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THORLABS

PMC780-90B-FC - July 12, 2016

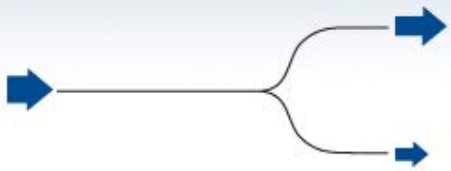
Item # PMC780-90B-FC was discontinued on July 12, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

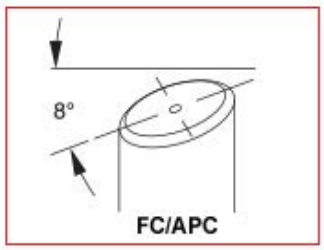
780 nm 1x2 POLARIZATION-MAINTAINING FIBER OPTIC COUPLERS / TAPS

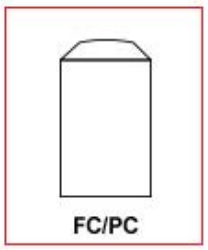
- 780 nm Center Wavelength
- 50:50 and 90:10 Split Ratios
- Polarization Extinction Ratio (PER) ≥ 16 dB

PMC780-50B-APC

Use for Splitting Signals







Hide Overview

OVERVIEW

Features

- 1x2 PM Couplers with 780 nm Center Wavelength
- High Polarization Extinction Ratio ≥16 dB
- 2.0 mm Narrow Key FC/PC or FC/APC Connectors for Low Insertion Loss (See Tables Below)
- Connector Key Aligned to Slow Axis

1x2 PM Coupler Selection Guide	
Center Wavelength	**Bandwidth**
630 nm	±15 nm
780 nm	±15 nm
1064 nm	±15 nm
1310 nm	±15 nm
1550 nm	±15 nm

Common Specifications	
Bandwidth	±15 nm
Maximum Input Power Total	1 W
Operating Temperature	-20 to 70 °C
Storage Temperature	-40 to 85 °C
Fiber Length	0.8 m Each Leg
Fiber Jacket	Ø900 µm Loose Tubing
Dimension	Ø3 mm x 70.1 mm

Note: All specifications are measured without connectors.

Thorlabs' high-performance 1x2 polarization-maintaining fiber couplers are designed for operation at 780 nm and are available with 50:50 and 90:10 couplng ratios. The Panda-style polarization-maintaining fiber in each leg is housed inside Ø900 µm loose furcation tubing and terminated with an FC/PC or FC/APC connector. Please note that these couplers only work with light launched into the slow axis.

Notable features include low excess loss, small package size (Ø3 mm x 70.1 mm), and high polarization extinction ratio (see the Specifications tables below and to the right). These couplers are commonly used for optical sensors, optical amplifiers, and fiber gyroscopes.

If a custom configuratoin is needed, please contact technical support for information.

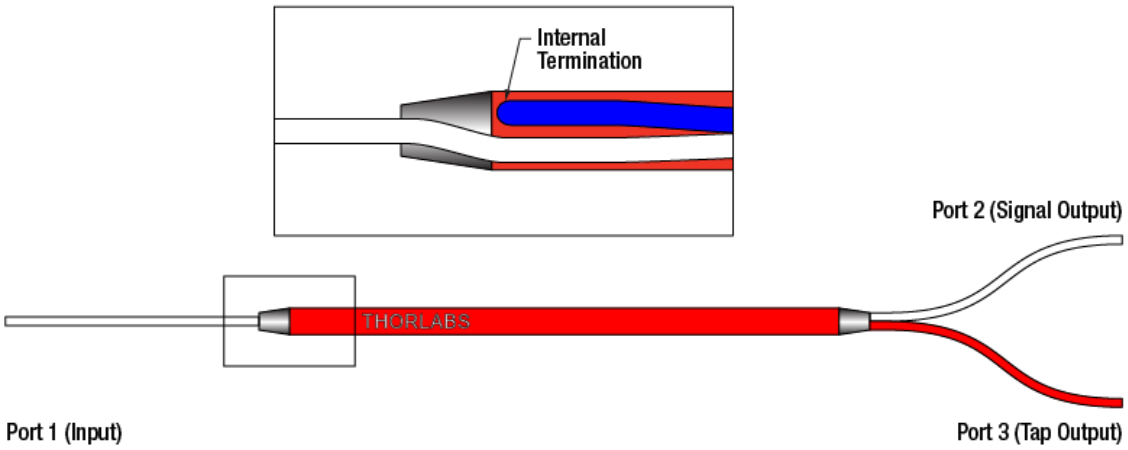
Alternative Fiber Coupler Options								
Double-Clad Couplers	Single Mode Couplers			Multimode Couplers		Polarization-Maintaining Couplers		Wavelength Division Multiplexers (WDM)
2x2	1x2	2x2	1x4	Graded-Index 1x2	Step-Index 2x2	1x2	2x2	

Hide 1x2 Coupler Tutorial

1X2 COUPLER TUTORIAL

Definition of 1x2 Fused Fiber Optic Coupler Specifications

This tab provides a brief explanation of how we determine several key specifications for our 1x2 couplers. 1x2 couplers are manufactured using the same process as our 2x2 fiber optic couplers, except the second input port is internally terminated using a proprietary method that minimizes back reflections. 1x2 couplers are not recommended for light combining applications and should only be used to split light. For combining light of different wavelengths, Thorlabs offers a line of wavelength division multiplexers (WDMs). The ports on our 1x2 couplers are configured as shown in the schematic below.



Excess Loss

Excess loss in dB is determined by the ratio of the total input power to the total output power:

$$\text{Excess Loss}(dB) = 10\log\frac{P_{port1}(mW)}{P_{port2}(mW)+P_{port3}(mW)}$$

P_{port1} is the input power at port 1 and P_{port2}+P_{port3} is the total output power from Ports 2 and 3. All powers are expressed in mW.

Optical Return Loss (ORL) / Directivity

The directivity refers to the fraction of input light that is lost in the internally terminated fiber end within the coupler housing when port 1 is used as the input. It can be calculated in units of dB using the following equation:

$$\text{Directivity}(dB) = 10\log\frac{P_{port1b}(mW)}{P_{port1}(mW)}$$

where P_{port1} and P_{port1b} are the optical powers (in mW) in port 1 and the internally terminated fiber, respectively. This output is the result of back reflection at the junction of the legs of the coupler and represents a loss in the total light output at ports 2 and 3. For a 50:50 coupler, the directivity is equal to the optical return loss (ORL).

Insertion Loss

The insertion loss is defined as the ratio of the input power to the output power at one of the output legs of the coupler (signal or tap). Insertion loss is always specified in decibels (dB). It is generally defined using the equation below:

$$\text{Insertion Loss}(dB) = 10\log\frac{P_{in}(mW)}{P_{out}(mW)}$$

where P_{in} and P_{out} are the input and output powers (in mW). For our 1x2 couplers, the insertion loss specification is provided for both signal and tap outputs; our specifications always list insertion loss for the signal output first. To define the insertion loss for a specific output (port 2 or port 3), the equation is rewritten as:

$$\text{Insertion Loss}_{port1\rightarrow port2}(dB) = 10\log\frac{P_{port1}(mW)}{P_{port2}(mW)}$$

$$\text{Insertion Loss}_{port1\rightarrow port3}(dB) = 10\log\frac{P_{port1}(mW)}{P_{port3}(mW)}$$

Calculating Insertion Loss using Power Expressed in dBm

Insertion loss can also be easily calculated with the power expressed in units of dBm. The equation below shows the relationship between power expressed in mW and dBm:

$$P(dBm) = 10\log P(mW)$$

Then, the insertion loss in dB can be calculated as follows:

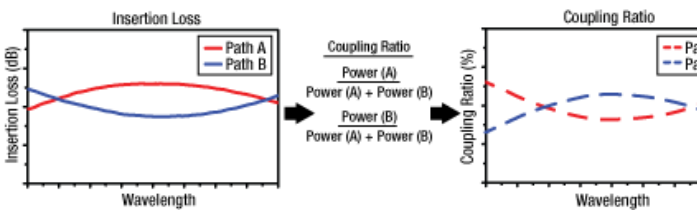
$$\text{Insertion Loss}(dB) = P_{in}(dBm) - P_{out}(dBm)$$

Coupling Ratio

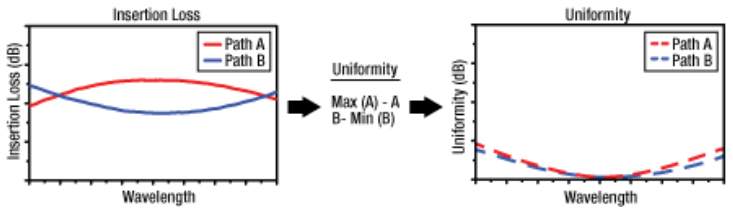
Insertion loss (in dB) is the ratio of the input power to the output power from each leg of the coupler as a function of wavelength. It captures both the coupling ratio and the excess loss. The coupling ratio is calculated from the measured insertion loss. Coupling ratio (in %) is the ratio of the optical power from each output port (ports 2 and 3) to the sum of the total power of both output ports as a function of wavelength. Path A represents light traveling from port 1 to port 2 while Path B represents light traveling from port 1 to port 3. It is not impacted by spectral features such as the water absorption region because both output legs are affected equally. Persistence plots showing the coupling ratio of our wideband couplers can be viewed by clicking on the blue info icons below.

Uniformity

The uniformity is also calculated from the measured insertion loss. Uniformity is the variation (in dB) of the insertion loss over the bandwidth. It is a measure of how evenly the insertion loss is distributed over the spectral range. The uniformity of Path A is the difference between the value of highest insertion loss and the solid red insertion loss curve (in the Insertion Plot below). The uniformity of Path B is the difference between the solid blue insertion loss curve and the value of lowest insertion loss. Persistence plots showing the uniformity of our wideband couplers can be viewed by clicking on the blue info icons below.



Click to Enlarge
A graphical representation of the coupling ratio calculation.



Click to Enlarge
A graphical representation of the Uniformity calculation.

780 nm, 1 x 2 Polarization Maintaining Fiber Optic Couplers

Item #[a]	Center Wavelength	Bandwidth	Coupling Ratio (%)	Extinction Ratio	Insertion Loss	Excess Loss	Directivity	Fiber Type	Termination
PMC780-50B-FC	780 nm	±15 nm	50:50	≥16.0 dB	≤4.1 / ≤4.1 dB	≤0.6 dB (Typ.)	≥55 dB	SM85-PS-U25D	FC/PC
PMC780-50B-APC									FC/APC
PMC780-90B-FC			90:10		≤1.6 / ≤12.0 dB				FC/PC

a. All specifications are measured without connectors during the manufacturing process.

Part Number	Description	Price	Availability
PMC780-50B-FC	**1x2 PM Coupler, 780 nm, 50:50, FC/PC Aligned to Slow Axis**	**$880.00 Volume Pricing Available**	**Today**
PMC780-50B-APC	**Customer Inspired!1x2 PM Coupler, 780 nm, 50:50, FC/APC Aligned to Slow Axis**	**$895.00 Volume Pricing Available**	**Lead Time**
PMC780-90B-FC	**1x2 PM Coupler, 780 nm, 90:10, FC/PC Aligned to Slow Axis**	**$880.00 Volume Pricing Available**	**Lead Time**

Visit the *780 nm 1x2 Polarization-Maintaining Fiber Optic Couplers / Taps* page for pricing and availability information:
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=10024