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Attenuators

Singlemode Build Out Attenuators

Product Facts

- A range of fixed attenuation values. Standard values of 1 through 20 and 25 dB
- UPC and APC offer Excellent Return Loss
- LC, SC, FC, ST, and D4 styles
- Attenuation is wavelength independent and polarization insensitive
- Low PDL
- Low modal noise
- High reliability
- Very low reflectance
- Vibration resistant
- Dual Window and Broadband Bandpass
- End face geometry per GR-326
- Designed to comply with Telcordia GR-910

Applications

- Power leveling in DWDM transmission systems
- Test and Measurement
- Power attenuation at the receiver

Available Collateral

- Test reports qualifying product to Telcordia GR-910 (2004)
- Application Specification 114-1129
- Installation/Cleaning Instruction Sheet 408-8895
- Product Specification 108-2099

<http://www.tycoelectronics.com/documents>

- Customer Drawings



Tyco Electronics high performance Build Out Attenuators utilize a unique all-fiber construction to absorb the optical signal.

By employing a Tyco Electronics' technology, the design minimizes

reflectance, attenuation tolerance, and PDL while maximizing reliability, environmental stability, and power handling. There are no filters, air gaps, or core mismatches.

Specifications

Attenuation Values —
1-20 dB and 25 dB (Fixed)

Reflectance —
≤ -55 and -65 dB for UPC and APC polish, respectively

Operating Temperature —
-40°C to +75°C

Vibration Resistance —
< 0.1 x attenuation

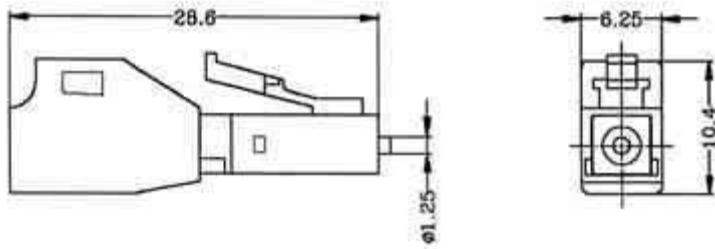
Customizable Features

- Attenuation tolerance
- Attenuation values in 1 dB increments
- Labeling
- Kitting/Packaging
- Wavelength Dependent Loss
- Reflectance:
 - UPC to -55 dB max.
 - APC to -65 dB max.

Attenuators (Continued)

**Singlemode
LC Attenuators, Build Out
Style, Fixed Value**

LC/UPC



Note: Additional attenuation values available upon request.

**Broadband Bandpass Attenuators
Operating Wavelength
1260-1360 nm & 1430-1625 nm**

Attenuation (dB)	Part Number
1	1693560-1
2	1693560-2
3	1693560-3
4	1693560-4
5	1693560-5
6	1693560-6
7	1693560-7
8	1693560-8
9	1693560-9
10	1-1693560-0
11	1-1693560-1
12	1-1693560-2
13	1-1693560-3
14	1-1693560-4
15	1-1693560-5
16	1-1693560-6
17	1-1693560-7
18	1-1693560-8
19	1-1693560-9
20	2-1693560-0
25	2-1693560-5

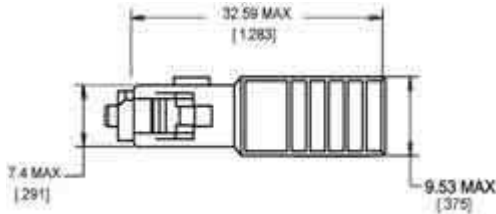
Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: $\pm .10 \times$ nominal
attenuation value
 < 5 dB: ± 0.50 dB
Reflectance ≤ -55 dB

Note: All part numbers are RoHS compliant.

Attenuators (Continued)

Singlemode SC Attenuators, Build Out Style, Fixed Value

SC/UPC



Note: Additional attenuation values available upon request.

Dual Window Attenuators Operating Wavelength 1310/1550 nm ±25 nm

Attenuation (dB)	Part Number
1	5209943-1
2	5209943-2
3	5209943-3
4	5209943-4
5	5209943-5
6	5209943-6
7	5209943-7
8	5209943-8
9	5209943-9
10	1-5209943-0
11	1-5209943-1
12	1-5209943-2
13	1-5209943-3
14	1-5209943-4
15	1-5209943-5
16	1-5209943-6
17	1-5209943-7
18	1-5209943-8
19	1-5209943-9
20	2-5209943-0
25	2-5209943-5

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal attenuation value
 < 5 dB: ± 0.50 dB
 0 dB: 0.50 dB max
 Reflectance ≤ -55 dB

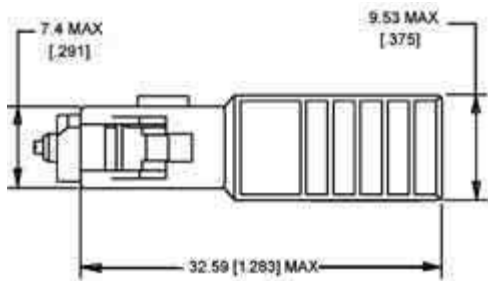
Broadband Bandpass Attenuators Operating Wavelength 1260-1360 nm & 1430-1625 nm

Attenuation (dB)	Part Number
1	5209250-1
2	5209250-2
3	5209250-3
4	5209250-4
5	5209250-5
6	5209250-6
7	5209250-7
8	5209250-8
9	5209250-9
10	1-5209250-0
11	1-5209250-1
12	1-5209250-2
13	1-5209250-3
14	1-5209250-4
15	1-5209250-5
16	1-5209250-6
17	1-5209250-7
18	1-5209250-8
19	1-5209250-9
20	2-5209250-0
25	2-5209250-5

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal attenuation value
 < 5 dB: ± 0.50 dB
 0 dB: 0.50 dB max.
 Reflectance ≤ -55 dB

Singlemode SC Attenuators, Build Out Style Fixed Value

SC/APC 8°



Note: Additional attenuation values available upon request.

* 9° APC Available (Part Number 5417496-X)

Dual Window Attenuators Operating Wavelength 1310/1550 nm ±25 nm

Attenuation (dB)	Part Number
1	5209597-1
2	5209597-2
3	5209597-3
4	5209597-4
5	5209597-5
6	5209597-6
7	5209597-7
8	5209597-8
9	5209597-9
10	1-5209597-0
11	1-5209597-1
12	1-5209597-2
13	1-5209597-3
14	1-5209597-4
15	1-5209597-5
16	1-5209597-6
17	1-5209597-7
18	1-5209597-8
20	2-5209597-0
25	2-5209597-5

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal attenuation value
 < 5 dB: ± 0.50 dB
 Reflectance ≤ -60 dB

Broadband Bandpass Attenuators Operating Wavelength 1260-1360 nm & 1430-1625 nm

Attenuation (dB)	Part Number
1	5417021-1
2	5417021-2
3	5417021-3
4	5417021-4
5	5417021-5
6	5417021-6
7	5417021-7
8	5417021-8
9	5417021-9
10	1-5417021-0
11	1-5417021-1
12	1-5417021-2
13	1-5417021-3
14	1-5417021-4
15	1-5417021-5
16	1-5417021-6
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19	1-5417021-9
20	2-5417021-0
25	2-5417021-5

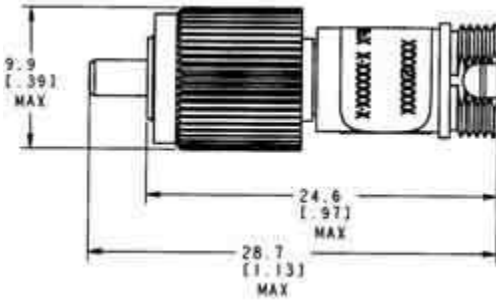
Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal attenuation value
 < 5 dB: ± 0.50 dB
 Reflectance ≤ -65 dB

Note: All part numbers are RoHS compliant.

Attenuators (Continued)

**Singlemode
FC Attenuators, Build Out
Style, Fixed Value**

FC/UPC



Note: Additional attenuation values available upon request.

**Dual Window Attenuators
Operating Wavelength
1310/1550 nm ±25 nm**

Attenuation (dB)	Part Number
1	5209948-1
2	5209948-2
3	5209948-3
4	5209948-4
5	5209948-5
6	5209948-6
7	5209948-7
8	5209948-8
9	5209948-9
10	1-5209948-0
11	1-5209948-1
12	1-5209948-2
13	1-5209948-3
14	1-5209948-4
15	1-5209948-5
16	1-5209948-6
17	1-5209948-7
18	1-5209948-8
19	1-5209948-9
20	2-5209948-0
25	2-5209948-5

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal attenuation value
 < 5 dB: ± 0.50 dB
 Reflectance ≤ -55 dB

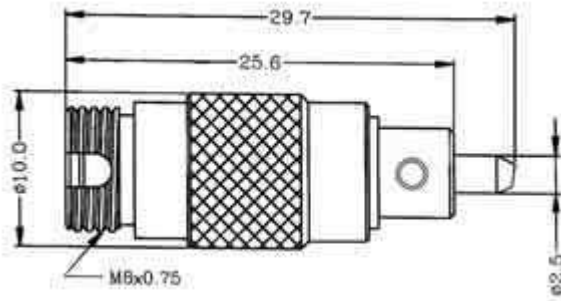
**Broadband Bandpass Attenuators
Operating Wavelength
1260-1360 nm & 1430-1625 nm**

Attenuation (dB)	Part Number
1	5209285-1
2	5209285-2
3	5209285-3
4	5209285-4
5	5209285-5
6	5209285-6
7	5209285-7
8	5209285-8
9	5209285-9
10	1-5209285-0
11	1-5209285-1
12	1-5209285-2
13	1-5209285-3
14	1-5209285-4
15	1-5209285-5
16	1-5209285-6
17	1-5209285-7
18	1-5209285-8
19	1-5209285-9
20	2-5209285-0
25	2-5209285-5

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal attenuation value
 < 5 dB: ± 0.50 dB
 0 dB: 0.50 dB max.
 Reflectance ≤ -55 dB

**Singlemode
FC Attenuators, Build Out
Style, Fixed Value**

FC/APC (8°)



Note: Additional attenuation values available upon request.

**Dual Window Attenuators
Operating Wavelength
1310/1550 nm ±25 nm**

Attenuation (dB)	Part Number
1	1754722-1
2	1754722-2
3	1754722-3
4	1754722-4
5	1754722-5
6	1754722-6
10	1-1754722-0
12	1-1754722-2
15	1-1754722-5
18	1-1754722-8
20	2-1754722-0
25	2-1754722-5

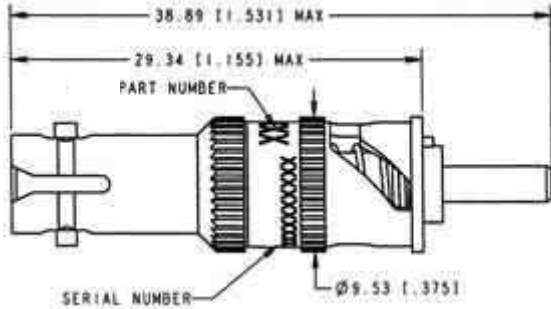
Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal attenuation value
 < 5 dB: ± 0.50 dB
 Reflectance ≤ -65 dB

Note: All part numbers are RoHS compliant.

Attenuators (Continued)

**Singlemode
ST Attenuators, Build Out
Style, Fixed Value**

ST/UPC



**Dual Window Attenuators
Operating Wavelength
1310/1550 nm ±25 nm**

Attenuation (dB)	Part Number
1	5417549-1
2	5417549-2
3	5417549-3
4	5417549-4
5	5417549-5
6	5417549-6
7	5417549-7
8	5417549-8
9	5417549-9
10	1-5417549-0
11	1-5417549-1
12	1-5417549-2
13	1-5417549-3
14	1-5417549-4
15	1-5417549-5
16	1-5417549-6
17	1-5417549-7
18	1-5417549-8
19	1-5417549-9
20	2-5417549-0
25	2-5417549-5

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .15 x nominal
 attenuation value
 < 5 dB: ± 0.75 dB
 Reflectance ≤ -55 dB

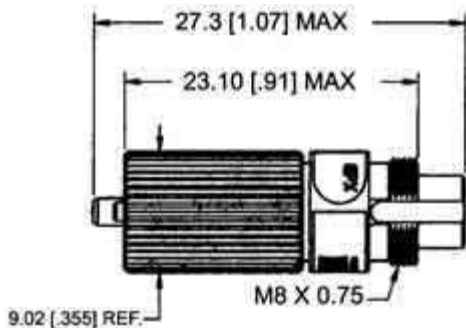
**Broadband Bandpass Attenuators
Operating Wavelength
1260-1360 nm & 1430-1625 nm**

Attenuation (dB)	Part Number
1	5417399-1
2	5417399-2
3	5417399-3
4	5417399-4
5	5417399-5
6	5417399-6
7	5417399-7
8	5417399-8
9	5417399-9
10	1-5417399-0
11	1-5417399-1
12	1-5417399-2
13	1-5417399-3
14	1-5417399-4
15	1-5417399-5
16	1-5417399-6
17	1-5417399-7
18	1-5417399-8
19	1-5417399-9
20	2-5417399-0
25	2-5417399-5

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal
 attenuation value
 < 5 dB: ± 0.50 dB
 0 dB: 0.50 dB max.
 Reflectance ≤ -55 dB

**Singlemode
D4 Attenuators, Build Out
Style, Fixed Value**

D4/PC



Note: Additional attenuation values
 available upon request.

**Dual Window Attenuators
Operating Wavelength
1310/1550 nm ±25 nm**

Attenuation (dB)	Part Number
5	5209570-5
10	1-5209570-0
15	1-5209570-5
20	2-5209570-0

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .15 x nominal
 attenuation value
 < 5 dB: ± 0.75 dB
 Reflectance ≤ -45 dB

Note: All part numbers are RoHS compliant.

Attenuators (Continued)

In Line Attenuators

Product Facts

- A range of fixed attenuation values. Standard values of 1 through 20, and 25 dB
- UPC offers Excellent Return Loss
- Attenuation is wavelength independent and polarization insensitive
- Low PDL
- Low modal noise
- High reliability
- ≤ -60 dB Reflectance (unconnectorized)
- Low cost
- Vibration resistant
- Single and Dual Window
- Designed to comply with Telcordia GR-910

Applications

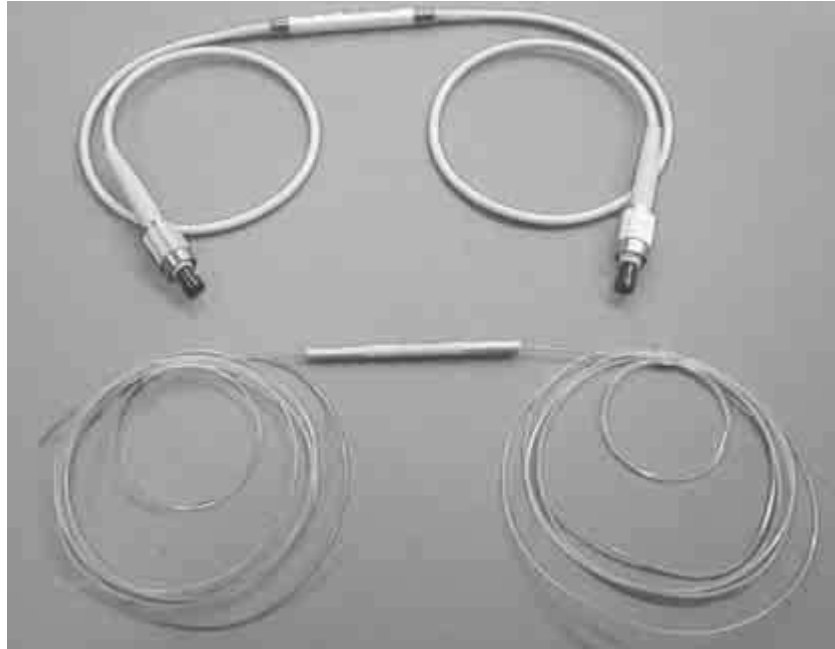
- Power leveling in DWDM transmission systems
- Test and Measurement
- Power attenuation at the receiver

Available Collateral

- Product Specification
108-2103 Heavy Duty
3 mm cable
108-2130 Medium Duty
900 μm cable
- Customer Drawings

Customizable Features

- Lead lengths
- Connectorized types, including SC, FC, ST, & LC
- LC available in Medium Duty (900 μm cable) only
- Available in Heavy Duty (3 mm cable) and Medium Duty (900 μm cable)



Specifications

- Attenuation Values** — 1-20 dB and 25 dB (Fixed)
- Reflectance** — ≤ -55 and -60 dB for UPC and unterminated respectively
- Operating Temperature** — -40°C to +75°C
- Vibration Resistance** — < 0.1 x attenuation

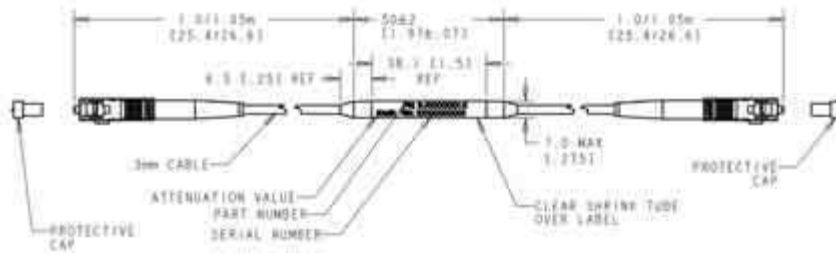
Tyco Electronics' high performance In Line Attenuators utilize a unique all fiber construction to absorb the optical signal.

By employing a Tyco Electronics' technology,

the design minimizes reflectance, attenuation tolerance, and PDL while maximizing reliability, environmental stability, and power handling. There are no filters, air gaps, or core mismatches.

Attenuators (Continued)

Singlemode In Line Attenuators, Heavy Duty (3 mm cable), Fixed Value SC - SC

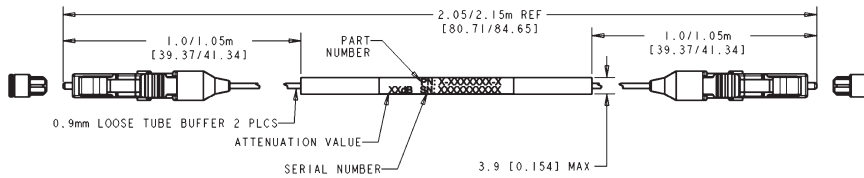


**Dual Window In Line Attenuators
Operating Wavelength
1310/1550 nm ±25 nm**

Attenuation (dB)	Part Number
1	6588517-1
2	6588517-2
3	6588517-3
4	6588517-4
5	6588517-5
6	6588517-6
7	6588517-7
8	6588517-8
9	6588517-9
10	1-6588517-0
11	1-6588517-1
12	1-6588517-2
13	1-6588517-3
14	1-6588517-4
15	1-6588517-5
16	1-6588517-6
17	1-6588517-7
18	1-6588517-8
19	1-6588517-9
20	2-6588517-0
25	2-6588517-5

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal attenuation value
 < 5 dB: ± 0.50 dB
 Reflectance ≤ -55 dB

Singlemode In Line Attenuators, Medium Duty (900 μm cable), Fixed Value LC to LC



**Dual Window In Line Attenuators
Operating Wavelength
1310/1550 nm ±25 nm**

Attenuation (dB)	Part Number
1	6588564-1
2	6588564-2
3	6588564-3
4	6588564-4
5	6588564-5
6	6588564-6
7	6588564-7
8	6588564-8
9	6588564-9
10	1-6588564-0
11	1-6588564-1
12	1-6588564-2
13	1-6588564-3
14	1-6588564-4
15	1-6588564-5
16	1-6588564-6
17	1-6588564-7
18	1-6588564-8
19	1-6588564-9
20	2-6588564-0
25	2-6588564-5

Note: Attenuation Tolerance, Ambient
 ≥ 5 dB: ± .10 x nominal attenuation value
 < 5 dB: ± 0.50 dB
 Reflectance ≤ -50 dB

Note: All part numbers are RoHS compliant.

Lensed Wavelength Division Multiplexer and Demultiplexer (LWDM) Products

Singlemode and Multimode Lensed WDM's

Features

- High isolation
- Wide bandpass
- Excellent reflectance
- Small footprint

Applications

- Two-way, single-fiber video links
- Instrumentation

Available Collateral

- Customer Drawings

Customizable Features

- Lead Lengths
- Connector Type
- Labels
- Optical Specifications



Tyco Electronics' Multiplexers allow use of a single fiber for simultaneous transmission of two signals of different wavelengths.

Tyco Electronics' Demultiplexers separate the combined wavelengths from the single fiber into individual fibers. The universal MUX/DEMUX's are available for multimode as well as singlemode applications.

Through the use of high-quality dichroic coatings, which act as bandpass filters, numerous wavelength combinations from 800-1600 nm can be accommodated.

Unlike the narrow bandpass of fused multiplexers, the minimum bandpass of these devices around the central wavelength is ± 50 nm. This feature makes these multiplexers ideal for use in broadband communication applications.

These devices are unique in that their optical performance is independent of polarization effects of the light source.

The 11.9 mm [7/16 inch] thick encapsulated devices with monolithic lens structures tolerate vibration and shock; their low profile permits easy printed circuit board mounting.

Specifications — Multimode

Insertion Loss (per FOTP-180) —

	Maximum
Without connectors	1.3 dB
With 2 connectors	2.3 dB

Change in Transmission over operating temperatures +/- 0.5 dB

Directivity (50/125, 62.5/125 only) —
Minimum: >45 dB

Wavelength Bandpass (nm) —
Minimum: 100 nm

Isolation —
35 dB Minimum

Fiber Types — 50/125 and 62.5/125

Specifications — Singlemode

Insertion Loss (per FOTP-180) —

	Maximum
Without connectors	1.3 dB
With 2 connectors	2.3 dB

Change in Transmission over operating temperatures +/- 0.5 dB

Directivity —
Minimum: >55 dB

Wavelength Bandpass (nm) —
Minimum: 100 nm

Return Loss (Reflectance) —

Port 1	≤ -40 dB
Port 2	≤ -55 dB
Port 3	≤ -55 dB

Without connectors

Isolation —
35 dB Minimum

Polarization Sensitivity — <0.1 dB

Fiber Types — (Corning SMF-28)

Temperature

Multimode —
-40°C to +65°C (Operating)
-40°C to +75°C (Storage)

Singlemode —
-20°C to +60°C (Operating)
-20°C to +60°C (Storage)

Weight — 42 grams [1.5 oz.]

Pigtail — 0.5 meter, [3 mm] OD cable, 900 μ m OD cable.

Terminations and connectors available on request.

Lensed Wavelength Division Multiplexer and Demultiplexer (LWDM) Products (Continued)

Singlemode and Multimode Lensed WDM's (Continued)

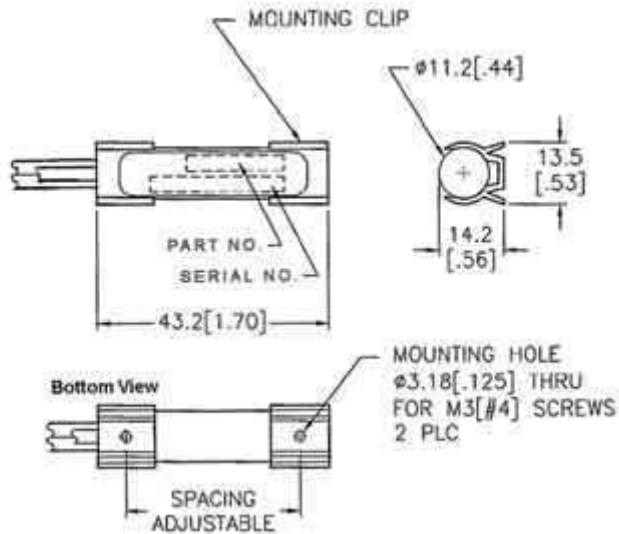
Part Numbers

Fiber	Cable Diameter	Connector	850/1310 nm	1310/1550 nm
50/125 Multimode	3 mm	ST	5099102-2	5099105-2
	3 mm	None	5099108-1	—
	900 μm	ST	9-5099102-2	—
	900 μm	None	9-5099108-1	9-5099111-1
62.5/125 Multimode	3 mm	ST	5099102-3	5099105-3
	3 mm	None	5099108-2	—
	900 μm	ST	9-5099102-3	9-5099105-3
Singlemode	900 μm	None	9-5099108-2	9-5099111-2
	3 mm	FC/APC	—	5099717-4
	3 mm	None	—	5099717-5
	3 mm	FC/UPC	—	5099717-6
	3 mm	ST/UPC	—	5099717-7
	3 mm	SC/UPC	—	5099717-8
	900 μm	FC/APC	—	9-5099717-4
	900 μm	None	—	9-5099717-5
	900 μm	FC/UPC	—	9-5099717-6
	900 μm	ST/UPC	—	9-5099717-7
900 μm	SC/UPC	—	9-5099717-8	

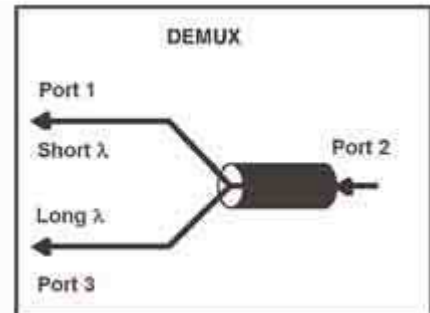
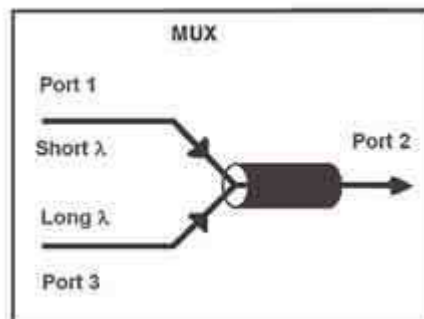
Note: Mux specific versions available when higher return loss required. Contact your local Tyco Electronics Sales Office. Cable length is 0.5 meter.

Note: All part numbers are RoHS compliant.

For custom mounting options, please contact your local Tyco Electronics' Sales Representative.



Application



Switches

Ruggedized Multimode Switches

**Refractive Plate Switch
2 x 2 Bypass Configuration**

**Part Number
6588871-1**

Product Facts:

- No optical path interruption @200 G's for 8 ms
- Successfully passed MIL-S-901D (Navy) Heavyweight Shock Test (Barge Test)
- Fiber type 62.5/125 μ m multimode

Specifications

Operating Temperature Range —
-30° to +85° C

Storage Temperature Range —
-40° to +85° C

Durability —
>1,000,000 cycles

Minimum Actuation Voltage —
4.75 V

Maximum Actuation Voltage —
5.25 V

Actuation Current at Typical —
5.0 V

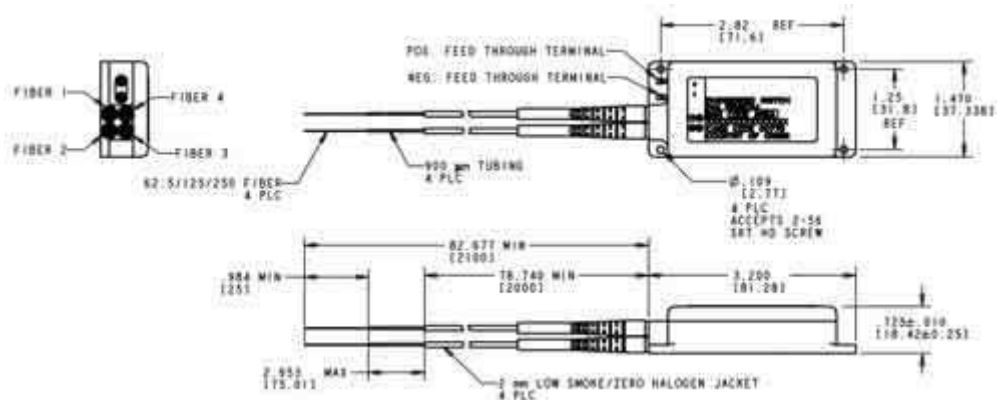
Actuation Voltage —
100mA (maximum)



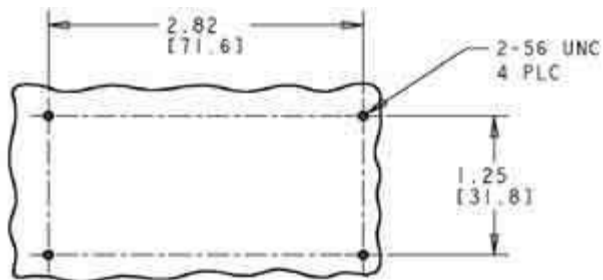
Tyco Electronics' "Ruggedized" Refractive Plate Switch is a multimode optical switch that is capable of withstanding a 200 G shock with a duration of >8ms without interruption of the signal path.

This switch is designed for extreme environments that require absolute product quality on optical installations and optical signal integrity.

Product Dimensions:



NOTE
Dimensions are Inches over millimeters



Recommended Mounting Layout

Note: All part numbers are RoHS compliant.

Switches (Continued)

- Multimode
- 1 x 2 SPDT Switch
- Dual 1 x 2 DPDT Switch
- 2 x 2 Bypass Switch

Product Facts

- Low profile
- Utilizes pivoting mirror
- Wide wavelength range
- Low insertion loss
- Excellent repeatability
- Environmentally stable
- Shock and vibration resistant
- Board or chassis mounting
- Optical & electrical leads exit from one end for easy cable routing



Tyco Electronics Low Profile Fiber Optic Switches are miniature, board mountable devices that permit the switching of an optical signal from one fiber to another. Switching is accomplished by a slight pivoting motion of a spherical mirror which reflects the optical signal to the appropriate fiber. This patented imaging technology provides very low optical loss.

Tyco Electronics' Fiber Optic Switches can be terminated with any Tyco fiber optic connector, and they are

available in the following configurations:

■ **1 x 2 SPDT Switch**

■ **Dual 1 x 2 DPDT Switch**

Tyco Electronics' SPDT and DPDT Switches permit the transfer of optic signals from an input fiber to either of two output fibers. Switches are applied to the positive terminal. The switch reverts to its original state when power is removed.

■ **2 x 2 Bypass Switch**

Tyco Electronics' Bypass Switches provide bypass protection for fiber optic ring networks. They also provide bypass protection for fiber optic ring networks per IEEE 802.5 and ANSI FDDI standards.

A self-test path permits testing the node's transmitter against its receiver when the switch is in the bypass mode. This transmitter - receiver path is attenuated to prevent saturation of the receiver, while maintaining minimal light loss in the bypass path.

Specifications

Configuration	1 x 2 and Dual 1 x 2	2 x 2 Fully Reversing Bypass
Switching speed	10 milliseconds maximum	10 milliseconds maximum
Operating wavelength	750–1450 nanometers	750–1450 nanometers
Insertion loss at 1300 nm (Includes 2 connectors)	1.8 dB max. per FOTP-34, Method A2	1.8 dB max. per FOTP-34, Method A2 5 dB on loopback path max
Crosstalk	≤45 dB per FOTP-42	≤45 dB per FOTP-42
Switch driver	5 V at 80mA max.	5 V at 80mA max.
Drop In/Drop Out	Drop In: 4.0 V minimum	Drop In: 4.0 V minimum
Voltage	Drop Out: 0.5 V minimum	Drop Out: 0.5 V minimum
Fiber types	Graded index 50/125, 62.5/125 (others available upon request)	Graded index 50/125, 62.5/125 (others available upon request)
Lead length	1 meter	1 meter
Temperature range	Operating –10°C to +65°C per FOTP-3, C2 Storage –30°C to +70°C per FOTP-188, 4	Operating –10°C to +65°C per FOTP-3, C2 Storage –30°C to +70°C per FOTP-188, 4
Connector styles	ST Style (others available upon request)	ST Style (others available upon request)
Electrical interface	Bent pins for PCB soldering Straight pins for soldering, or Tyco Electronics modular connector	Bent pins for PCB soldering Straight pins for soldering, or Tyco Electronics modular connector
Durability	>1 million cycles	>1 million cycles
Weight (unconnectorized)	<1 oz.	<1 oz.

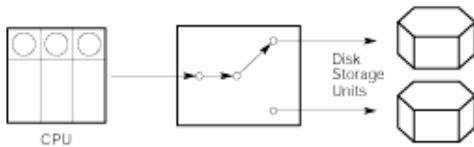
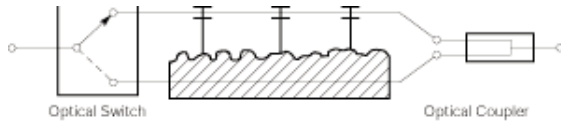
Switches (Continued)

Multimode
1 x 2 SPDT Switch
Dual 1 x 2 DPDT Switch
2 x 2 Bypass Switch (Continued)

1 x 2 SPDT

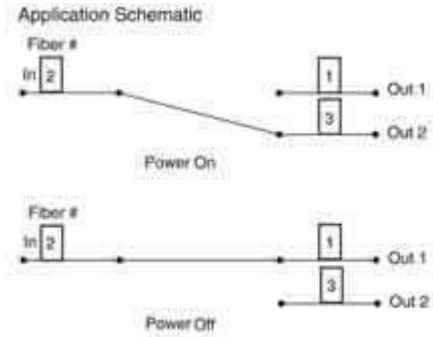
Application Information

Possible Application



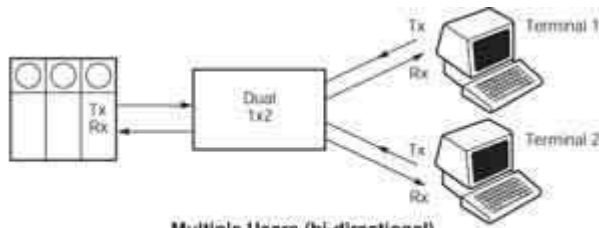
Multiple Users (uni-directional)

Schematic



Dual 1 x 2 DPDT

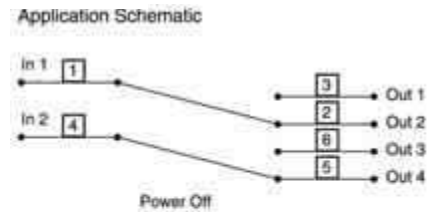
Possible Application



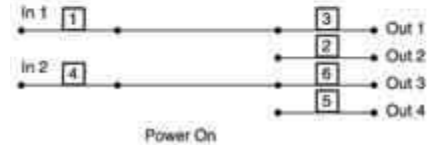
Multiple Users (bi-directional)

Schematic

Position 1

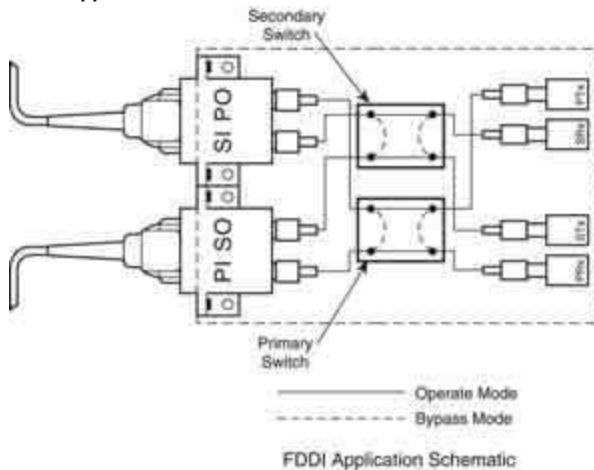


Position 2

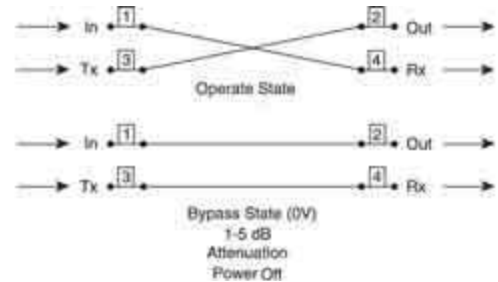


2 x 2 Bypass Fully Reversing

Possible Application



Schematic

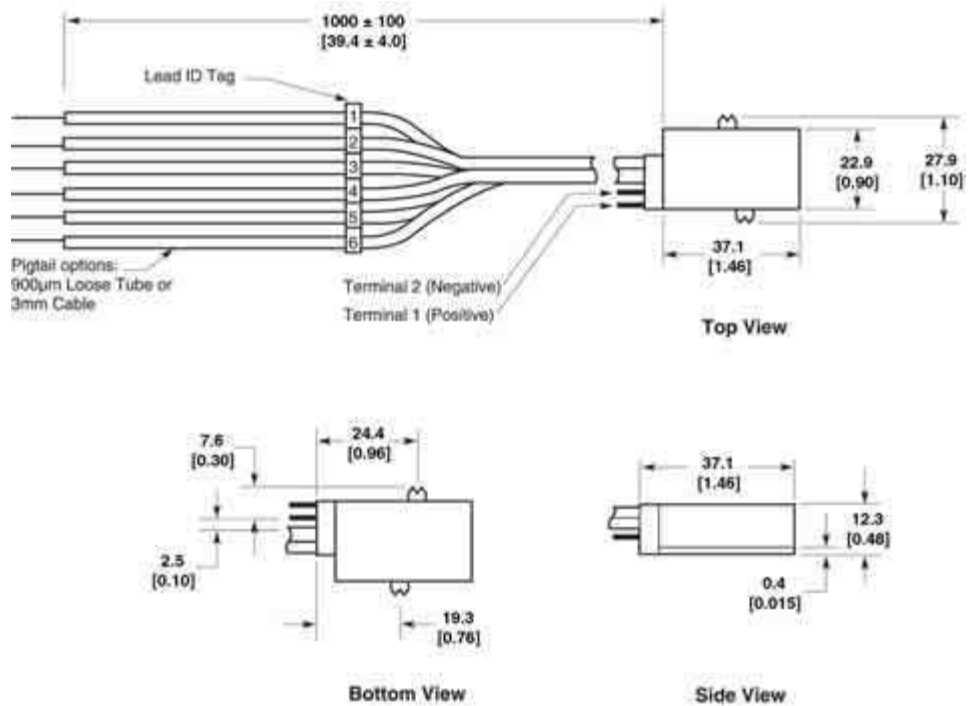


Switches (Continued)

Multimode
1 x 2 SPDT Switch
Dual 1 x 2 DPDT Switch
2 x 2 Bypass Switch (Continued)

Dimensions

Switch	Fiber Leads Used
1 x 2 SPDT	1,2,3
Dual 1 x 2 DPDT	1,2,3,4,5,6
2 x 2 Bypass	1,2,3,4



Part Number Information

Switch Type:	Electrical Interface	Fiber Connector	900 µm Loose Tube Cable		3 mm Cable Jacket	
			Fiber Size 50/125	Fiber Size 62.5/125	Fiber Size 50/125	Fiber Size 62.5/125
1 X 2	Bent Pin	None	—	—	5099403-1	5099403-2
		ST Style	5099414-1	5099414-2	5099415-1	5099415-2
		SC Style	—	—	8-5099403-1	8-5099403-2
	Straight Pin	None	5099420-1	5099420-2	—	5099421-2
		ST Style	—	—	5099427-1	5099427-2
		SC Style	8-5099420-1	8-5099420-2	—	8-5099421-2
Dual 1 X 2	Bent Pin	None	5099973-1	5099973-2	5099974-1	5099974-2
		ST Style	—	—	—	—
		SC Style	8-5099973-1	8-5099973-2	8-5099974-1	8-5099974-2
	Straight Pin	None	5099979-1	5099979-2	—	—
		ST Style	5099981-1	5099981-2	5099982-1	5099982-2
		SC Style	8-5099979-1	8-5099979-2	—	—
2 X 2 Bypass	Bent Pin	None	—	—	5099405-1	5099405-2
		ST Style	5099416-1	5099416-2	5099417-1	5099417-2
		SC Style	—	—	8-5099405-1	8-5099405-2
	Straight Pin	None	—	—	5099423-1	5099423-2
		ST Style	—	—	5099429-1	5099429-2
		SC Style	—	—	8-5099423-1	8-5099423-2

Fiber Type:	50/125	62.5/125
	-1	-2

Note: All part numbers are RoHS compliant.

Switches (Continued)

**Multimode
Bypass Switches**

Product Facts

- Increases reliability of mission-critical network applications
- Low insertion loss — 1.8 dB typical, including connectors
- Choice of 62.5/125 μm , 50/125 μm
- Choice of FSD MIC, ST-style, or duplex SC connectors and ports
- Rack or panel-mount versions
- Compact size with all front-mounted connections to conserve space
- High-speed optical switching
- Simple to install



Tyco Electronics' Bypass Switch is a second-generation device that allows a dual-attach station to be bypassed without loss of ring integrity. The switch module contains two fully reversing optical bypass switches that direct the optical signals to the appropriate fiber according to signals on the device's electrical interface.

A spherical mirror, which is pivoted at high speeds between two stable positions, reflects light into

specific fibers in either the operate or bypass state. Signal attenuation is very low on the network path. In the bypass state, the path from transmitter to receiver is attenuated to prevent receiver saturation. Holding the switches in the operating (non-bypass) state requires a 5-VDC, 160-mA power. Both switches return to the bypass state if the power is removed. Switching occurs in less than 10 ms.

The modules are easy to install between a dual-

attached station and the ring. Pigtailed optical-fiber cables connect the switch module to the node, while the primary and secondary ring cables connect to the switch's A and B ports.

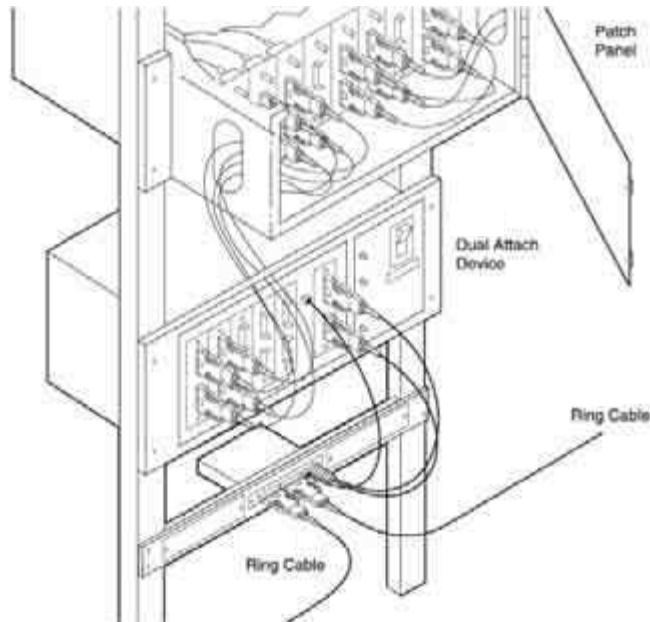
The electrical connection is supplied by one of three standard electrical interfaces. A status LED lights when the switch is in the operate state. The bypass switch can be either booth panel or rack mounted.

Singlemode Bypass Modules

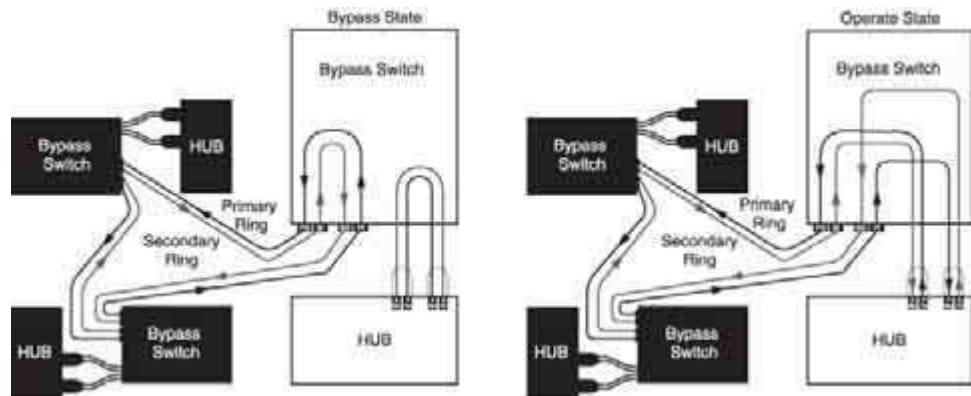
Tyco Electronics offers Singlemode Bypass Modules designed to meet your optical path protection needs. For more information, please consult your local Tyco Electronics Sales Representative or call Tyco Electronics Product Information Center at 1-800-522-6752.

Switches (Continued)

Multimode Bypass Switches
(Continued)



Switch Operation: Bypass and Operate States



Insertion Loss

Operate Mode		Power On
PI Line to PRX Station		1.8 dB Max.
SI Line to SRX Station		1.8 dB Max.
PTX Station to PO Line		1.8 dB Max.
STX Station to SO Line		1.8 dB Max.
Bypass Mode		Power Off
PI Line to PO Line		1.8 dB Max.
SI Line to SO Line		1.8 dB Max.
PTX Station to PRX Line		5.0 dB Max.
STX Station to SRX Line		5.0 dB Max.

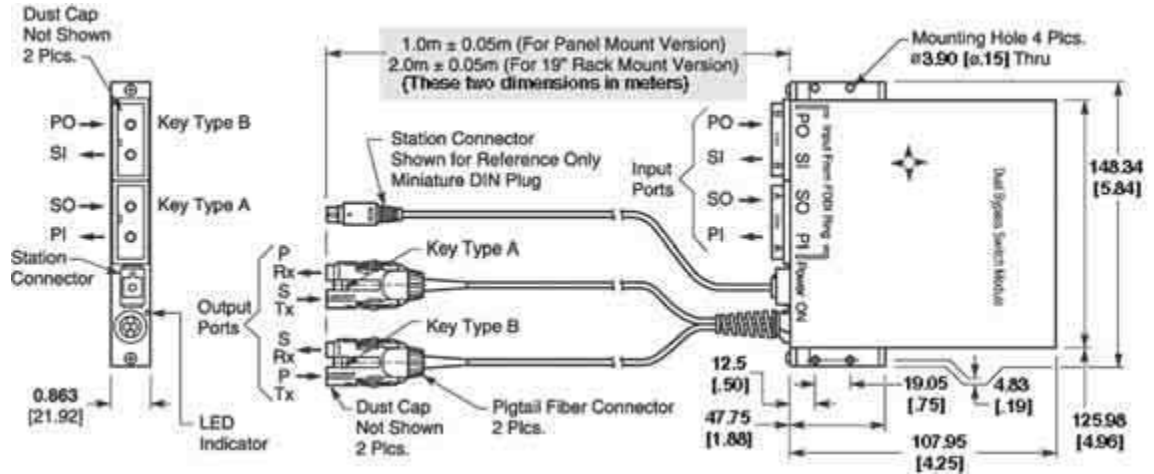
Note: FOTP-34, Method A2. IL values given for ST/SC options.

Specifications

- Switching Speed** — 10 ms max.
- Operating Wavelength** — 750 - 1450 nm
- Crosstalk** — ≤45 dB (FOTP-42)
- Switch Driver** — 5 V at 160 mA
- Fiber Type** — 62.5/125 μm or 50/125 μm graded index
- Operating Temperature** — -10°C to +65°C (FOTP-3, Condition C2)
- Storage Temperature** — -30°C to +70°C (FOTP-3, Condition C2)
- Durability** — >1 million cycles
- Weight** — 12 oz [340 g]

Switches (Continued)

Multimode Bypass Switches
(Continued)



Switch Module Base Part Numbers

Input Port Interface	Mounting	Part Numbers					
		Optical Fiber Pigtails					
		62.5/125 μm Fiber			50/125 μm Fiber		
		FSD MIC	ST-style	SC	LC	FSD MIC	SC
FSD MIC	Panel	5209161	5209162	5209163	—	5209167	—
	Rack	5209164	5209165	5209166	—	5209170	—
ST	Panel	—	5209174	5209175	—	—	—
	Rack	—	5209177	—	—	—	—
Duplex SC	Panel	—	—	5209187	1918973	—	5209193
	Rack	5209188	—	5209190	—	—	5209196

Note: All part numbers are RoHS compliant.

Switch Module Dash Numbers: Electrical Interface

Dash Number	Station Connector
-3	6-pos. Shielded Modular Plug
-4	6-pos. Shielded Miniature Circular DIN Plug
-6	4-pos. Modular Plug

Note: The electrical cable consists of an 8-position modular plug at one end for connecting to the switch and one of the connectors listed at the other end.

Ordering Information

Select the required switch module. To the base part number for the module, add the dash number for the electrical interface you require for the station connector. Example: 5209163-3 is a switch with FSD MIC receptacles on ring ports, duplex SC connectors on the fiber pigtails, and a 6-position modular plug on the electrical cable.

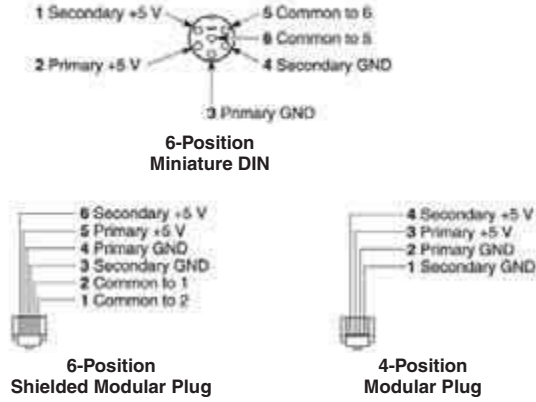
For other connector interfaces, contact your local Tyco Electronics Sales Representative

Switches (Continued)

Multimode Bypass Switches
(Continued)

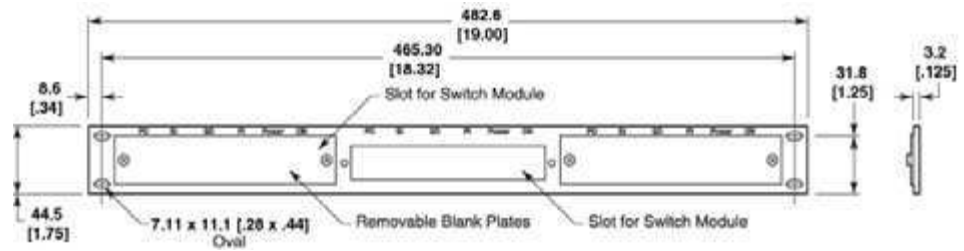
Station Connector and Pinouts

Contact ID Shown from Mating End of Station Connector



To Order the Electrical Interface Powercord Separately:

Part Number	Station Connector
5209503-1	6-pos. Modular Plug
5209504-1	6-pos. Shielded Miniature DIN Plug
5209506-1	4-pos. Modular Plug



Rack-Mount Panel

Part Number 209197-1 Mounts in a 19-inch rack and accepts up to three switch modules.

Note: All part numbers are RoHS compliant.