



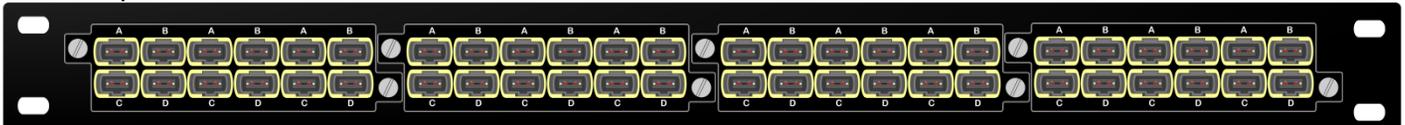
GARLAND

T E C H N O L O G Y

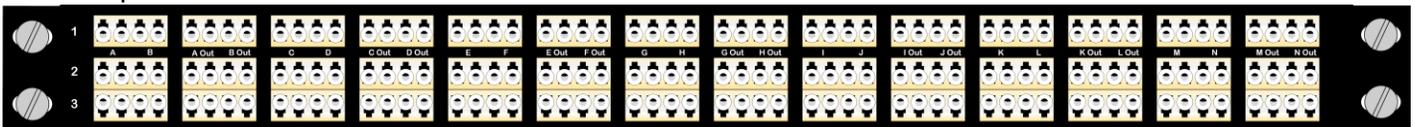
See every bit, byte, and packet[®]

Passive Fiber Installation Guide October 2015

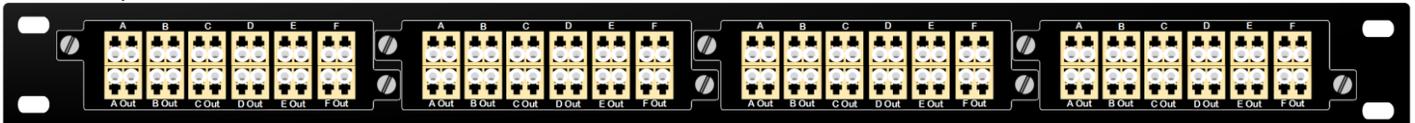
12 40Gbps Passive MPO TAPS



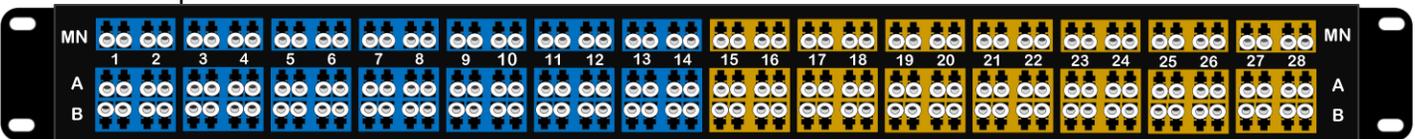
21 40Gbps BiDi Passive TAPS



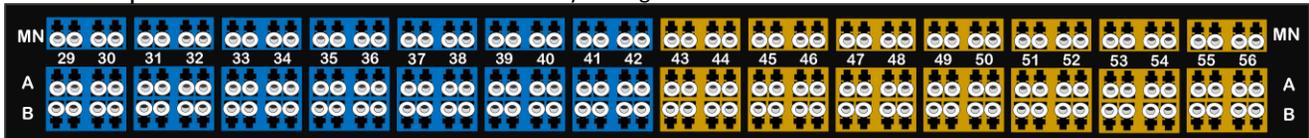
12 40Gbps BiDi Passive TAPS



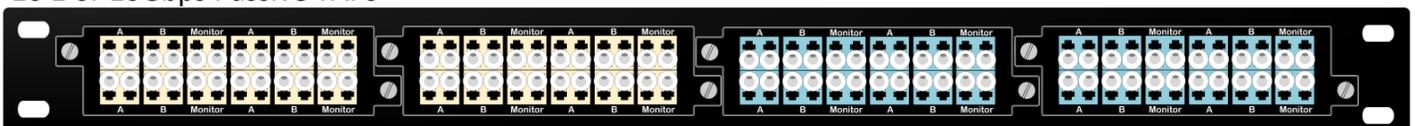
28 1 or 10Gbps Passive TAPS



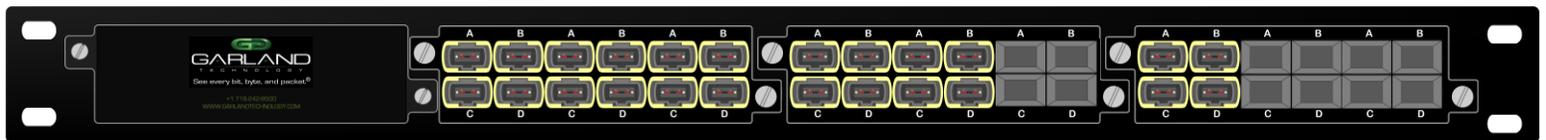
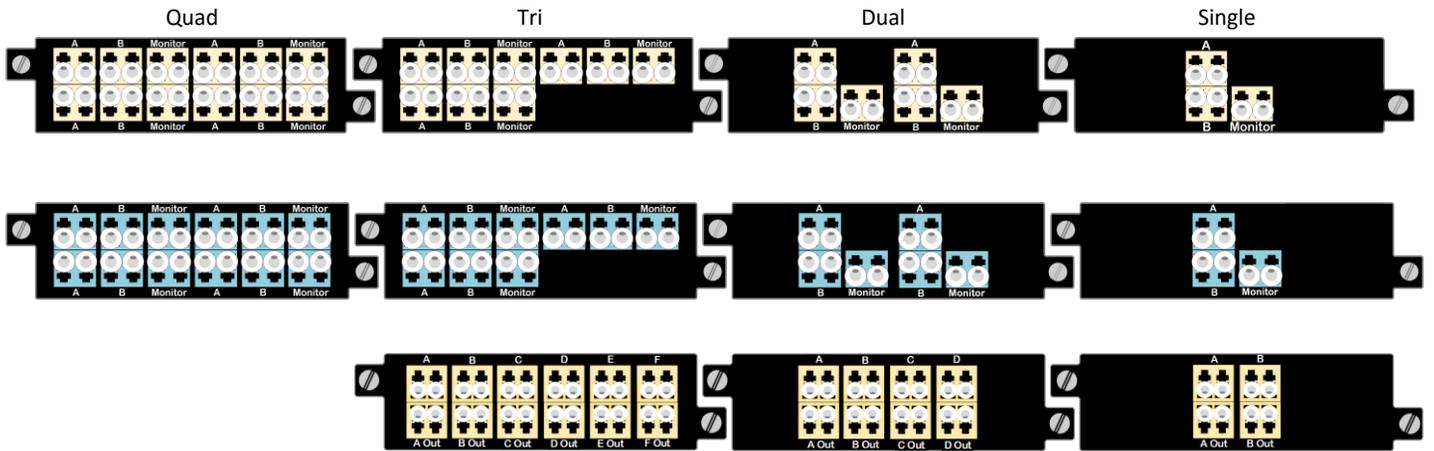
28 1 or 10Gbps Passive TAPS – available in 56 TAPS by adding 28 more TAPS on the rear of the 28 TAP unit.



16 1 or 10Gbps Passive TAPS



Garland Technology Passive Fiber Module Options

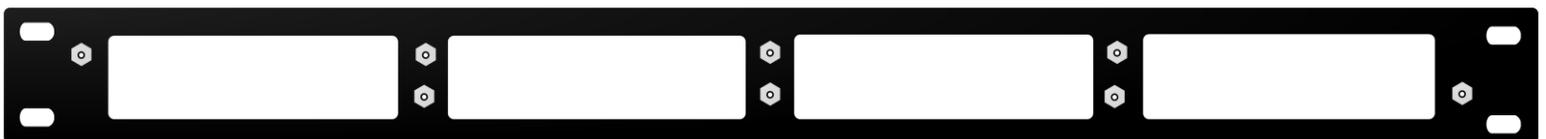


Blanking Plate

Tri

Dual

Single



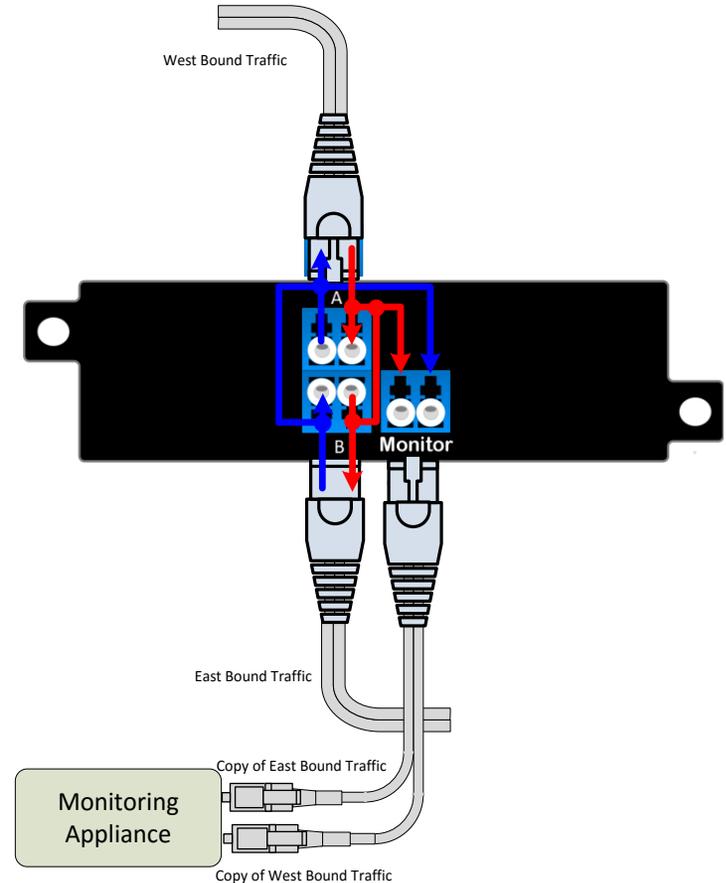
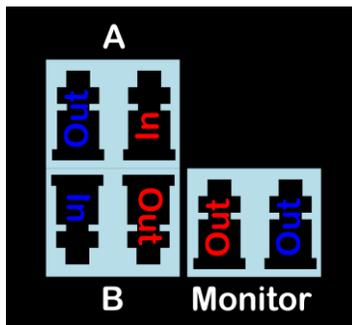
Four Slot Rack Mount Plate

Single TAP Module Installation

Cabling:

- Port **A** is a full-duplex fiber tap port that should be connected to one of the two network devices where network monitoring is desired.
- Port **B** is a full-duplex fiber tap port that should be connected to the other side or adjacent network device where network monitoring is desired.
- The **MONITOR** port is a dual-simplex directional port (both sides are output only) which should be connected to the input or receive only side of two interfaces of any monitoring device(s) that will collect the tapped traffic.

Fiber Tap Port Relationship



Breakout: Separates data flows for half-duplex directional monitoring. Ideal when utilization is very high and packet loss is not an option.

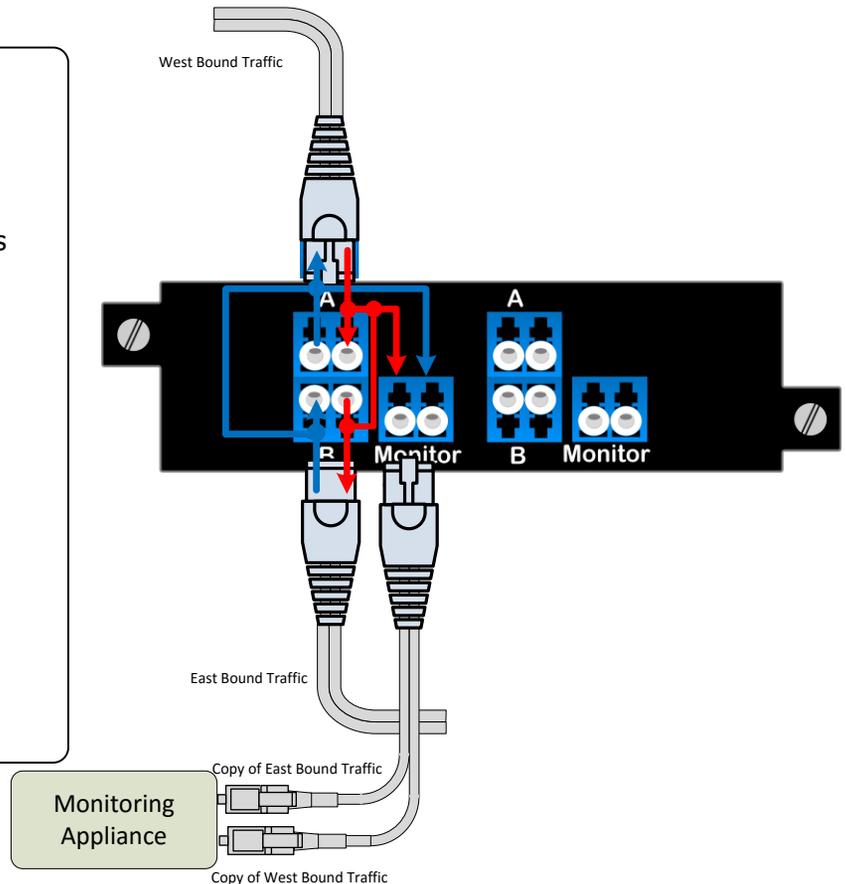
Link Failure Propagation: Allows link state to be mirrored to adjacent live network interfaces. When one side of a network loses link on a connecting fiber tap, the link state is propagated to the other interface of the tap and ultimately to the other side of the network.

Passive: A powerless device. Live network tap ports maintain link with each other, continuing traffic flow between critical network devices.

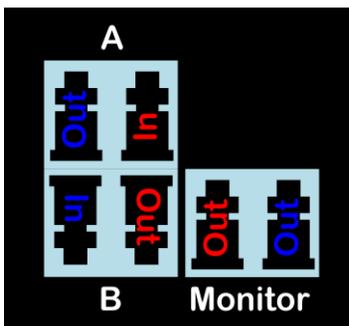
Dual TAP Module Installation

Cabling:

- Port **A** is a full-duplex fiber tap port that should be connected to one of the two network devices where network monitoring is desired.
- Port **B** is a full-duplex fiber tap port that should be connected to the other side or adjacent network device where network monitoring is desired.
- The **MONITOR** port is a dual-simplex directional port (both sides are output only) which should be connected to the input or receive only side of two interfaces of any monitoring device(s) that will collect the tapped traffic.



Fiber Tap Port Relationship



Breakout: Separates data flows for half-duplex directional monitoring. Ideal when utilization is very high and packet loss is not an option.

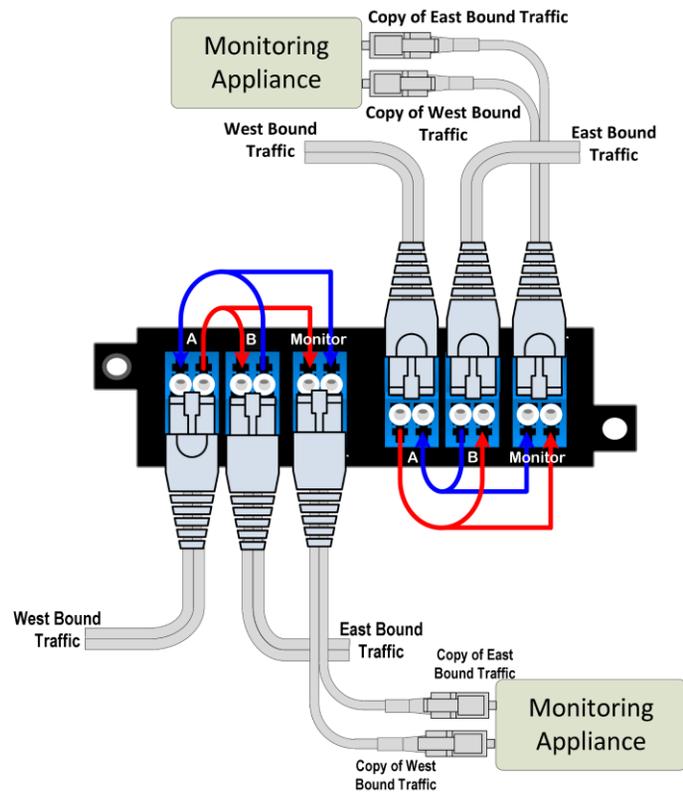
Link Failure Propagation: Allows link state to be mirrored to adjacent live network interfaces. When one side of a network loses link on a connecting fiber tap, the link state is propagated to the other interface of the tap and ultimately to the other side of the network.

Passive: A powerless device. Live network tap ports maintain link with each other, continuing traffic flow between critical network devices.

Tri or Quad TAP Module Installation

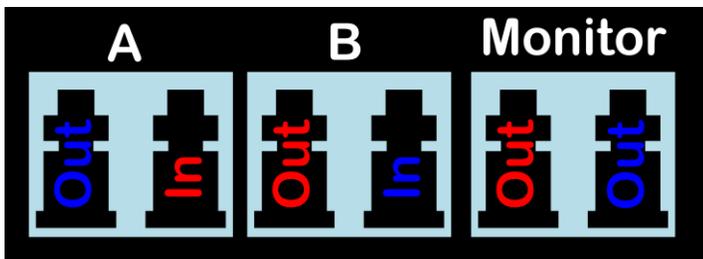
Cabling:

- Port **A** is a full-duplex fiber tap port that should be connected to one of the two network devices where network monitoring is desired.
- Port **B** is a full-duplex fiber tap port that should be connected to the other side or adjacent network device where network monitoring is desired.
- The **MONITOR** port is a dual-simplex directional port (both sides are output only) which should be connected to the input or receive only side of two interfaces of any monitoring device(s) that will collect the tapped traffic.

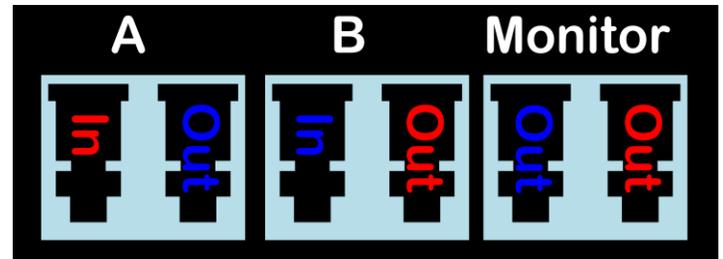


Fiber Tap Port Relationship

Fiber TAP Port Relationship **Top** Row



Fiber TAP Port Relationship **Bottom** Row



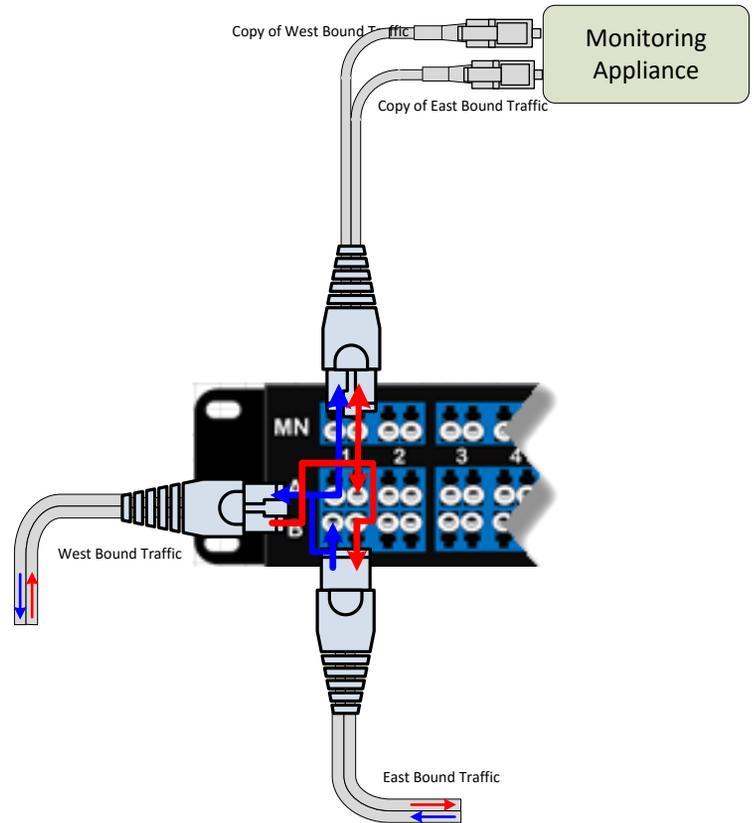
Breakout: Separates data flows for half-duplex directional monitoring. Ideal when utilization is very high and packet loss is not an option.

Passive: A powerless device. Live network tap ports maintain link with each other, continuing traffic flow between critical network devices.

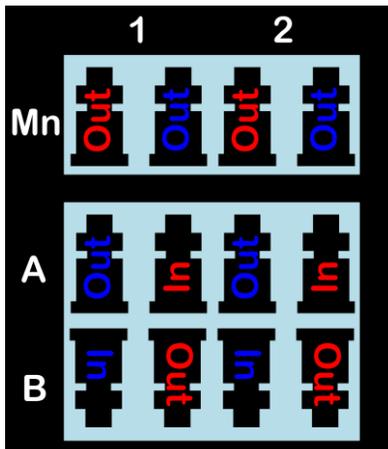
1U Integrated 28 or 56 TAP Installation

Cabling:

- Port **A** is a full-duplex fiber tap port that should be connected to one of the two network devices where network monitoring is desired.
- Port **B** is a full-duplex fiber tap port that should be connected to the other side or adjacent network device where network monitoring is desired.
- The **MONITOR** port is a dual-simplex directional port (both sides are output only) which should be connected to the input or receive only side of two interfaces of any monitoring device(s) that will collect the tapped traffic.



Fiber TAP Port Relationship



Fiber Tap Port Relationship

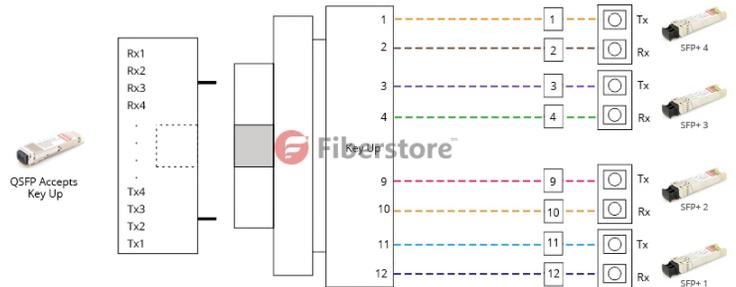
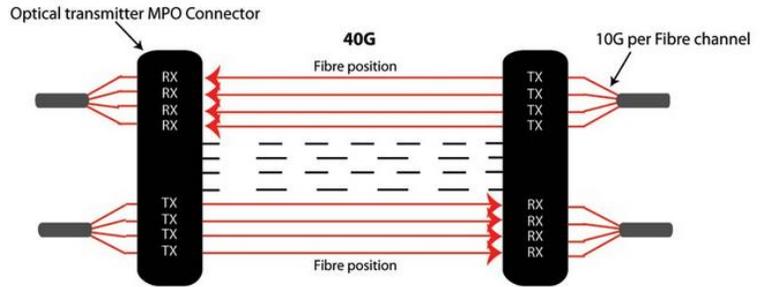
Breakout: Separates data flows for half-duplex directional monitoring. Ideal when utilization is very high and packet loss is not an option.

Passive: A powerless device. Live network tap ports maintain link with each other, continuing traffic flow between critical network devices.

40Gbps MPO/MTP Passive TAP Installation

Cabling:

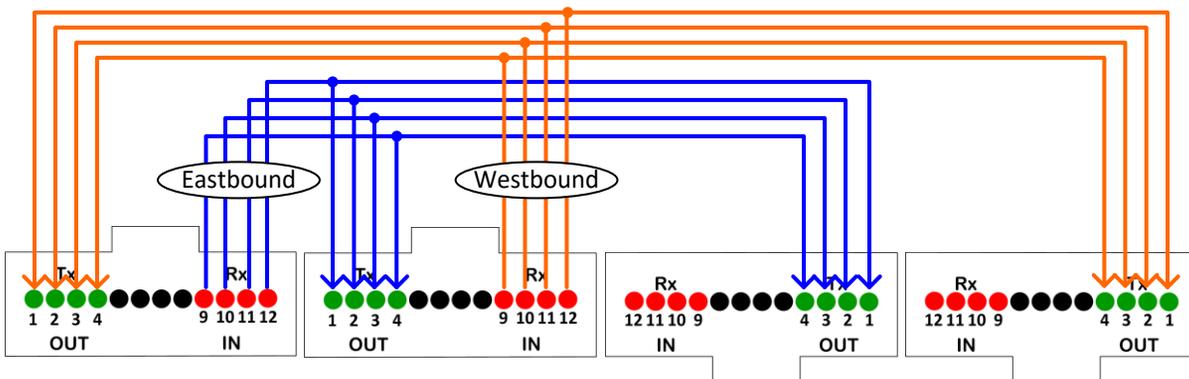
- Port **A** is a full-duplex fiber tap port that should be connected to one of the two network devices where network monitoring is desired.
- Port **B** is a full-duplex fiber tap port that should be connected to the other side or adjacent network device where network monitoring is desired.
- The **MONITOR** port is a unidirectional port (both sides are output only) which should be be connected to the input or receive only side of two interfaces of any monitoring device(s) that will collect the tapped traffic.



MPO/MTP Trunk Cable



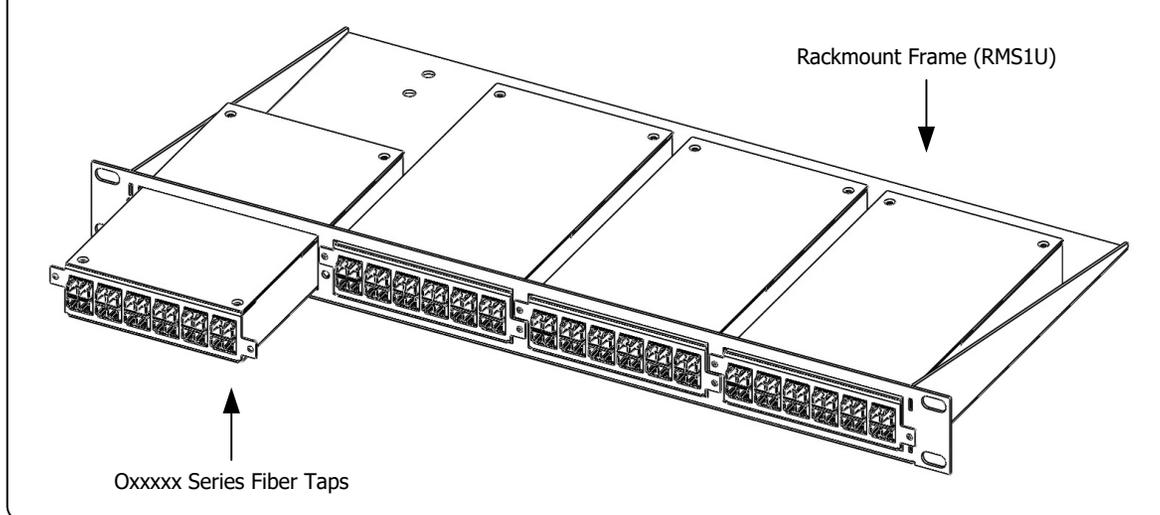
MPO/MTP Harness Cable



Passive Fiber TAP Module Installation

Installation:

To install the tap and rackmount frame assembly, simply slide the tap into an available slot of any 1U network rack-enclosure and fasten it with four securing screws.



Multi-mode Fiber Optic Characteristics

OM1 specifies 62.5-micron cable and OM2 specifies 50-micron cable. These are commonly used in premises applications supporting Ethernet rates of 10 Mbps to 1 Gbps. They are also typically used with LED transmitters.

OM1 and OM2 cable are not suitable for today's higher-speed networks.

OM3 and OM4 are both laser-optimized multimode fiber (LOMMF) and were developed to accommodate faster networks such as 10, 40, and 100 Gbps. Both are designed for use with 850-nm VCSELS (vertical-cavity surface-emitting lasers) and have aqua sheaths.

OM3 specifies an 850-nm laser-optimized 50-micron cable with an effective modal bandwidth (EMB) of 2000 MHz/km. It can support 10-Gbps link distances up to 300 meters.

OM4 specifies a high-bandwidth 850-nm laser-optimized 50-micron cable with an effective modal bandwidth of 4700 MHz/km. It can support 10-Gbps link distances of 550 meters. 100-Gbps distances are 100 meters and 150 meters, respectively. Both rival single-mode fiber in performance while being significantly less expensive to implement.

OM1 and OM2 are made with a different process than OM3 and OM4. Non-laser-optimized fiber cable is made with a small defect in the core, called an index depression. LED light sources are commonly used with these cables.

OM3 and 4 are manufactured without the center defect. As networks migrated to higher speeds, VCSELS became more commonly used rather than LEDs, which have a maximum modulation rate of 622 Mbps. Because of that, LEDs can't be turned on and off fast enough to support higher-speed applications. VCSELS provided the speed, but unfortunately when used with older OM1 and 2 cables, required mode-conditioning launch cables. Thus manufacturers changed the production process to eliminate the center defect and enable OM3 and OM4 cables to be used directly with the VCSELS.

Fiber Specifications

Optical Fiber Insertion Losses for Passive Fiber TAPs

Optical Fiber Insertion Loss for OS1, OS2 with 1310/1550nm - Corning 9/125 micron

Split Ratio	Splitter: Single-Mode (OS1, OS2) with LC Connector*		Splitter plus loss with one mated pair**		Splitter plus loss with two mated pairs***	
	Network Port	Monitor Port	Network Port	Monitor Port	Network Port	Monitor Port
50/50	3.6 dB	3.6 dB	3.9 dB	3.9 dB	4.2 dB	4.2 dB
60/40	2.6 dB	4.6 dB	2.9 dB	4.9 dB	3.2 dB	5.2 dB
70/30	1.9 dB	5.8 dB	2.2 dB	6.1 dB	2.5 dB	6.4 dB
80/20	1.3 dB	7.6 dB	1.6 dB	7.9 dB	1.9 dB	8.2 dB
90/10	0.8 dB	11.1 dB	1.1 dB	11.4 dB	1.4 dB	11.7 dB
Directivity: ≥50dB						
Operating Temperature: -40 to +85C						

* Measured loss through splitter only ** Measured loss through splitter; plus one mated pair (two fibers terminated and connected together with a fiber optic coupler).

*** Measured loss through splitter, plus two additional mated pairs. For methodology, read: Tech Notes on Measuring Budget Light Loss

Optical Fiber Insertion Loss for OM1, OM3 with 850/1300nm - OM1 Models Corning 62.5 micron - OM3 Models Corning 50 micron

Split Ratio	Splitter: Multi-Mode with LC Connector*		Splitter plus loss with one mated pair**		Splitter plus loss with two mated pairs***	
	Network Port	Monitor Port	Network Port	Monitor Port	Network Port	Monitor Port
50/50	3.7 dB	3.7 dB	4 dB	4 dB	4.3 dB	4.3 dB
60/40	2.8 dB	4.8 dB	3.1 dB	5.1 dB	3.4 dB	5.4 dB
70/30	2.1 dB	6.1 dB	2.4 dB	6.4 dB	2.7 dB	6.7 dB
80/20	1.5 dB	7.9 dB	1.8 dB	8.2 dB	2.1 dB	8.5 dB
90/10	1.2 dB	11 dB	1.5 dB	11.3 dB	1.8 dB	11.6 dB
Directivity: ≥40dB						
Operating Temperature: -40 to +85C						

* Measured loss through splitter only ** Measured loss through splitter; plus one mated pair (two fibers terminated and connected together with a fiber optic coupler).

*** Measured loss through splitter, plus two additional mated pairs. For methodology, read: Tech Notes on Measuring Budget Light Loss

Optical Fiber Insertion Loss for OM4 with 850nm - OM4 Clearcurve BIF 900um buffer

Split Ratio	Splitter: Multi-Mode MTP Connector*		Splitter plus loss with one mated pair**		Splitter plus loss with two mated pairs***	
	Network Port	Monitor Port**	Network Port	Monitor Port**	Network Port	Monitor Port
50/50	3.8 dB	3.8 dB	4.1 dB	4.1 dB	4.4 dB	4.4 dB
60/40	2.9 dB	4.8 dB	3.2 dB	5.1 dB	3.5 dB	5.4 dB
70/30	1.80 dB	6.6 dB	2.5 dB	7.30 dB	2.4 dB	7.2 dB
80/20	1.45 dB	7.4 dB	1.75 dB	7.7 dB	2.05 dB	8 dB
90/10	1.1 dB	10.6 dB	1.4 dB	10.9 dB	1.7 dB	11.2 dB
Directivity: ≥40dB						
Operating Temperature: -40 to +85C						

* Measured loss through splitter only ** Measured loss through splitter; plus one mated pair (two fibers terminated and connected together with a fiber optic coupler).

*** Measured loss through splitter, plus two additional mated pairs. For methodology, read: Tech Notes on Measuring Budget Light Loss

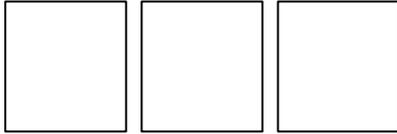
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Ordering Information

Part Number	Description
OM1501	Fiber Single TAP: Multi-Mode Fiber 62.5 micron, OM1, 850/1300nm dual wavelengths, 50/50, LC conn.
OM1701	Fiber Single TAP: Multi-Mode Fiber 62.5 micron, OM1, 850/1300nm dual wavelengths, 70/30, LC conn.
OM3501	Fiber Single TAP: Multi-Mode Fiber 50 micron, OM3, 850/1300nm dual wavelengths, 50/50, LC conn.
OM4501	Fiber Single TAP: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 50/50, LC conn.
OM4701	Fiber Single TAP: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 70/30, LC conn.
OS1501	Fiber Single TAP: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 50/50, LC conn.
OS1701	Fiber Single TAP: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 70/30, LC conn.
OS2501	Fiber Single TAP: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 50/50, LC conn.
OS2701	Fiber Single TAP: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 70/30, LC conn.
OM1502	Fiber Dual TAP: Multi-Mode Fiber 62.5 micron OM1, 850/1300nm dual wavelengths, 50/50, LC conn.
OM1702	Fiber Dual TAP: Multi-Mode Fiber 62.5 micron OM1, 850/1300nm dual wavelengths, 70/30, LC conn.
OM3502	Fiber Dual TAP: Multi-Mode Fiber 50 micron, OM3, 850/1300nm dual wavelengths, 50/50, LC conn.
OM4502	Fiber Dual TAP: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 50/50, LC conn.
OM4702	Fiber Dual TAP: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 70/30, LC conn.
OS1502	Fiber Dual TAP: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 50/50, LC conn.
OS1702	Fiber Dual TAP: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 70/30, LC conn.
OS2502	Fiber Dual TAP: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 50/50, LC conn.
OS2702	Fiber Dual TAP: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 70/30, LC conn.
OM1503	Fiber Tri TAP: Multi-Mode Fiber 62.5 micron, OM1, 850/1300nm dual wavelengths, 50/50, LC conn.
OM1703	Fiber Tri TAP: Multi-Mode Fiber 62.5 micron, OM1, 850/1300nm dual wavelengths, 70/30, LC conn.
OM3503	Fiber Tri TAP: Multi-Mode Fiber 50 micron, OM3, 850/1300nm dual wavelengths, 50/50, LC conn.
OM4503	Fiber Tri TAP: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 50/50, LC conn.
OM4703	Fiber Tri TAP: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 70/30, LC conn.
OS1503	Fiber Tri TAP: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 50/50, LC conn.
OS1703	Fiber Tri TAP: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 70/30, LC conn.
OS2503	Fiber Tri TAP: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 50/50, LC conn.
OS2703	Fiber Tri TAP: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 70/30, LC conn.
OM1504	Fiber Quad TAP: Multi-Mode Fiber 62.5 micron OM1, 850/1300nm dual wavelengths, 50/50, LC conn.
OM1704	Fiber Quad TAP: Multi-Mode Fiber 62.5 micron OM1, 850/1300nm dual wavelengths, 70/30, LC conn.
OM3504	Fiber Quad TAP: Multi-Mode Fiber 50 micron OM3, 850/1300nm dual wavelengths, 50/50, LC conn.
OM4504	Fiber Quad TAP: Multi-Mode Fiber 50 micron OM3/OM4, 850nm wavelength, 50/50, LC conn.
OM4704	Fiber Quad TAP: Multi-Mode Fiber 50 micron OM3/OM4, 850nm wavelength, 70/30, LC conn.
OS1504	Fiber Quad TAP: Single-Mode Fiber 9 micron OS1, 1310/1550nm dual wavelengths, 50/50, LC conn.
OS1704	Fiber Quad TAP: Single-Mode Fiber 9 micron OS1, 1310/1550nm dual wavelengths, 70/30, LC conn.
OS2504	Fiber Quad TAP: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 50/50, LC conn.
OS2704	Fiber Quad TAP: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 70/30, LC conn.
OM15028	1U Integrated Fiber 28 TAPs: Multi-Mode Fiber 62.5 micron, OM1, 850/1300nm dual wavelengths, 50/50, LC
OM17028	1U Integrated Fiber 28 TAPs: Multi-Mode Fiber 62.5 micron, OM1, 850/1300nm dual wavelengths, 70/30, LC
OM35028	1U Integrated Fiber 28 TAPs: Multi-Mode Fiber 50 micron, OM3, 850/1300nm dual wavelengths, 50/50, LC
OM45028	1U Integrated Fiber 28 TAPs: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 50/50, LC
OM47028	1U Integrated Fiber 28 TAPs: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 70/30, LC
OS15028	1U Integrated Fiber 28 TAPs: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 50/50, LC
OS17028	1U Integrated Fiber 28 TAPs: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 70/30, LC
OS25028	1U Integrated Fiber 28 TAPs: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 50/50, LC
OS27028	1U Integrated Fiber 28 TAPs: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 70/30, LC
OM15056	1U Integrated Fiber 56 TAPs: Multi-Mode Fiber 62.5 micron, OM1, 850/1300nm dual wavelengths, 50/50, LC
OM17056	1U Integrated Fiber 56 TAPs: Multi-Mode Fiber 62.5 micron, OM1, 850/1300nm dual wavelengths, 70/30, LC
OM35056	1U Integrated Fiber 56 TAPs: Multi-Mode Fiber 50 micron, OM3, 850/1300nm dual wavelengths, 50/50, LC
OM45056	1U Integrated Fiber 56 TAPs: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 50/50, LC
OM47056	1U Integrated Fiber 56 TAPs: Multi-Mode Fiber 50 micron, OM3/OM4, 850nm wavelength, 70/30, LC
OS15056	1U Integrated Fiber 56 TAPs: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 50/50, LC
OS17056	1U Integrated Fiber 56 TAPs: Single-Mode Fiber 9 micron, OS1, 1310/1550nm dual wavelengths, 70/30, LC
OS25056	1U Integrated Fiber 56 TAPs: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 50/50, LC
OS27056	1U Integrated Fiber 56 TAPs: Single-Mode Fiber 9 micron, OS2, 1310/1550nm dual wavelengths, 70/30, LC
RMS1U	Rack Mount Shelf: 1U holds up to 4 Portable Taps
RMP1U	Rack Mount Plate: 1U holds up to 4 Portable Taps

Split Ratios are also available in 60:40, 80:20, 90:10 or custom ratios, contact your sales manager.

Passive Fiber TAP w/LC Connectors Part Number Scheme



Defines type of fiber

- OM1
- OM3
- OM4
- OS1
- OS2



Defines Split Ratio

- 50 = 50:50 -
- 60 = 60:40 -
- 70 = 70:30 -
- 80 = 80:20 -
- 90 = 90:10 -



Defines # of TAPs

- 1 = 1 TAP
- 2 = 2 TAPs
- 3 = 3 TAPs
- 4 = 4 TAPs
- 28 = 28 TAPs
- 56 = 56 TAPs