross-over or Method B) polarity patch cables are required for direct connecting transceivers.

Multi-mode fiber transceivers

Type B Patch Cable P/N

C-MPOMPO-xxM5OM4
C-MPOMPO-xxM5OM5*

See page 20 for standard length part numbers.



Transceiver Side A

QSFP-40G-SR4
QSFP-40G-ESR4
QSFP-100G-SR4
QSFP-100G-ESR4
QSFP56-200G-SR4
QSFPDD-400G-SR4.2*

Transceiver Side B

QSFP-40G-SR4
QSFP-40G-ESR4
QSFP-100G-SR4
QSFP-100G-ESR4
QSFP56-200G-SR4
QSFPDD-400G-SR4.2*



*OM5 Recommended

Direct Connect Scenarios

MPO-12 Transceivers

Direct connecting two MPO-12 transceivers requires considerations for transceiver polarity. To ensure the proper pairing of the transmit and receive, Type B (also called cross-over or Method B) polarity patch cables are required for direct connecting transceivers.

Single-mode Fiber Transceivers

Type B Patch Cable P/N

C-MPOMPO-xxM9SMF

See page 21 for standard length part numbers.



Transceiver Side A
QSFP-40G-PSM4-IR4
QSFP-40G-PLR4
QSFP-100G-PLR4
QSFP56-200G-DR4
QSFP-DD-400G-DR4
QSFP-DD-400G-DR4+ (4x100G FR)
QSFP-DD-400G-PLR4 (DR4++)

Transceiver Side B
QSFP-40G-PSM4-IR4
QSFP-40G-PLR4
QSFP-100G-PLR4
QSFP56-200G-DR4
QSFP-DD-400G-DR4
QSFP-DD-400G-DR4+ (4x100G FR)
QSFP-DD-400G-PLR4 (DR4++)



Direct Connect Scenarios

MPO-16 Transceivers

Direct connecting two MPO-16 transceivers requires considerations for transceiver polarity. To ensure the proper pairing of the transmit and receive, Type B (also called cross-over or Method B) polarity patch cables are required for direct connecting transceivers.

Multi-mode fiber transceivers

Type B Patch Cable P/N

C-16FMPOMPO-xxM5OM4

See page 20 for standard length part numbers.

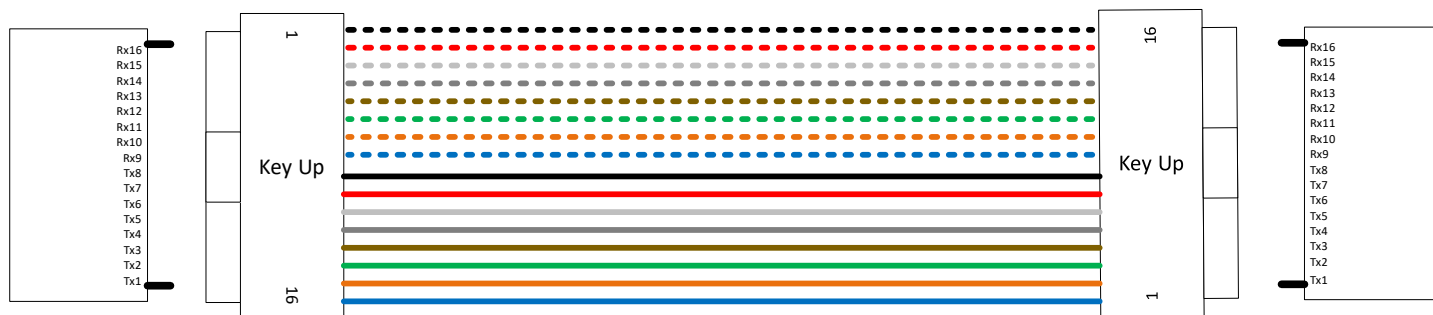


Transceiver Side A

QSFPDD-400G-SR8

Transceiver Side B

QSFPDD-400G-SR8



Breakout Cabling

MPO-12 Transceivers

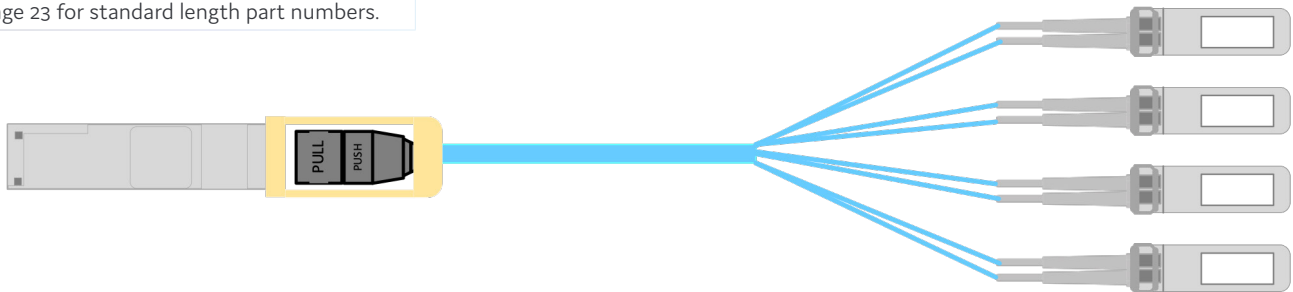
Aggregating lower data-rate transceivers to high-speed transceivers with breakout cabling is straight forward. The multiple fibers from an MPO connector are broken out to individual transmit and receive LC pairs. These scenarios are ideal for top of rack applications or end of row applications.

Multi-mode fiber

Breakout Cable P/N

C-MPO-4LCxxM5OM4
C-MPO-4LCxxM5OM5*

See page 23 for standard length part numbers.



Transceiver Side A

QSFP-40G-SR4
QSFP-40G-ESR4
QSFP28-100G-SR4
QSFP28-100G-ESR4
QSFP56-200G-SR4
QSFPDD-400G-SR4.2*

Transceiver Side B (x4)

SFP-10G-SR
SFP-10G-SR
SFP28-25G-SR
SFP28-25G-SR
SFP56-50G-SR
QSFP28-100G-SR1.2*



*OM5 Recommended

Breakout Cabling

MPO-12 Transceivers

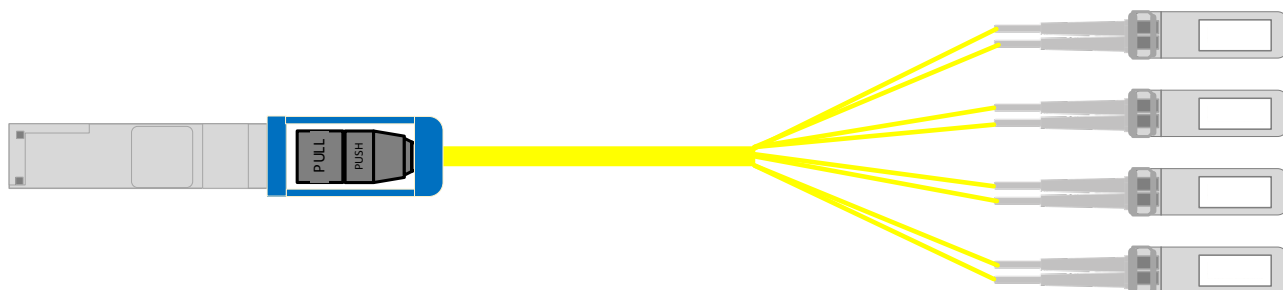
Aggregating lower data-rate transceivers to high-speed transceivers with breakout cabling is straight forward. The multiple fibers from an MPO connector are broken out to individual Tx/Rx LC pairs. These scenarios are ideal for top of rack applications or end of row applications.

Single-mode fiber

Breakout Cable P/N

C-MPO-4LCxxM9SMF

See page 23 for standard length part numbers.

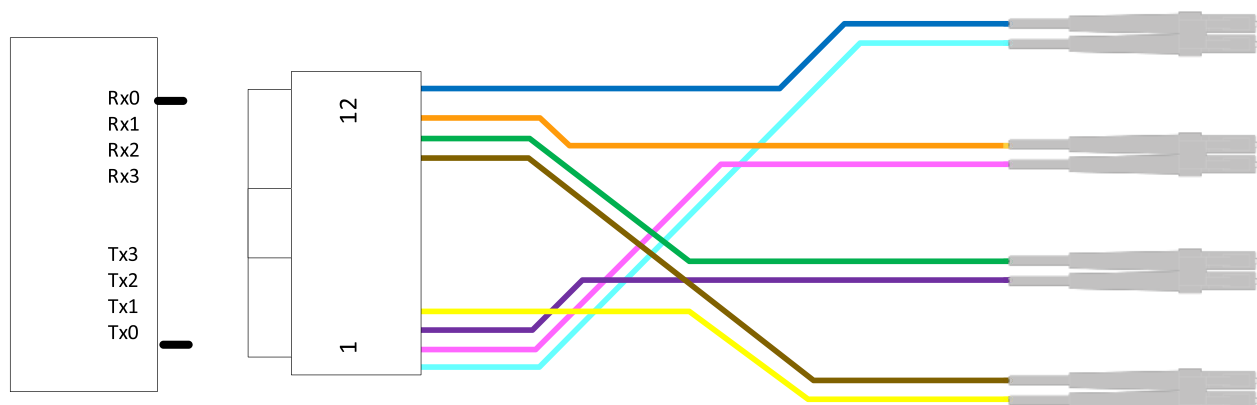


Transceiver Side A

QSFP-40G-PSM4-IR4
 QSFP-40G-PLR4
 QSFP-100G-PLR4
 QSFP56-200G-DR4
 QSFP-DD-400G-DR4
 QSFP-DD-400G-DR4+ (4x100G FR)
 QSFP-DD-400G-PLR4 (DR4++)

Transceiver Side B (x4)

SFP-10G-LR
 SFP-10G-LR
 SFP28-25G-LR
 SFP56-50G-DR
 QSFP28-100G-DR
 QSFP28-100G-FR
 QSFP28-100Go-LR



Breakout Cabling

MPO-16 Transceivers

Aggregating lower data-rate transceivers to high-speed transceivers with breakout cabling is straight forward. The multiple fibers from an MPO connector are broken out to individual Tx/Rx LC pairs. These scenarios are ideal for top of rack applications or end of row applications.

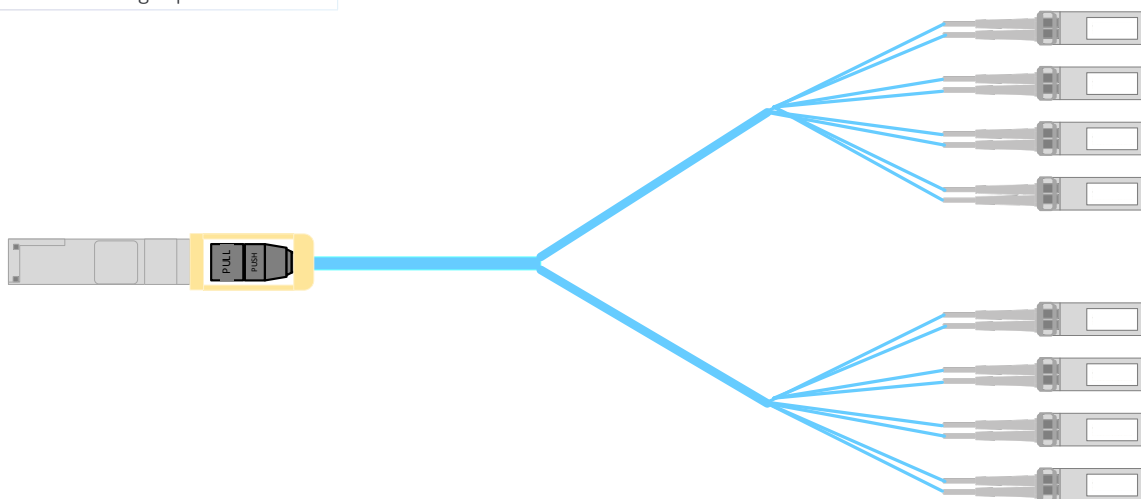
MPO-16 SR8 PAM4 400G MPO interfaces offer breakout options to 50G, 100G, and 200G transceivers.

8x50G Application

MPO-16 Breakout Cable P/N

C-16FMPO-8LCDxxM5OM4

See page 23 for standard length part numbers.

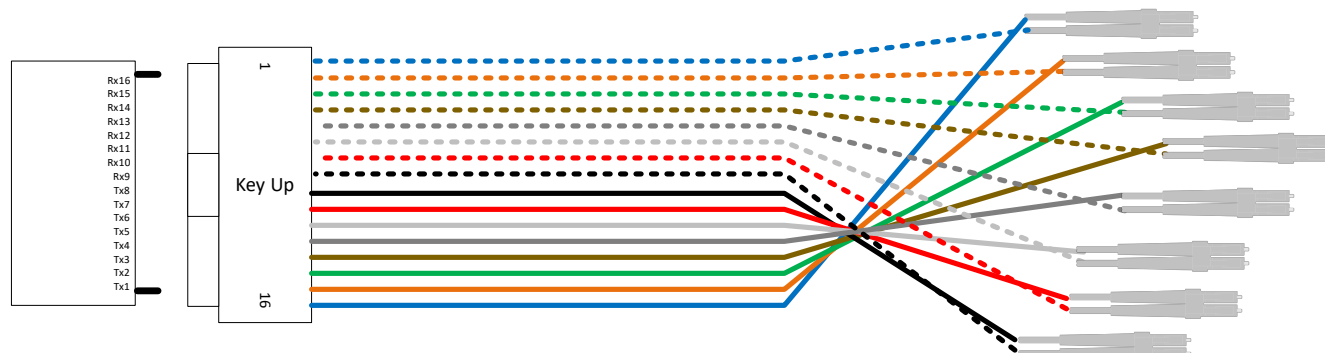


Transceiver Side A

QSFPDD-400G-SR8

Transceiver Side B (x8)

SFP56-50G-SR
QSFP28-50G-SR



Breakout Cabling

MPO-16 Transceivers

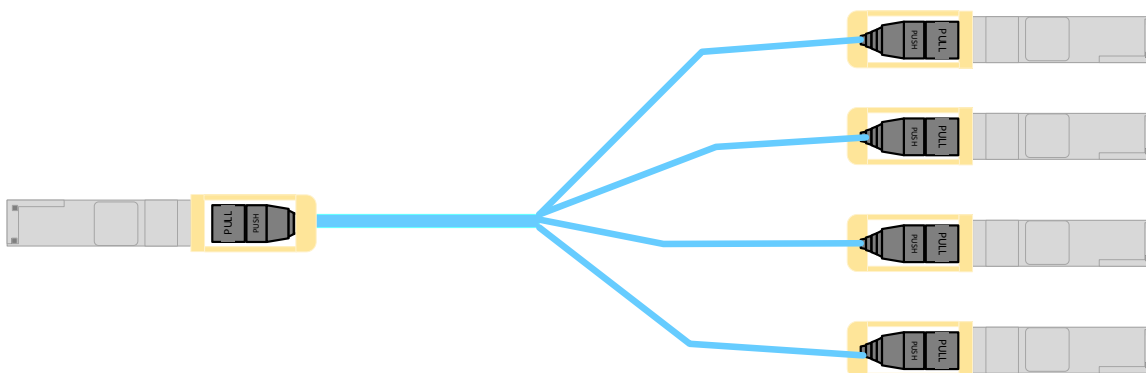
MPO-16 SR8 PAM4 400G MPO interfaces offer breakout options to 50G, 100G, and 200G transceivers.

4x100G Application

MPO-16 Breakout Cable P/N

C-16FMPO-4MPOxxM5OM4

See page 22 for standard length part numbers.

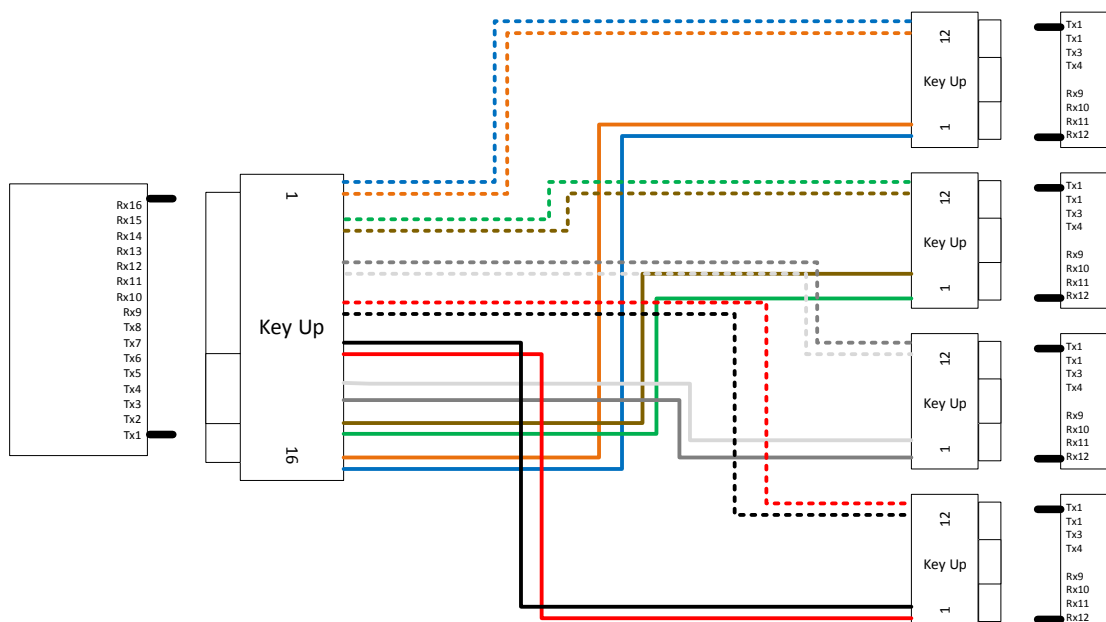


Transceiver Side A

QSFPDD-400G-SR8

Transceiver Side B (x4)

QSFP28-100G-SR2



Breakout Cabling

MPO-16 Transceivers

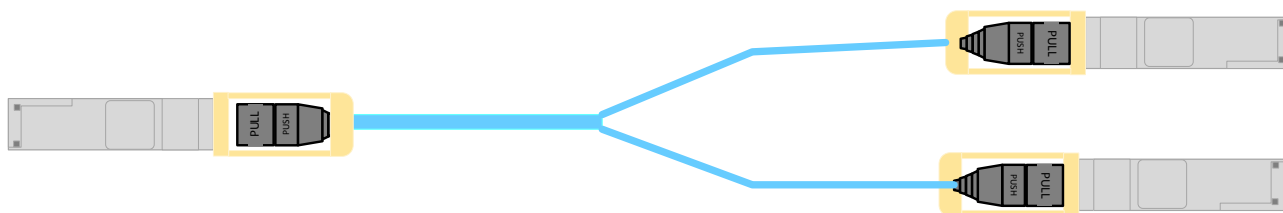
MPO-16 SR8 PAM4 400G MPO interfaces offer breakout options to 50G, 100G, and 200G transceivers.

2x200G Application

MPO-16 Breakout Cable P/N

C-16FMPO-2MPOxxM5OM4

See page 22 for standard length part numbers.

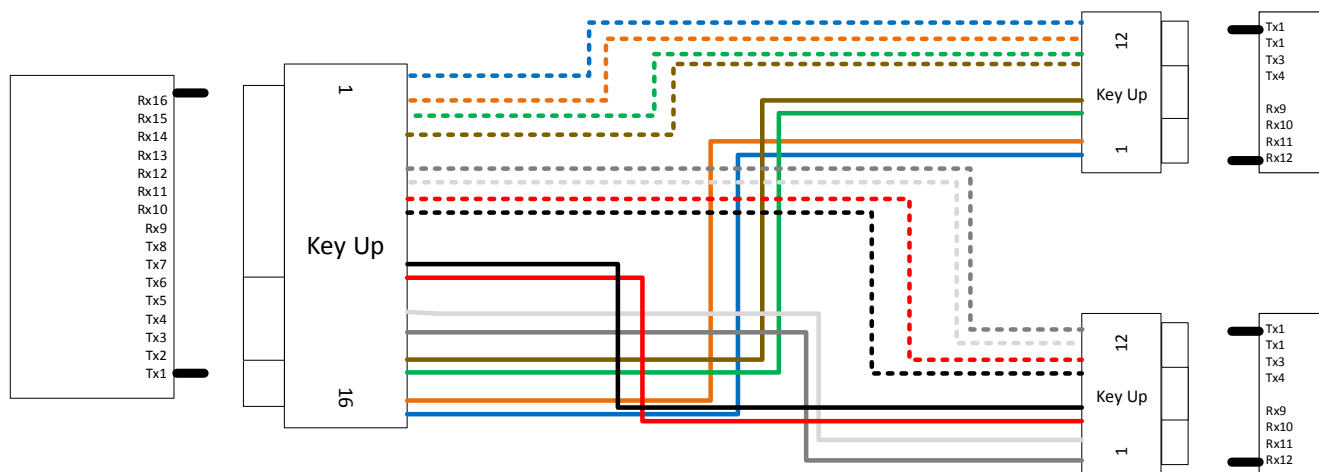


Transceiver Side A

QSFPDD-400G-SR8

Transceiver Side B (x4)

QSFP56-200G-SR4



Breakout Cabling

MPO-24 Transceivers

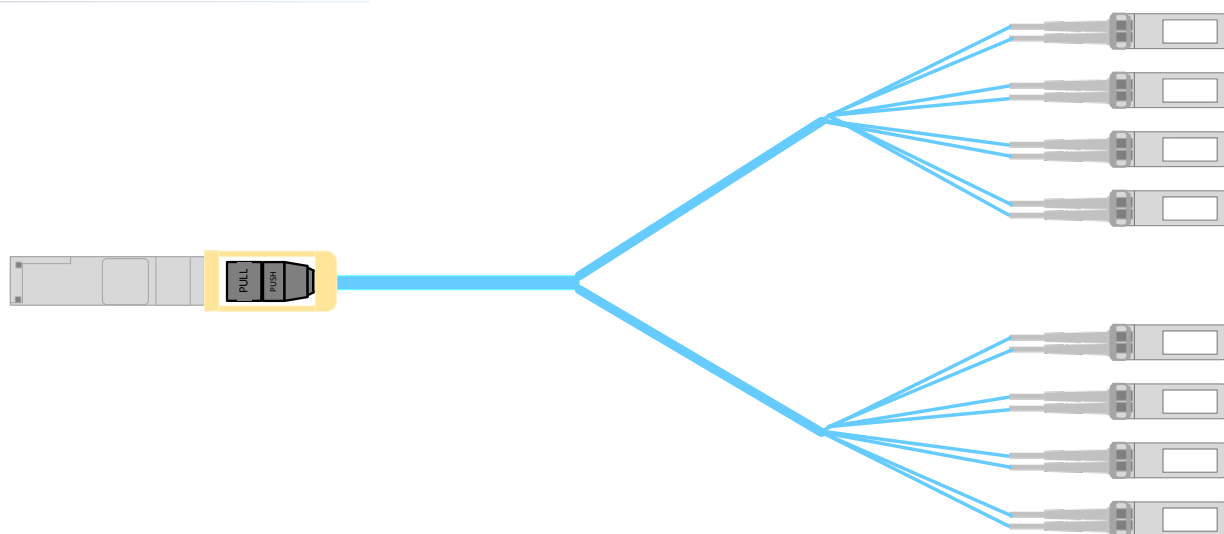
MPO-24 2x100G SR4 MPO-24 interfaces offer breakout options to 25G interfaces.

8x25G Application

MPO-16 Breakout Cable P/N

C-24FMPO-8LCDxxMOM4

See page 22 for standard length part numbers.

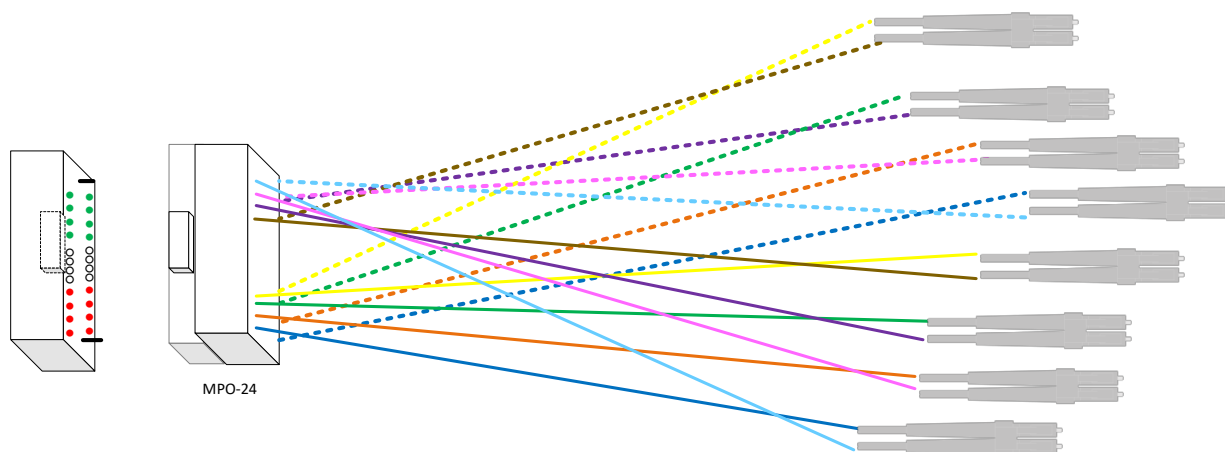


Transceiver Side A

QSFP28-DD-200G-SR8

Transceiver Side B (x2)

SFP28-25G-SR



Breakout Cassette

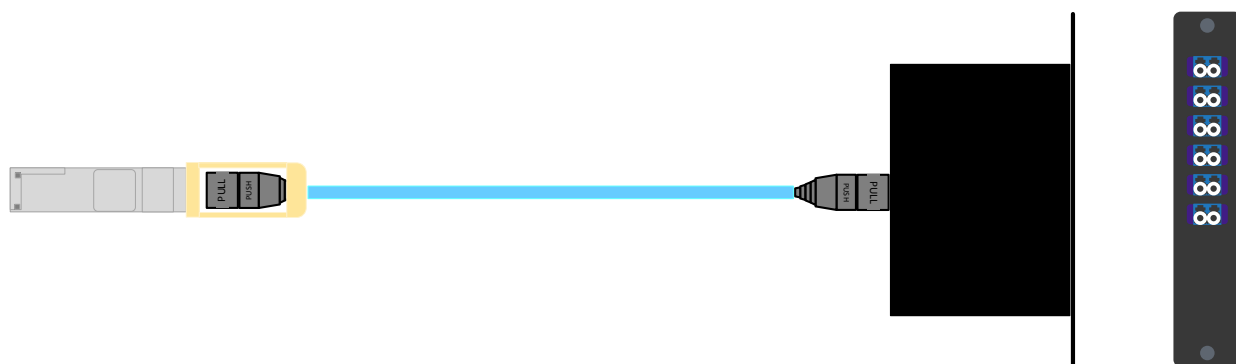
MPO-12 Transceivers

MPO Breakout Cassettes offer more flexibility than direct connect scenarios. Breakout cassettes present transmit and receive fibers as pairs on the front of the cassette. Connections can be routed to lower speed transceivers.

Multi-mode fiber

MPO Type B Cable P/N

C-MPOMPO-xxMOM4

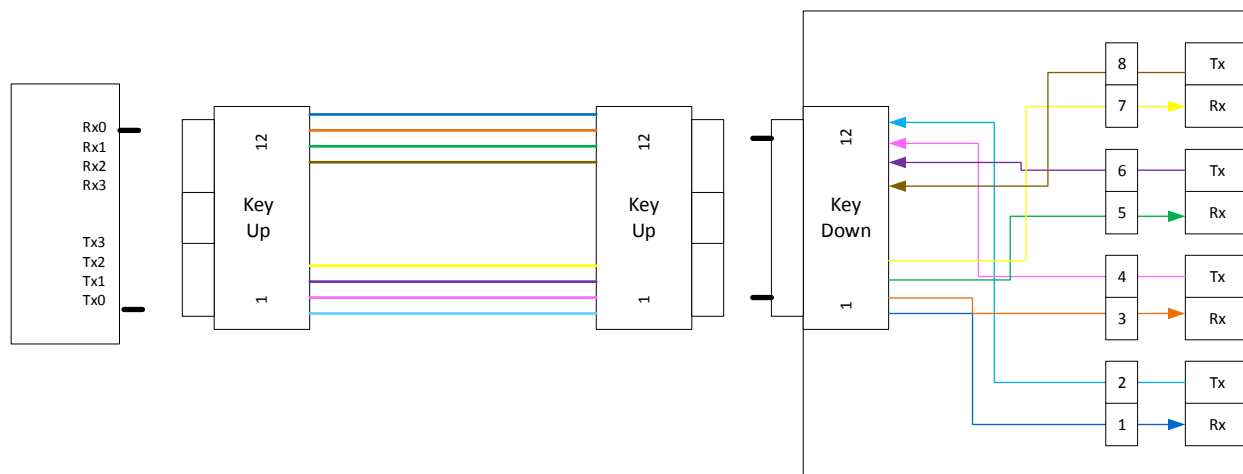


Transceiver Side A

QSFP-40G-SR4
QSFP-40G-ESR4
QSFP28-100G-SR4
QSFP28-100G-ESR4
QSFP56-200G-SR4
QSFPDD-400G-SR4.2

Single MPO Breakout Cassette

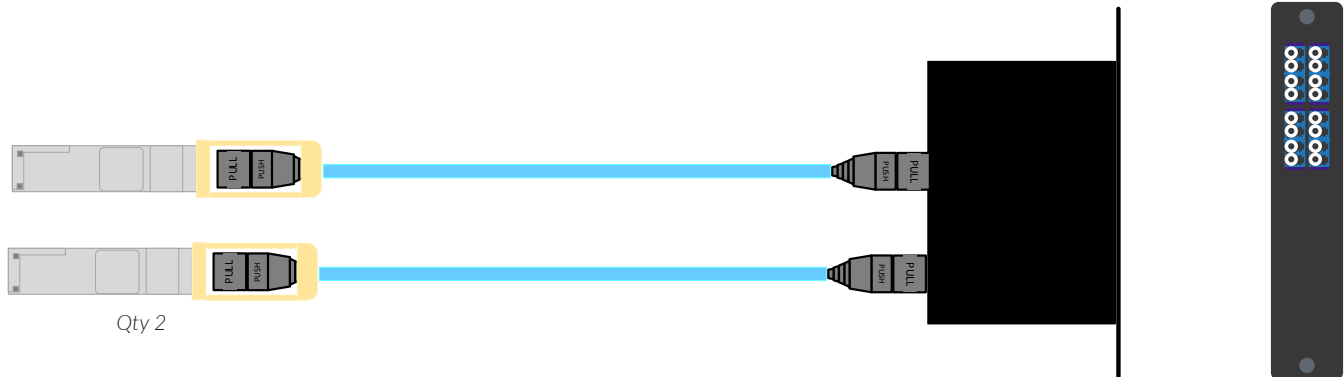
C-4BAYC1MP4LCDM3
C-4BAYC1MP4LCDM4



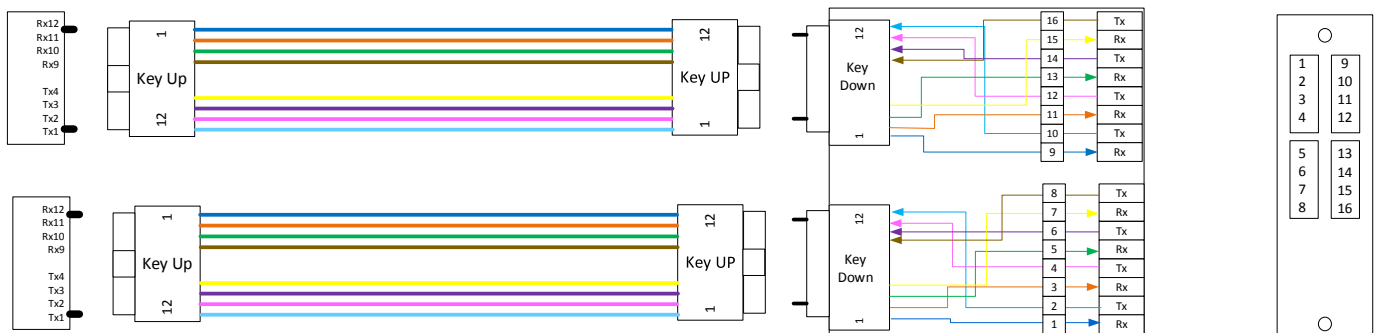
MPO-12 Transceivers

Multi-mode fiber

See page 20 for standard length part numbers.



C-4BAYC2MP8LCMDM4



Breakout Cassette

MPO-12 Transceivers

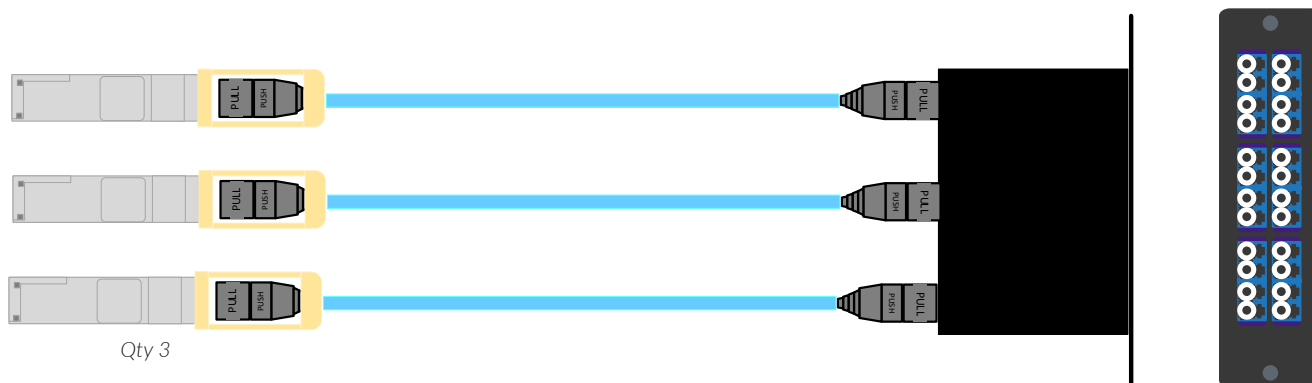
MPO Breakout Cassettes offer more flexibility than direct connect scenarios. Breakout cassettes present transmit and receive fibers as pairs on the front of the cassette. Connections can be routed to lower speed transceivers.

Multi-mode fiber

MPO Type B Cable P/N

C-MPOMPO-xxM5OM4

See page 20 for standard length part numbers.

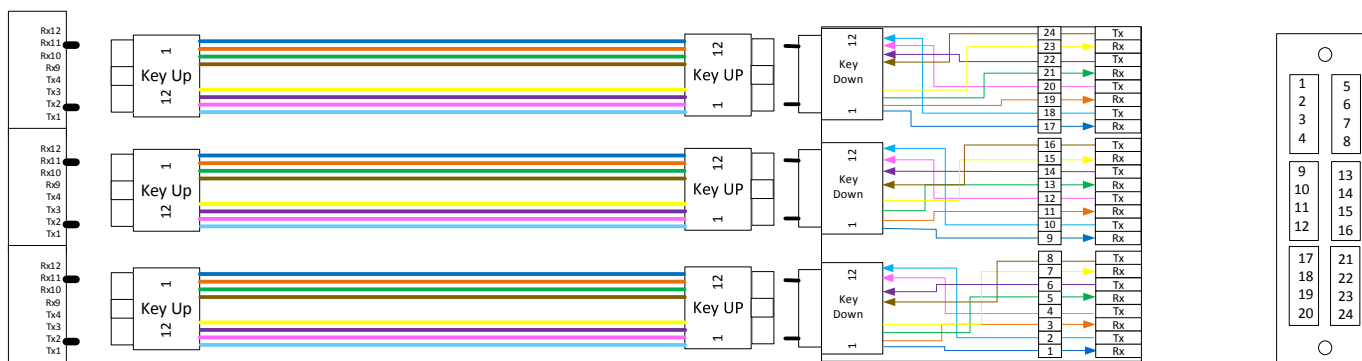


Transceiver Side A

QSFP-40G-SR4
QSFP-40G-ESR4
QSFP28-100G-SR4
QSFP28-100G-ESR4
QSFP56-200G-SR4
QSFPDD-400G-SR4.2*

Triple MPO Breakout Cassette

C-4BAYC3MP12LCDM4



*OM5 Recommended

Breakout Cassette

MPO-24 Transceivers

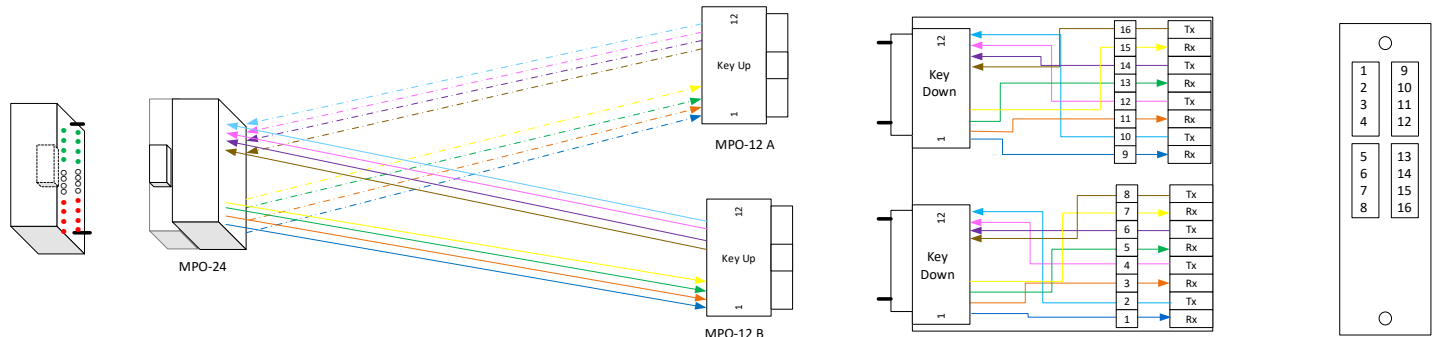
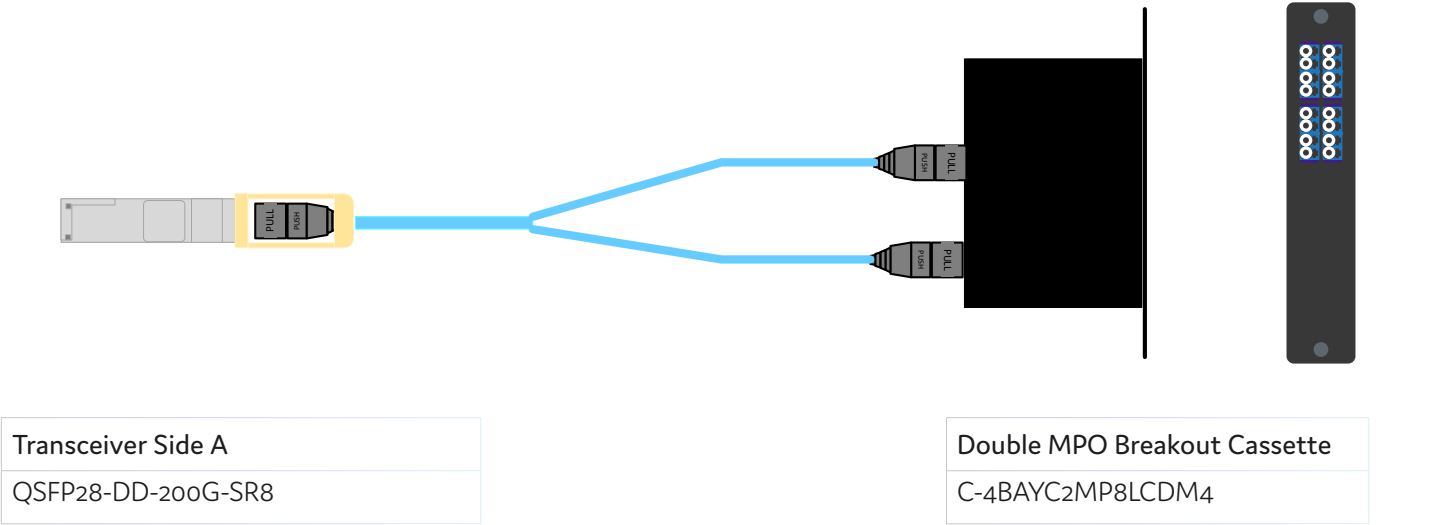
MPO Breakout Cassettes offer more flexibility than direct connect scenarios. Breakout cassettes present transmit and receive fibers as pairs on the front of the cassette. Connections can be routed to lower speed transceivers.

Multi-mode fiber

MPO-16 Breakout Cable P/N

C-24FMPO-2MPOxxM5OM4

See page 22 for standard length part numbers.



Breakout Cassette

MPO-12 Transceivers

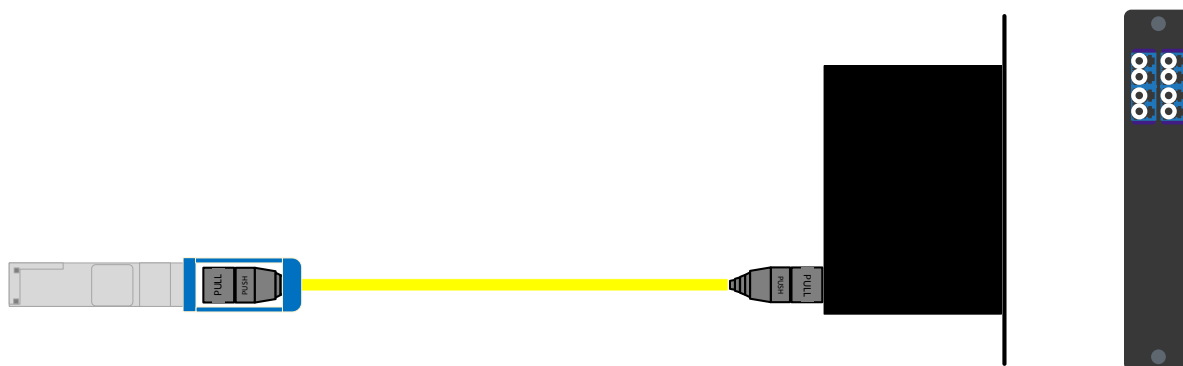
MPO Breakout Cassettes offer more flexibility than direct connect scenarios. Breakout cassettes present transmit and receive fibers as pairs on the front of the cassette. Connections can be routed to lower speed transceivers.

Single-mode fiber

MPO Type B Cable P/N

C-MPOMPO-xxM9SMF

See page 21 for standard length part numbers.

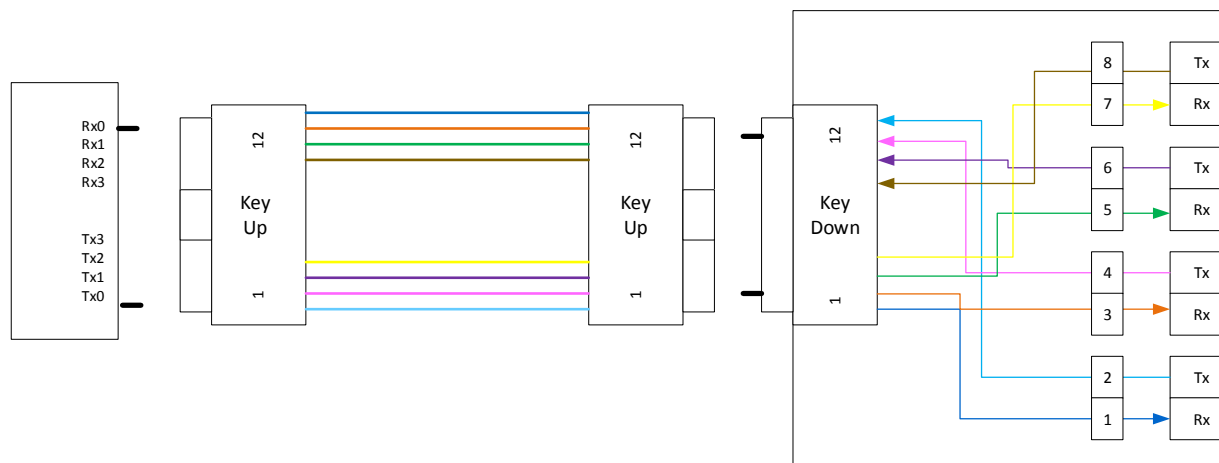


Transceiver Side A

QSFP-40G-PSM4-IR4
 QSFP-40G-PLR4
 QSFP-100G-PLR4
 QSFP56-200G-DR4
 QSFP-DD-400G-DR4
 QSFP-DD-400G-DR4+ (4x100G FR)
 QSFP-DD-400G-PLR4 (DR4++)

Single MPO Breakout Cassette

C-4BAYC1MP4LCD9SMF



Breakout Cassette

MPO-12 Transceivers

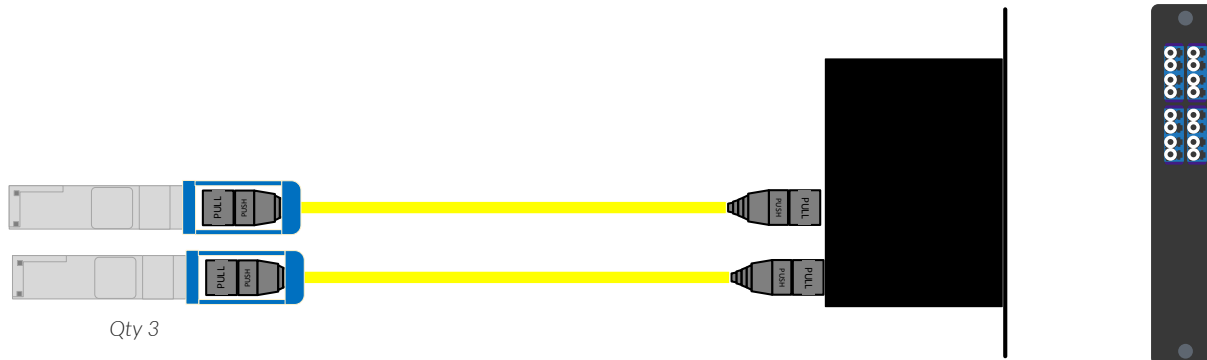
MPO Breakout Cassettes offer more flexibility than direct connect scenarios. Breakout cassettes present transmit and receive fibers as pairs on the front of the cassette. Connections can be routed to lower speed transceivers.

Single-mode fiber

MPO Type B Cable P/N

C-MPOMPO-xxM9SMF

See page 21 for standard length part numbers.

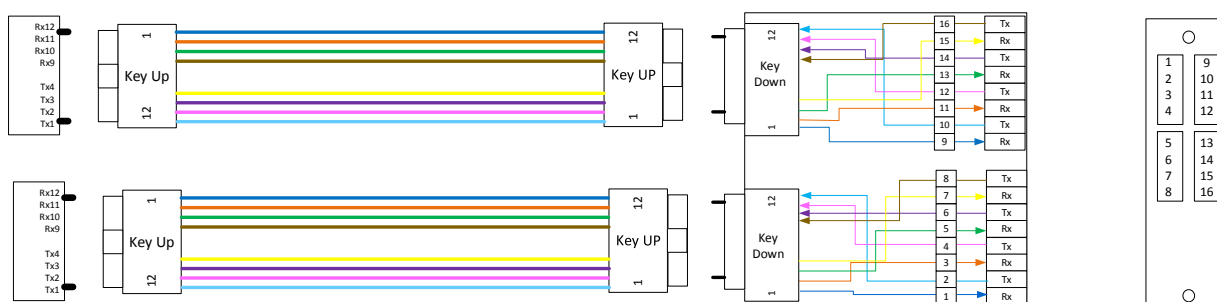


Transceiver Side A

QSFP-40G-PSM4-IR4
 QSFP-40G-PLR4
 QSFP-100G-PLR4
 QSFP56-200G-DR4
 QSFP-DD-400G-DR4
 QSFP-DD-400G-DR4+ (4x100G FR)
 QSFP-DD-400G-PLR4 (DR4++)

Double MPO Cassette

C-4BAYC2MP8LCD9SMF



Breakout Cassette

MPO-12 Transceivers

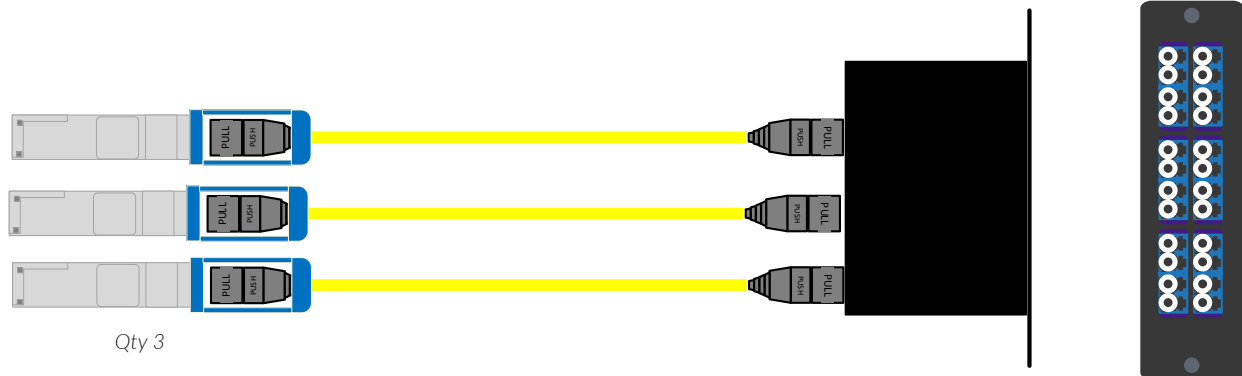
MPO Breakout Cassettes offer more flexibility than direct connect scenarios. Breakout cassettes present transmit and receive fibers as pairs on the front of the cassette. Connections can be routed to lower speed transceivers.

Single-mode fiber

MPO Type B Cable P/N

C-MPOMPO-xxM9SMF

See page 21 for standard length part numbers.

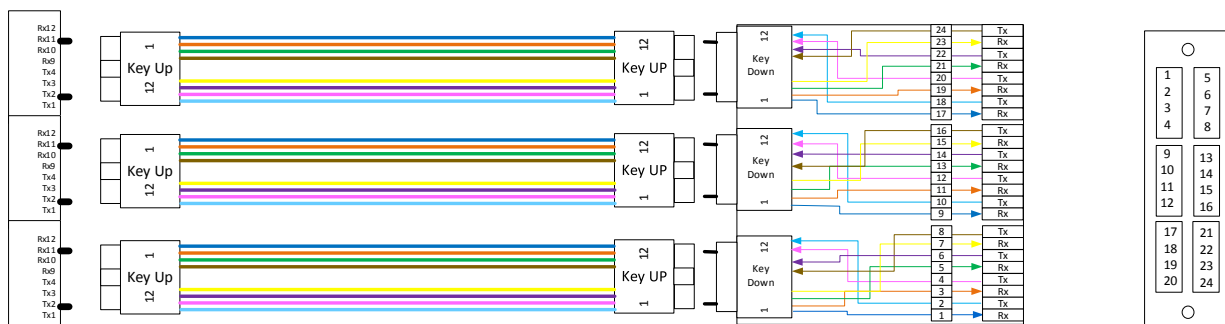


Transceiver Side A

QSFP-40G-PSM4-IR4
 QSFP-40G-PLR4
 QSFP-100G-PLR4
 QSFP56-200G-DR4
 QSFP-DD-400G-DR4
 QSFP-DD-400G-DR4+ (4x100G FR)
 QSFP-DD-400G-PLR4 (DR4++)

Triple MPO Breakout Cassette

C-4BAYC3MP12LCD9SMF



MPO to MPO Cable

Multi-mode Fiber



Specifications			
Connector A	MPO-12/16/24 Female	Connector B	MPO-12/16/24 Female
Fiber Mode	50/125µm OM4 / OM5	Jacket Color	Aqua / Lime Green
Polish Type	PC to PC	Jacket Material	OFNR, OFNP, LSZH
Insertion Loss	≤0.35dB	Fiber Glass	LOMM, WBMMF
Polarity	Method B	Wavelength	850/1300nm, 850/908nm
Return Loss	≥20dB	Operating Temperature	-10°C to +70°C
Cable diameter	3.0mm	Storage Temperature	-40°C to +85°C

Ordering Information

C - MPO - M

1 2 3 4

1. MPO 1 Type

Value	Description
MPO	MPO-12
16FMPO	MPO-16
24FMPO	MPO-24

2. Length*

Value	Description
1	1 Meter
2	2 Meters
3	3 Meters
4	4 Meters
5	5 Meters
6	6 Meters
7	7 Meters
8	8 Meters
9	9 Meters
10	10 Meters
15	15 Meters
20	20 Meters
25	25 Meters
30	30 Meters
35	35 Meters

3. Fiber Type

Value	Description
5OM4	OM4 LOMM
5OM5	OM5 WBMMF

4. Cable Jacket Rating

Value	Description
<blank>	OFNR Riser
P	OFNP Plenum
LZ	Low-Smoke Zero Halogen

*Other lengths available upon request

Ordering Information

1. Length*

2. Cable Jacket Rating

*Other lengths available upon request

MPO to MPO Breakout Cables

OM4 Multi-mode Fiber



Specifications			
Connector A	MPO-16/24 Female	Connector B	2x/4x MPO-12 Female
Fiber Mode	50/125µm OM4	Jacket Color	Aqua
Polish Type	PC to PC	Jacket Material	OFNR, OFNP, LSZH
Insertion Loss	≤0.35dB	Fiber Glass	LOMM
Polarity	Method B	Wavelength	850/1300nm
Return Loss	≥20dB	Operating Temperature	-10°C to +70°C
Cable diameter	3.0mm	Storage Temperature	-40°C to +85°C
Breakout Length	0.5m		

Ordering Information

C - - - M 5OM4

1 2 3 4

1. MPO 1 Type

Value	Description
16FMPO	MPO-16
24FMPO	MPO-24

2. MPO 2 Type

Value	Description
2MPO	2x MPO-12
4MPO	4x MPO-12

3. Length*

Value	Description
1	1 Meter
2	2 Meters
3	3 Meters
4	4 Meters
5	5 Meters
6	6 Meters
7	7 Meters
8	8 Meters
9	9 Meters
10	10 Meters
15	15 Meters
20	20 Meters
25	25 Meters
30	30 Meters
35	35 Meters

4. Cable Jacket Rating

Value	Description
<blank>	OFNR Riser
P	OFNP Plenum
LZ	Low-Smoke Zero Halogen

*Other lengths available upon request

MPO to LC Breakout Cables



Specifications

Connector A	MPO-12/16/24 Female	Connector B	LC
Fiber Mode	50/125µm OM4/OM5, 9/125µm SMF	Jacket Color	Aqua/Lime Green/Yellow
Polish Type	PC to UPC	Jacket Material	OFNR, OFNP, LSZH
Insertion Loss	MTP ≤0.35dB LC ≤0.2dB	Fiber Glass	LOMM, WBMMF, OS2
Return Loss	≥20dB OM4/OM5, ≥60dB SMF	Wavelength	850/1300nm, 850nm/908nm, 1310/1550nm
Cable diameter	3.0mm	Operating Temperature	-10°C to +70°C
Breakout Length	0.5m	Storage Temperature	-40°C to +85°C

Ordering Information

C - - - M

1 2 3 4 5

1. MPO Connector

Value	Description
MPO	MPO-12 Female
16FMPO	MPO-16 Female
24FMPO	MPO-24 Female

2. LC Connectors

Value	Description
4LC	4 Duplex LC
8LC	8 Duplex LC

3. Length*

Value	Description
1	1 Meter
2	2 Meters
3	3 Meters
4	4 Meters
5	5 Meters
6	6 Meters
7	7 Meters
8	8 Meters
9	9 Meters
10	10 Meters
15	15 Meters
20	20 Meters
25	25 Meters
30	30 Meters
35	35 Meters

4. Fiber Type

Value	Description
5OM4	50/125 LOMMF
5OM5	50/125 WBMMF
9SMF	OS2 SMF

5. Cable Type

Value	Description
<blank>	OFNR Riser
P	OFNP Plenum
LZ	Low-Smoke Zero Halogen

*Other lengths available upon request

LC Patch Cables



Specifications			
Connector A	Duplex LC	Connector B	Duplex LC
Fiber Mode	50/125µm OM4/OM5, 9/125µm SMF	Jacket Color	Aqua/Lime Green/Yellow
Polish Type	UPC	Jacket Material	OFNR, OFNP, LSZH
Insertion Loss	LC ≤0.2dB	Fiber Glass	LOMM, WBMMF, OS2
Return Loss	≥35dB OM4/OM5, ≥50dB SMF	Wavelength	850/1300nm, 850nm/908nm, 1310/1550nm
Cable diameter	2.0mm	Operating Temperature	-40°C to +70°C
Boot Length	50mm Std; 42mm Micro	Storage Temperature	-40°C to +85°C

Ordering Information

C - LC - LC - M

1 2 3 4

1. Boot Type

Value	Description
<blank>	Standard
MB	Microboot

2. Length*

Value	Description
1	1 Meter
2	2 Meters
3	3 Meters
4	4 Meters
5	5 Meters
6	6 Meters
7	7 Meters
8	8 Meters
9	9 Meters
10	10 Meters
15	15 Meters
20	20 Meters
25	25 Meters
30	30 Meters
35	35 Meters

3. Fiber Type

Value	Description
OM4	50/125 LOMMF
OM5	50/125 WBMMF
9SMF	OS2 SMF

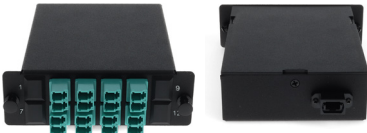
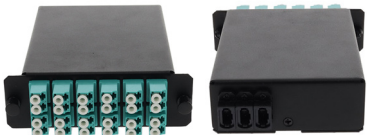
4. Cable Jacket Rating

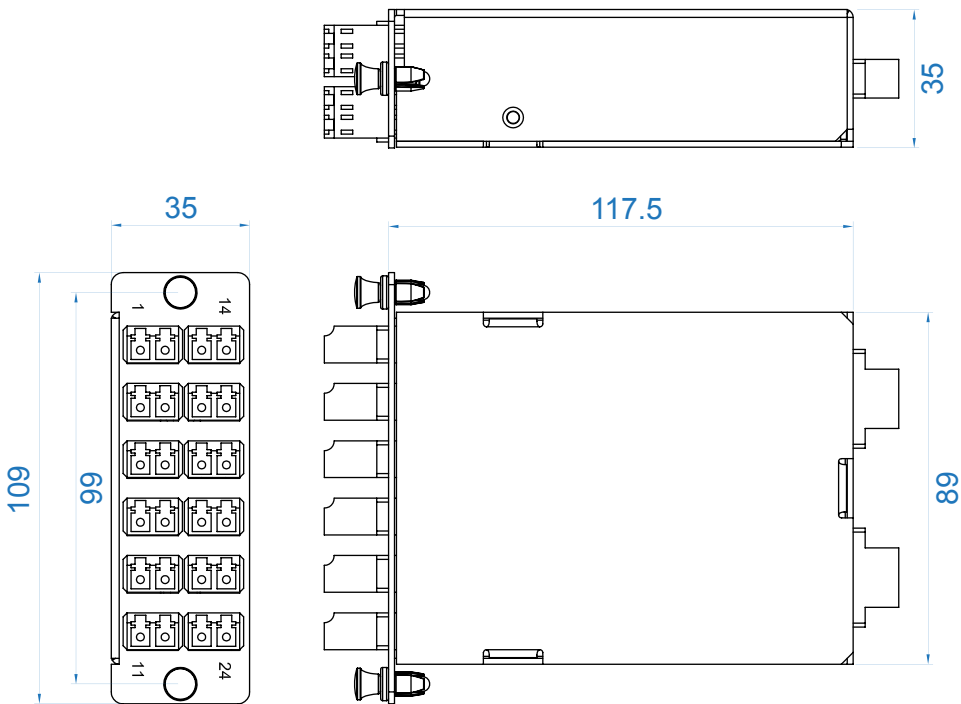
Value	Description
<blank>	OFNR Riser
P	OFNP Plenum
LZ	Low-Smoke Zero Halogen

*Other lengths available upon request



Breakout Cassettes

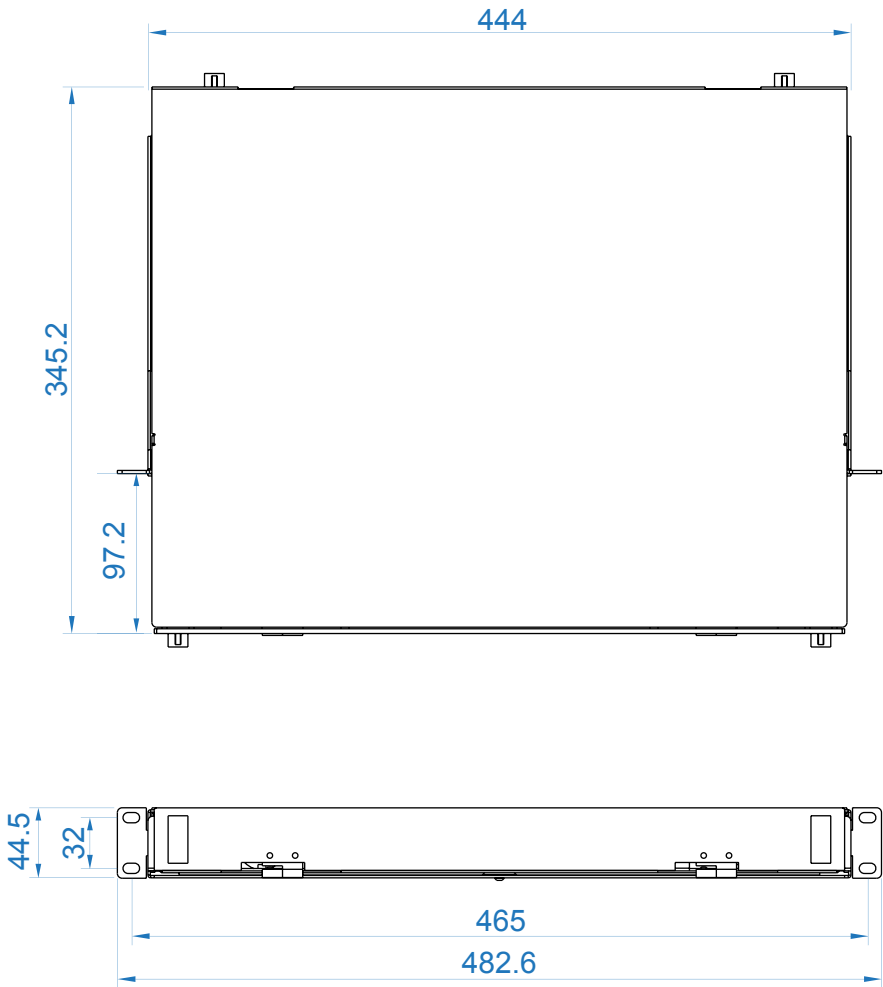
	4 Bay Patch Panel One MPO x 4 Duplex LC (8F) SMF OS2	C-4BAYC1MP4LCDS2 C-4BAYC2MP8LCDS2 C-4BAYC3MP12LCDS2
	8 Fiber Breakout Cassette One MPO x 4 Duplex LC 1U 4-Bay Chassis OM4 and SMF Options	C-4BAYC1MP4LCDM4 C-4BAYC1MP4LCDSMF
	16 Fiber Breakout Cassette Two MPO x 8 Duplex LC 1U 4-Bay Chassis OM4 and SMF Options	C-4BAYC2MP8LCDM4 C-4BAYC2MP8LCDSMF
	24 Fiber Breakout Cassette Three MPO x 12 Duplex LC 1U 4-Bay Chassis OM4 and SMF Options	C-4BAYC3MP12LCDM4 C-4BAYC3MP12LCDSMF



1U 4-Bay Chassis



1U Rackmount 19" W x 1.75" H x 13.6" D (482.6mm x 44.5mm x 345.2mm) Holds 4 Breakout Cassettes Slide-out drawer Rear cable ports	C-PPS-4BAY
---	------------



About ProLabs

North America
sales@prolabs.com
+1 952 852 0252

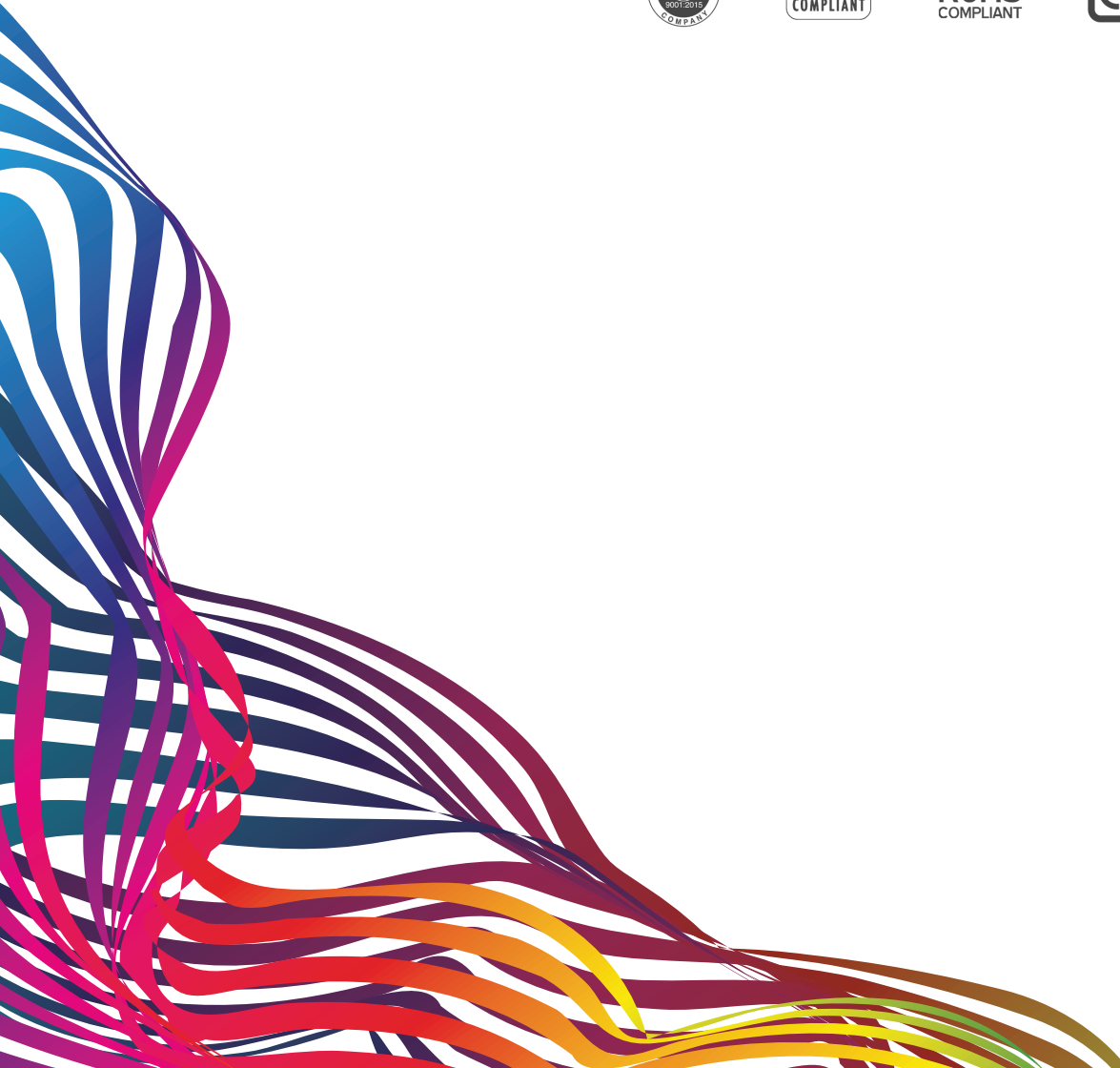
EMEA
salesemea@prolabs.com
+44 1285 719 600

For more information,
please visit
www.prolabs.com

ProLabs is a leading provider of optical networking solutions. For over two decades, we have delivered optical connectivity solutions that give our customers freedom, choice, and seamless interoperability. We serve a diverse range of industries including enterprise, government, and global service providers.

By championing higher standards for technology, service, and cost, ProLabs is changing the mindset of data centers and service providers the world over. We supply solutions that are 100% compatible in form and functionality across 100 OEM environments, covering more than and 20,000 systems and platforms.

At ProLabs we invest in people, R&D, equipment, and processes to ensure our optics are second to none. Our mission is to provide certified optical connectivity solutions across all networks. This means meeting MSA specifications, undergoing rigorous compliance measures to achieve TAA, RoHS, NEBS Level 3, and more.




ProLabs
Unlock your connectivity