Tyco Electronics

LIGHTPLANE Connector System

Product Facts

- Optical interconnection of daughter cards to motherboard
- Bellcore compliant SC interface from motherboard
- 2 to 8 positions
- Centerline spacing 12.5 mm (0.492 in.)
- Singlemode and multimode versions
- Daughtercard floats and alignment pins on mothercard assure mating

Performance Characteristics

Insertion Loss — 0.5 dB typ.
Return Loss — 40 dB min.
Temperature Range — -40°C to +85°C
Durability — <0.5 dB after 200 cycles

The Tyco Electronics' LIGHTPLANE Connector is a multi-position fiber optic backplane connector that permits blind mating of singlemode or multimode optical fibers from a daughtercard to a system backplane or motherboard. Now you can simultaneously make both the optical and electronic interconnections when installing the daughtercard. The LIGHTPLANE connector contains up to 8 fiber positions utilizing the standard SC interface.

Use of off the shelf SC components minimizes per line costs. It also eliminates the need for separate optical jumpers from the daughter-cards to the front or back of the cabinet, minimizing labor costs and possible fiber damage.
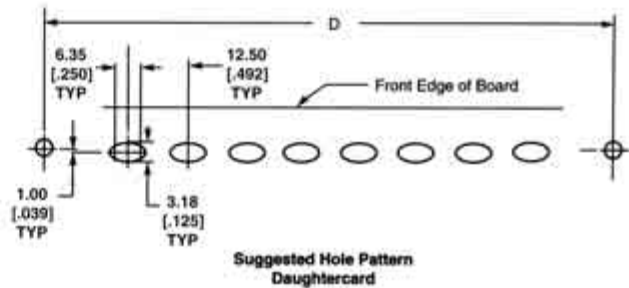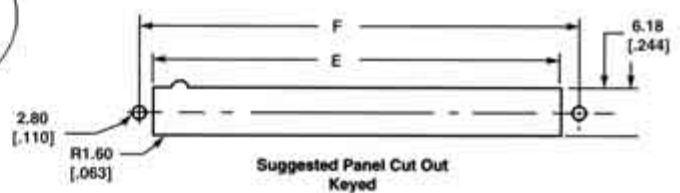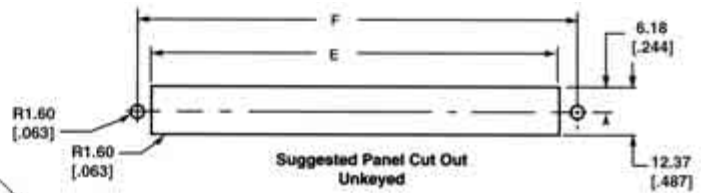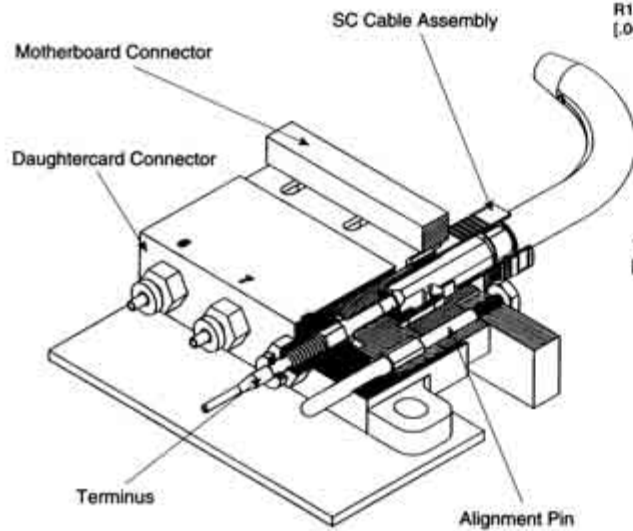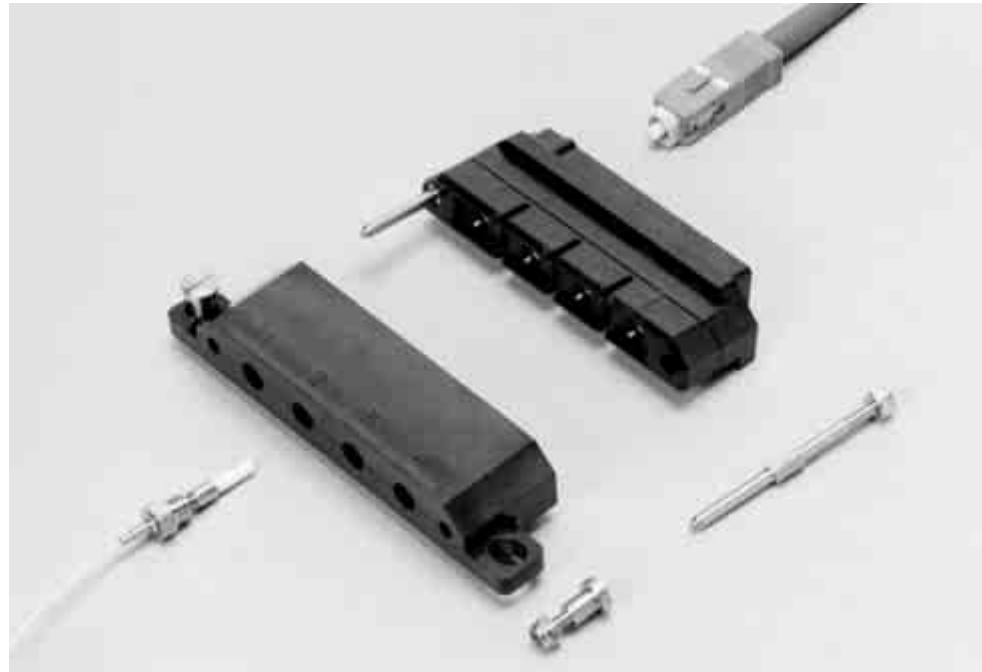
Designed for telecommunications and networking equipment, the LIGHTPLANE connector provides performance comparable to conventional SC interconnections: 0.5 dB typical insertion loss and 40 dB return loss. Shoulder screws on the daughtercard

module provide the necessary float for precise alignment. Daughtercard termini are spring loaded to ensure optical contact between the backplane and daughtercard. The daughtercard connector acts like multiple SC connectors, providing fiber density and minimizing packaging all in one protective shell. The shell protects the optical contacts on all sides from accidental damage if the board is dropped or knocked against a hard surface.

Description	Size/No. of Positions	Part Number
Daughtercard Connector	8	503185-1
Motherboard Connector Ceramic Alignment Sleeves with Polarization Key	8	5503682-1

Description	Type/Fiber Hole Dia. (µm)	Part Number
Daughtercard Terminus for 900 µm buffered fiber	Singlemode/125	5503186-1
	Singlemode/126	5503186-2
	Singlemode/127	5503186-3
	Multimode/125	5503412-1
Pre-Assembled Cable Assembly Daughtercard Terminus on both ends-2 meters — Singlemode		5503683-1

Note: All part numbers are RoHS compliant.

LIGHTPLANE Connector System (Continued)

Motherboard Connector

Daughtercard Connector

SC Cable Assembly

Terminus

Alignment Pin

R1.60 [.063]

R1.60 [.063]

6.18 [.244]

12.37 [.487]

F

E

Suggested Panel Cut Out Unkeyed

2.80 [.110]

R1.60 [.063]

6.18 [.244]

F

E

Suggested Panel Cut Out Keyed

6.35 [.250] TYP

12.50 [.492] TYP

Front Edge of Board

D

1.00 [.039] TYP

3.18 [.125] TYP

Suggested Hole Pattern Daughtercard

LIGHTPLANE Connector System

No. of Positions	Dimension		
	D	E	F
1	38.00 [1.496]	12.88 [.507]	20.00 [.787]
2	50.50 [1.988]	25.38 [.999]	32.50 [1.280]
4	75.50 [2.972]	50.38 [1.984]	57.50 [2.264]
8	125.50 [4.941]	100.38 [3.952]	107.50 [4.232]

LIGHTRAY MPX System Interconnects

Product Facts

- **LIGHTRAY MPX Interconnects offer a blindmate backplane solution**

- **A complete fiber optic system which is ideal for applications requiring customized solutions**

- **Features very small, high density LIGHTRAY MPX connectors**

- **Based on industry proven MT interconnection technology**

- **Can use both multimode (62.5/125 μm or 50/125 μm) and singlemode (9 μm) fiber, and is designed to meet Bellcore GR 1435**

- **Saves valuable board space on the PCB, backplane and I/O**

- **Suitable for blind mate (free floating) and bulkhead applications. Offers flexible fiber routing and management**

- **2.5 mm of daughter card axial travel is provided**

- **Misalignment pick-up tolerance are:**
  ± 2.0 mm horizontal
  ± 2.5 mm vertical
  ± 2 degree angular
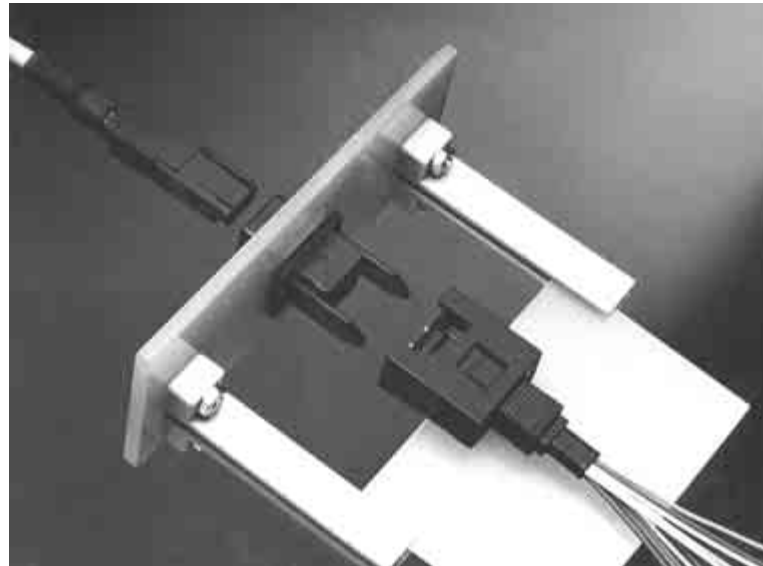
Tyco Electronics' LIGHTRAY MPX Interconnection System is designed for blind mate backplane and bulkhead dense fiber-to-fiber interconnect applications, including stand alone interconnections when used with bulkhead adapters.

The LIGHTRAY MPX Interconnection System

offers maximum flexibility, making them ideal for customized requirements and solutions.

Based on the field-proven MT ferrule technology, the LIGHTRAY MPX Interconnection System features a miniature multi-fiber connector, which holds up to 24 fibers on 250 μm centers.

Tyco Electronics' LIGHTRAY MPX Interconnection System is multi-sourced and features fanout assemblies, mini trunk and trunk cable assemblies, pre-loaded enclosures, cable management systems, PC card connector housings and tooling, bulkhead adapters and transceiver modules and datalinks.

LIGHTRAY MPX Connector

Design Objectives

| Parameter	Value		
	Multimode	**Singlemode**	**Singlemode Low Loss**
Insertion Loss, Mean (typical)	0.20 dB	0.25 dB	0.20 dB
Insertion Loss, Max.	0.50 dB	0.75 dB	0.30 dB / 0.5 dB*
Return Loss, Min.	20 dB	45 dB	45 dB
Durability,	0.3 dB CIT - 200 cycles		
Straight Pull 2.2N	0.3 dB change		
Vibration, 10 to 55 Hz	0.3 dB change		
Temperature, Storage	-40°C to +85°C		
Temperature Operating	-40°C to +85°C		
Thermal Aging, 14 Days @ +85°C	0.3 dB change		
Humidity,14 days 95% Rh @ +60°C	0.3 dB change		

* Low loss tested in-house to a maximum of 0.3 dB against a reference. 0.5 dB is maximum random mate loss.

LIGHTRAY MPX System Interconnects (Continued)

LIGHTRAY MPX Connector
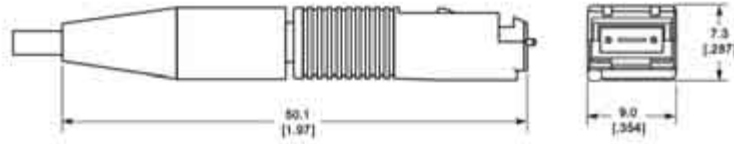
**Straight Through Fiber Path Configuration**
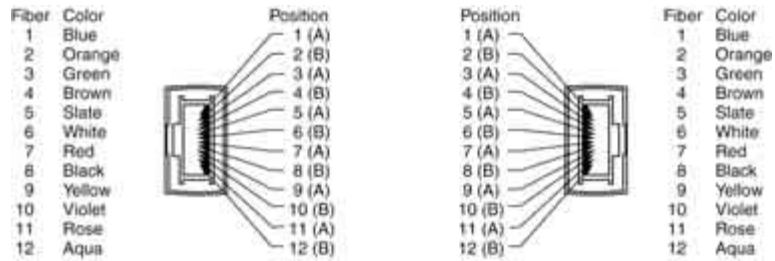
**Straight Through
Fiber Path Configuration**

Unlike their mainframe application counterparts, LIGHTRAY MPX trunks for Premise applications typically do not require "pair flipping". Pair Flipping, or "AB/BA" transmit/receive configuration is a sequential channel cross-over scheme used for IBM Enterprise Systems Connectivity (ESCON) architecture. LIGHTRAY MPX premise-trunk fiber pairs are configured 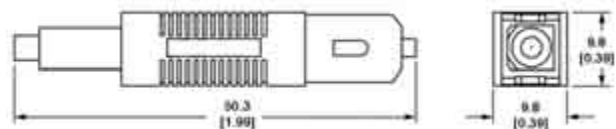as "AB/AB". For example — blue fiber (1) travels straight the cable and exits on the opposite end in the same position (1), as illustrated below. This fiber path configuration is known as "straight through".

LIGHTRAY MPX Connector
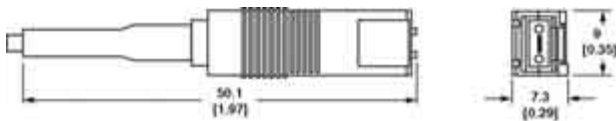
LIGHTRAY MPX Connector accommodates up to 12 fibers in a form factor smaller than typical single-fiber connectors
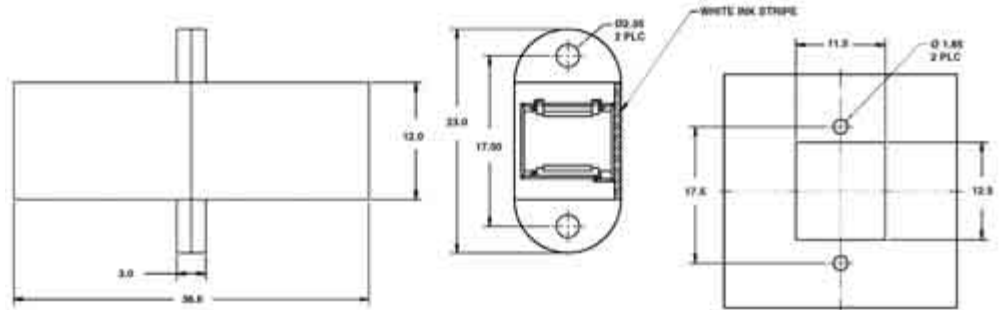
SC Connector

ESCON is a trademark of IBM Corporation.

LIGHTRAY MPX System Interconnects (Continued)

Bulkhead Coupling Adapter

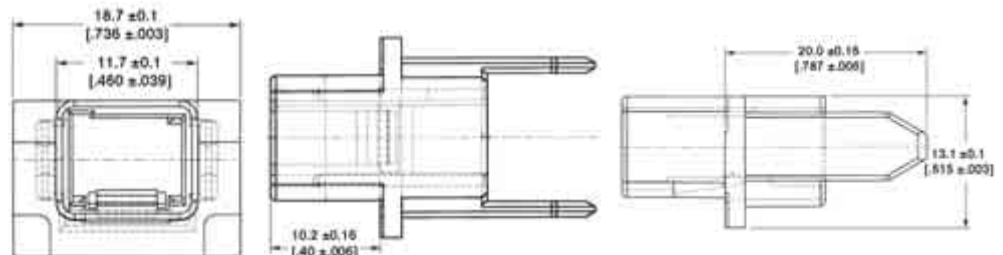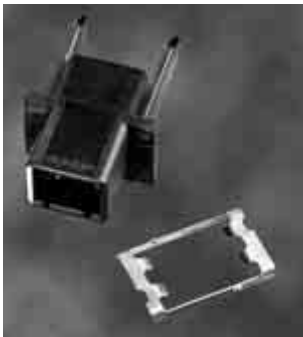**Part Number 492305-1**

Panel Cutout

Product Facts

■ Use two #2 screws for panel mounting

■ LIGHTRAY MPX coupling adapter uses the same dust cover as the SC coupling adapter

■ Can be mounted side-by-side for maximum port density

Backplane Housings and Adapters

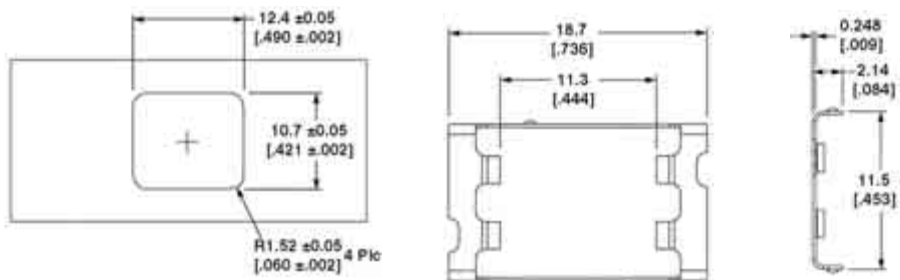**Backplane Housing — Simplex**

Part Number 492739-1

Product Facts

■ All backplane mounting holes must be within 0.1 mm diameter true position of nominal from backplane daturns to assure proper mating

■ Used to mate any LIGHTRAY MPX Connector from the backplane side

■ Mates to 492234-1

Clip Part Number 492740-2

Backplane Cutout

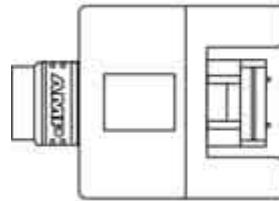**Note:** All part numbers are RoHS compliant.

LIGHTRAY MPX System Interconnects (Continued)

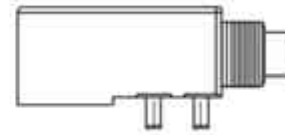**Backplane Housings and Adapters** (Continued)

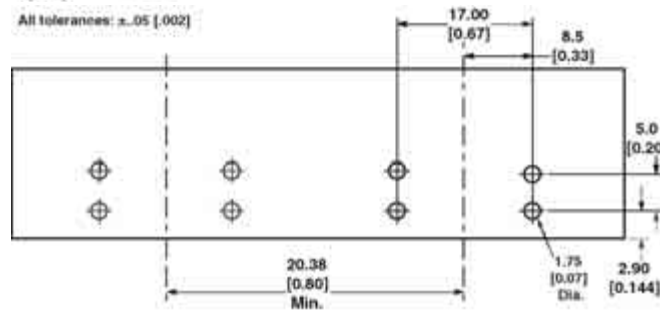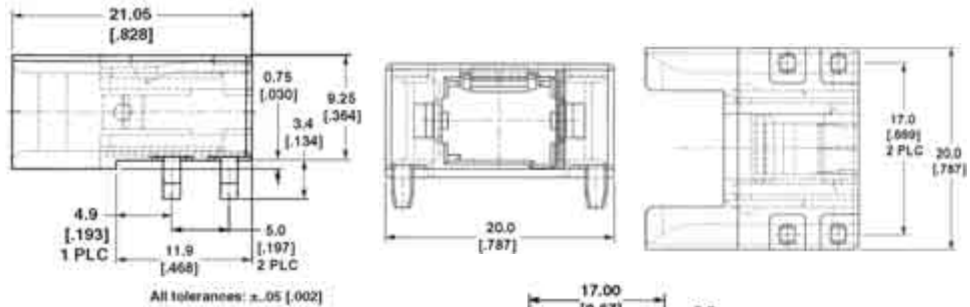**System Card Housing — Simplex**

Part Number 492234-1

Top View

Side View

Product Facts

■ Holds one standard or low loss LIGHTRAY MPX connector

■ Simple press-fit mounting — no hardware needed

■ Unique latching provides positive retention when card is unmated

■ Space daughtercard mounting hole patterns no closer than 20.38 mm

■ All daughtercard mounting holes must be within 0.1 mm diameter true position of nominal from daughtercard daturn to assure proper mating
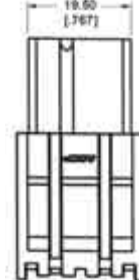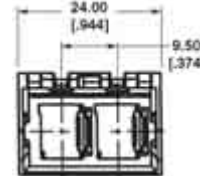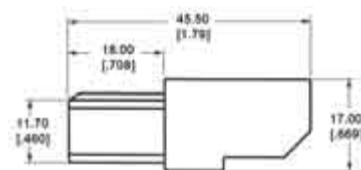
■ Mates to 492739-1

21.05 [.828]

0.75 [.030]   9.25 [.364]

3.4 [.134]

4.9 [.193] 1 PLC

11.9 [.468]

5.0 [.197] 2 PLC

17.0 [.669] 2 PLC   20.0 [.787]

20.0 [.787]

All tolerances: ±.05 [.002]

17.00 [0.67]   8.5 [0.33]

5.0 [0.20]

20.38 [0.80] Min.

1.75 [0.07] Dia.   2.90 [0.144]

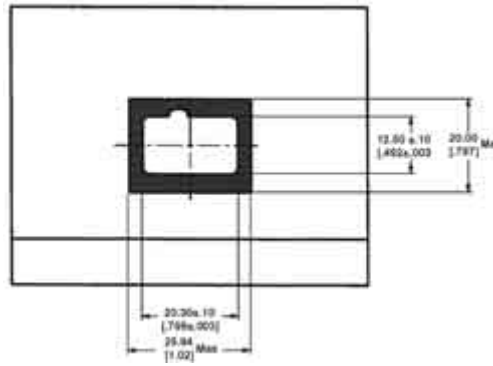**Daughtercard Housing Spacing**

Backplane Housing — Duplex

Part Number 1374490-1 and 6374493-1 (with safety shutter)

Product Facts

■ Holds two standard or low loss LIGHTRAY MPX connectors

■ Optional self actuated laser safety shutter

■ Up to 48 fibers simultaneously mated and managed

■ Mates to part number 1374491-1

■ Used with clip part number 1278530-2 (next page)

45.50 [1.79]

18.00 [.708]

11.70 [.460]   17.00 [.669]

24.00 [.944]

9.50 [.374]

19.50 [.767]

12.50 ±.10 [.492±.003]   20.00 Max [.787]

20.30±.10 [.799±.003]

25.84 Max [1.02]

Panel Cutout

Note: All part numbers are RoHS compliant.

Cable Assemblies & Backplane Interconnects

2

LIGHTRAY MPX System Interconnects (Continued)

Backplane Housings and Adapters (Continued)

Clip Part Number 1278530-2, 1 x 2 Duplex

System Card Housing — Duplex

Part Number 1374491-1

Recommended Hole Pattern
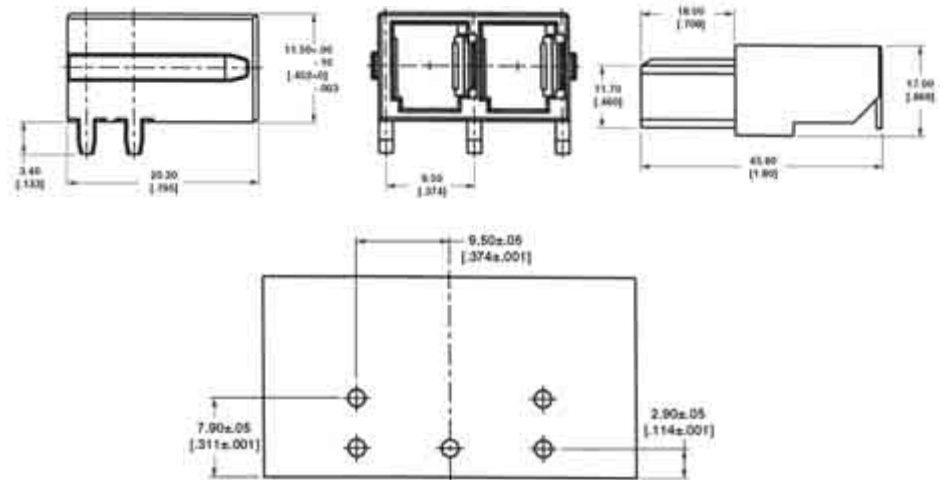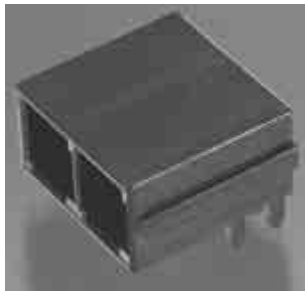
Product Facts

■ Holds two standard or low loss LIGHTRAY MPX connectors

■ Up to 48 fibers simultaneously mated and managed

■ Simple press-fit mounting, no hardware needed

■ Unique latching provides positive retention when card is unmated
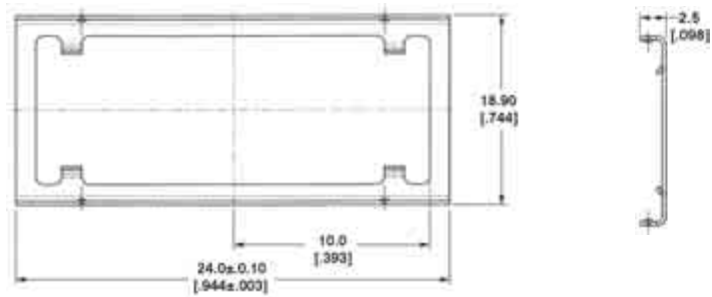
■ Mates to part number 1374490-1

Note: All part numbers are RoHS compliant.

LIGHTRAY MPX System Interconnects (Continued)

Backplane Housings and Adapters (Continued)

Backplane Housing — Quad
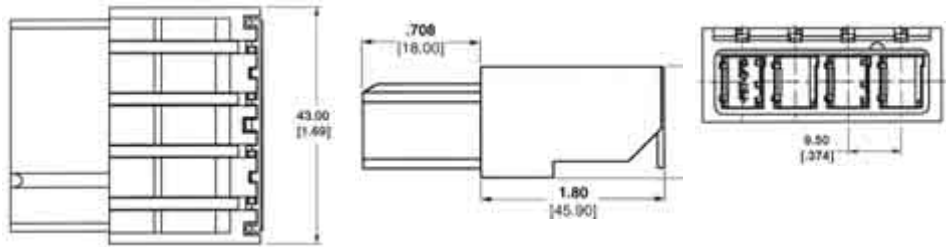
Product Facts

■ **Holds up to 4 standard or low loss LIGHTRAY MPX connectors**

■ **Self actuated laser-safe shutter**

■ **Up to 96 fibers simultaneously mated and managed**

■ **Integral "tool safe" cable latching**

■ **Mates to 1278391-1**

■ **Used with clip 1278530-1**

Part Number 6278529-1

Suggested Panel Cutout Looking from System Card Side

Clip Part Number 1278530-1, 1 x 4 Quad
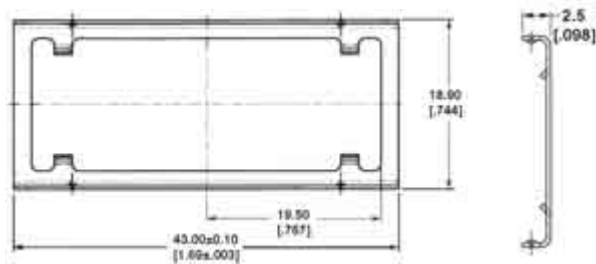
Note: All part numbers are RoHS compliant.

LIGHTRAY MPX System Interconnects (Continued)

Backplane Housings and Adapters (Continued)

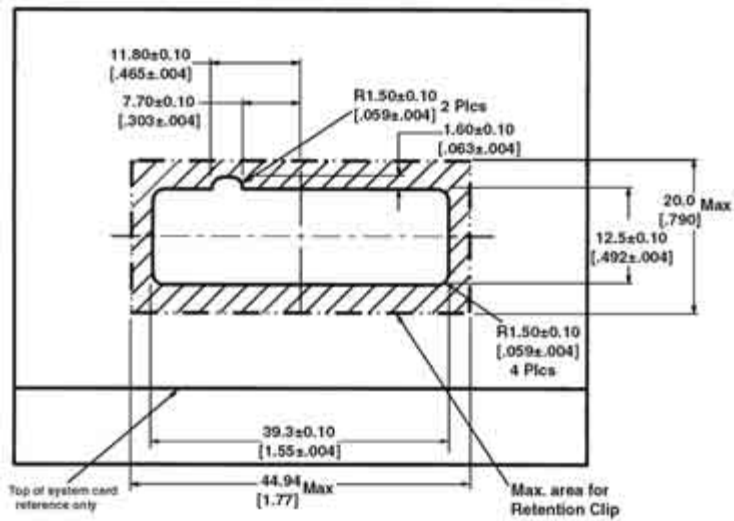**System Card Housing — Quad**

Product Facts

- Holds 4 standard or low loss LIGHTRAY MPX connectors
- Up to 96 fibers simultaneously mated and managed
- Simple press-fit mounting — no hardware needed
- Unique latching provides positive retention when card is unmated
- Mates to 6278529-1

Part Number 1278391-1

Recommended Hole Pattern

Note: All part numbers are RoHS compliant.

LIGHTRAY MPX System Interconnects (Continued)

Fanout Assemblies

Product Facts

- ■ Multimode 62.5/125 µm and 50/125 µm
- ■ Singlemode 9 µm, 8° angle interface
- ■ Color coded buffered fiber or LSZH (Low Smoke Zero Halogen) sheathed cable with breakout kit
- ■ Male LIGHTRAY MPX connectors (with guide pins)
- ■ 4, 8, 12, 16 and 24 fibers
- ■ Custom lengths available
- ■ Connector labeling to guide insertion
- ■ SC, ST, FC or MT-RJ terminations available
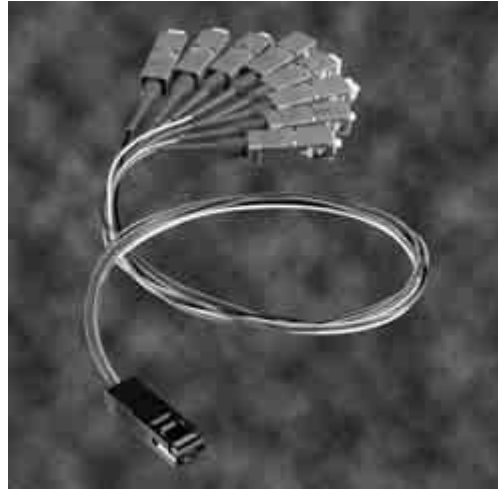
Mini Trunk Assemblies

Product Facts

- ■ Multimode 62.5/125 µm and 50/125 µm
- ■ Singlemode 9 µm, 8° angle interface
- ■ 250 µm bare ribbon and LSZH (Low Smoke Zero Halogen) sheathed ribbon cable available
- ■ Female LIGHTRAY MPX connectors (without guide pins)
- ■ 4, 8, 12, 16 and 24 fibers
- ■ Custom lengths available
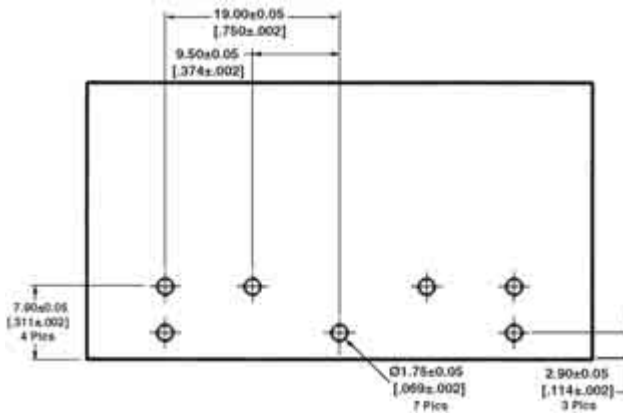- ■ Connector labeling to guide insertion
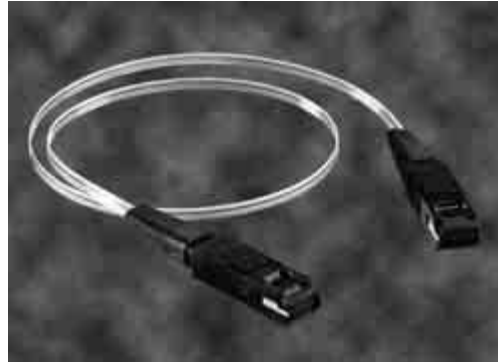
Trunk Assemblies

Product Facts

- ■ Multimode 62.5/125 µm and 50/125 µm
- ■ Singlemode 9 µm, 8° angle interface
- ■ Available with female LIGHTRAY MPX connectors (without guide pins) and/or male LIGHTRAY MPX connectors (with guide pins)
- ■ SC, ST, FC or MT-RJ terminations available for hybrid configurations
- ■ 4, 8 and 12 position ribbon fiber sub-units
- ■ LSZH (Low Smoke Zero Halogen) sheathed cable (round construction)
- ■ Internal/external cable
- ■ Custom lengths available

Cable Assemblies &
Backplane Interconnects

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LIGHTRAY MPX System Interconnects (Continued)

System Card Assemblies

LIGHTRAY MPX to LIGHTRAY MPX Connector
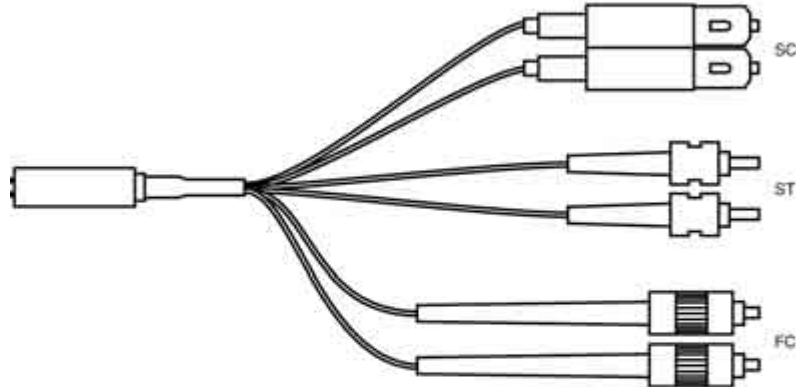
LIGHTRAY MPX Connectors to Industry-Standard Connectors

Fanout Assembly Options

Product Facts

- ■ **Multimode and singlemode**
- ■ **Available with 900 µm buffered fiber, jacketed cable and ruggedized cable**
- ■ **SC, ST, FC, MT-RJ, LC or other industry-standard connector terminations available**
- ■ **Up to 24 fibers**
- ■ **Custom lengths available**

Factory terminated assemblies are supplied custom built for each application. Assemblies are fully tested and can be offered with standard (multimode) or 8° angled (singlemode) end finishes to meet return loss needs.

The connectors accommodate various cable types, including ribbon and easy strip cable. The variety of configurations in cable assemblies makes it easy to transition from industry standard transceiver interfaces at one end and patch panels at the other. Factory terminated cables also speed system assembly, since the cables quickly and simply snap into place.

LIGHTRAY MPX Connector Pigtail

LIGHTRAY MPX System Interconnects (Continued)

System Card Assemblies
(Continued)

Optical Performance Characteristics

- **Mean insertion loss of 0.35 dB, with a maximum of 1.0 dB for both multimode and singlemode**

- **Minimum return loss 45 dB (8° APC interface for singlemode)**

LIGHTRAY MPX Fanout Assembly — 900 μm Buffered Fiber

White Stripe

LIGHTRAY MPX Connector

Buffered Fiber

Up to 12 Places
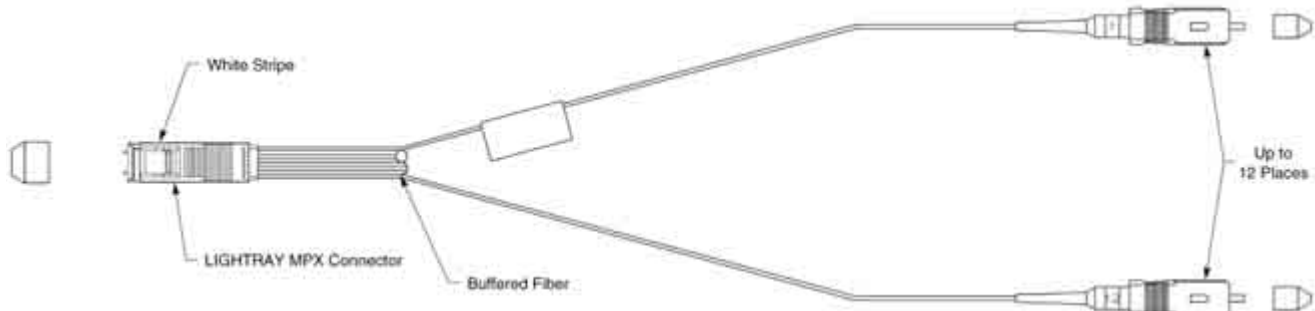
LIGHTRAY MPX Fanout Assembly — Jacketed Cable

White Stripe

LIGHTRAY MPX Connector

Up to 12 Places
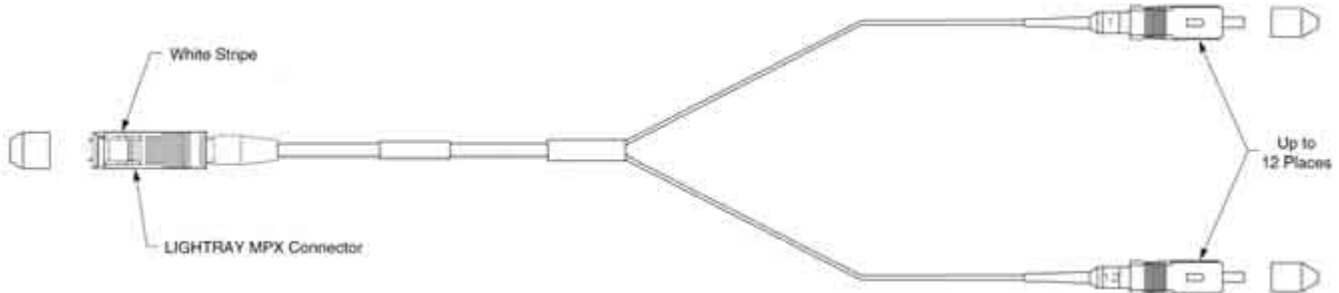
LIGHTRAY MPX Fanout Assembly — Ruggedized Cable

White Stripe

LIGHTRAY MPX Connector

3.0mm Jacketed Cable

Up to 12 Places
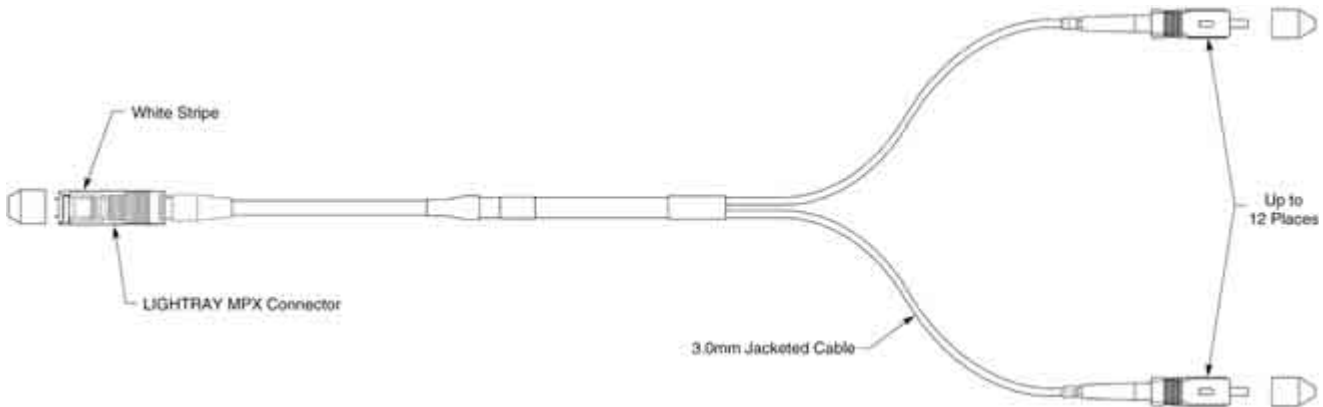
LIGHTRAY MPX System Interconnects (Continued)

Patch Cords

Cable Assembly Options

Product Facts

- **Multimode and singlemode**
- **Up to 24 fibers**
- **Ribbon cable, ruggedized or unruggedized cable construction**
- **Custom lengths available**

The LIGHTRAY MPX connector is pre-terminated onto fiber optic cable and pre-tested at the factory before being shipped. It can be used with either multimode or singlemode fiber and accepts a wide range of cable constructions, including ribbon fiber or "easy strip" fiber.

LIGHTRAY MPX to LIGHTRAY MPX Cable Assembly — Ribbon Fiber

LIGHTRAY MPX to LIGHTRAY MPX Cable Assembly — Jacketed Cable — Straight
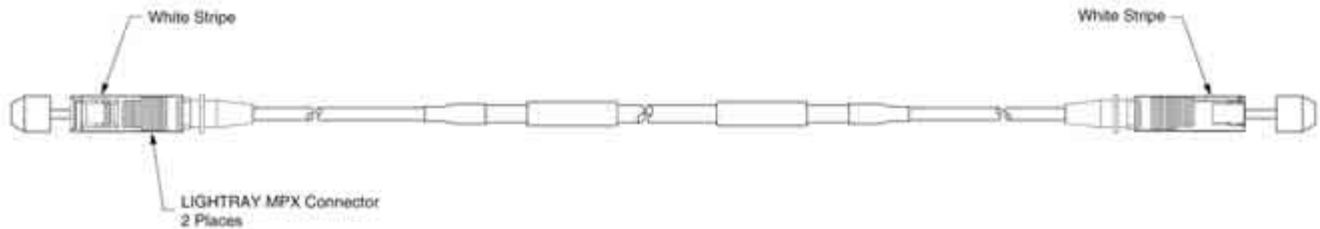
LIGHTRAY MPX to LIGHTRAY MPX Cable Assembly — Jacketed Cable — Right Angle

LIGHTRAY MPX System Interconnects (Continued)

LIGHTRAY MPX Cable Assemblies

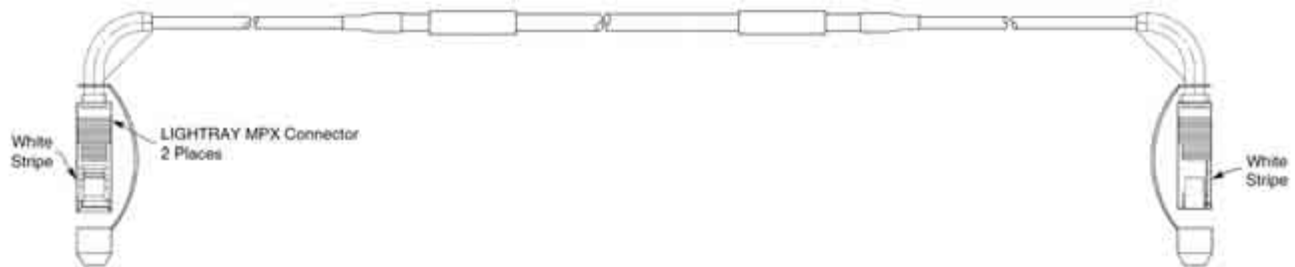| Description	Part Number
Singlemode	
Standard Loss LIGHTRAY MPX Cable Assemblies	
4-fiber LIGHTRAY MPX (m) pigtail assy., 900 µm buffered fibers	6457078-X
8-fiber LIGHTRAY MPX (m) pigtail assy., bare ribbon	6374392-X
8-fiber LIGHTRAY MPX (f) pigtail assy., bare ribbon	6374539-X
8-fiber LIGHTRAY MPX (f) pigtail assy., 900 µm buffered fibers	6374537-X
8-fiber LIGHTRAY MPX (m) pigtail assy., 900 µm buffered fibers	6374538-X
8-fiber LIGHTRAY MPX (m) to LIGHTRAY MPX (m) assy., bare ribbon	6457394-X
8-fiber LIGHTRAY MPX (f) to LIGHTRAY MPX (f) assy., bare ribbon	6374600-X
8-fiber LIGHTRAY MPX (f) to LIGHTRAY MPX (f) assy., jacketed ribbon	6374887-X
12-fiber LIGHTRAY MPX (m) to LIGHTRAY MPX (m) assy., bare ribbon	6374743-X
12-fiber LIGHTRAY MPX (m) assy. to (12) SC, ruggedized	5492515-X
Low Loss LIGHTRAY MPX Cable Assemblies	
4-fiber LIGHTRAY MPX (m) to LIGHTRAY MPX (m) assy., bare ribbon	6457398-X
8-fiber LIGHTRAY MPX (m) pigtail assy., bare ribbon	6374448-X
8-fiber LIGHTRAY MPX (f) pigtail assy., bare ribbon	6374639-X
8-fiber LIGHTRAY MPX (m) pigtail assy., 900 µm buffered fibers	6457173-X
8-fiber LIGHTRAY MPX (f) pigtail assy., 900 µm buffered fibers	6457174-X
8-fiber LIGHTRAY MPX (m) to LIGHTRAY MPX (m) assy., bare ribbon	6374738-X

Note: All assemblies are custom built to customer's length specifications. Dash number indicates length. Please contact Tyco Electronics for proper dash number.

Note: All part numbers are RoHS compliant.

Cable Assemblies &
Backplane Interconnects

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LIGHTRAY MPX System Interconnects (Continued)

Dust Covers

Description		Part Number	
Simplex			
System Card	Board Side	1278201-1	
	Backplane Side	492578-1	
Backplane	Inside Cage	492575-1	(no insert)
		5492576-1	(with insert)
		503967-5	(removal tool)
	Back of Cage	5502871-1	
Duplex			
System Card	Board Side	5502871-1	
	Backplane Side	1374674-1	
Backplane	Inside Cage	6374671-1	
	Back of Rack	5502871-1	
Quad			
System Card	Board Side	5502871-1	
	Backplane Side	1374547-1	
Backplane	Inside Cage	6374548-1	
	Back of Rack	5502871-1	
Bulkhead		5502871-1	
Cable		492577-1	(without strap)
		492577-2	(with strap)

Cleaning Kit

Product Facts

- 2 re-useable cleaning kit assemblies
- 2 LIGHTRAY MPX bulkhead adapters
- 2 LIGHTRAY MPX backplane housings
- 1 pack of 24 cleaning tool inserts (can be ordered separately)

Description	Part Number
LIGHTRAY MPX Cleaning Kit	1278498-1
Cleaning Inserts (24/pack)	1457019-3

Connector Microscope Adapters

Product Facts

- Designed specifically for the LIGHTRAY MPX Connector
- Fits in standard Tyco Electronics' microscope Part Number 1754767-1
- 200 x power

Description	Part Number*
Microscope Adapter	1828834-1
Microscope Adapter (angled)	1828835-1

* Coupling adapter Part Number 1985041-1 required.

Note: All part numbers are RoHS compliant.

LIGHTRAY MPX System Interconnects (Continued)

Tooling and Accessories

Simplex Backplane Housing Tooling

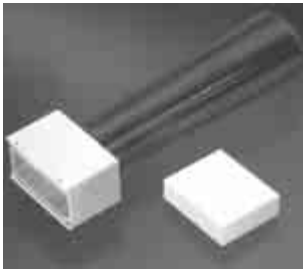| Part Number	Description
492356-3	System Card Mounting (Kit)
492356-2	Backplane Mounting (Kit)
492356-1	System Card & Backplane Mounting (Kits)
492493-1	Backplane Connector Side — Connector Support
1278315-1	Retention Clip Tool (Molded Plastic)
492578-1	Dust Cover — System Card Connector
5492576-1	Dust Cover — Backplane Connector Mating Connector Side (System Card Side)
503967-5	Dust Cover Removal Tool — Backplane (System Card Side)
5502871-1	Dust Cover — Backplane Connector Cable Side[1]
492740-2	Retention Clip

[1] Dust cover shown is flush mount. Same part with finger tabs is 1374678-1.

Duplex Backplane Housing Tooling

Part Number	Description
(Customer Supplied)[2]	System Card Seating Tool (Flat Rock on Housing)
(Customer Supplied)[2]	System Card Support Tool (Clearance for Attachment Posts)
1278944-2	Backplane Connector Side — Connector Support
1278945-4	Retention Clip Tool (with Handle)
1374674-1	Dust Cover — System Card Connector
6374671-1	Dust Cover — Backplane Connector Mating Connector Side (System Card Side)
503967-5	Dust Cover Removal Tool — Backplane (System Card Side)
5502871-1	Dust Cover — Backplane Connector Cable Side[1]
1278530-2	Retention Clip

[1] Dust cover shown is flush mount. Same part with finger tabs is 1374678-1.
[2] System card tooling is "customer supplied" — suggested detail is defined in application specifications (contact Tyco Electronics for availability).

Quad Backplane Housing Tooling

Part Number	Description
(Customer Supplied)[2]	System Card Seating Tool (Flat Rock on Housing)
(Customer Supplied)[2]	System Card Support Tool (Clearance for Attachment Posts)
1278944-1	Backplane Connector Side — Connector Support
1278945-2	Retention Clip Tool (with Handle)
1374547-1	Dust Cover — System Card Connector
6374548-1	Dust Cover — Backplane Connector Mating Connector Side (System Card Side)
503967-5	Dust Cover Removal Tool — Backplane (System Card Side)
5502871-1	Dust Cover — Backplane Connector Cable Side[1]
1278530-1	Retention Clip

[1] Dust cover shown is flush mount. Same part with finger tabs is 1374678-1.
[2] System card tooling is "customer supplied" — suggested detail is defined in application specifications (contact Tyco Electronics for availability).

Note: All part numbers are RoHS compliant.

Cable Assemblies & Backplane Interconnects

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