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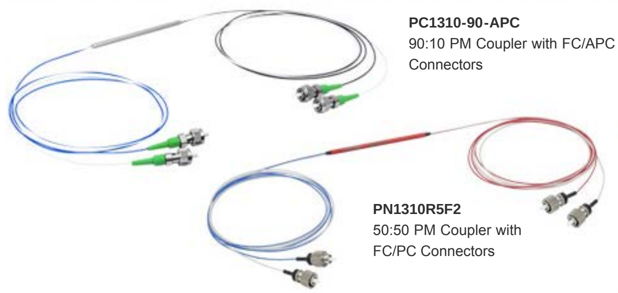
THORLABS

PC1310-50-APC - April 12, 2017

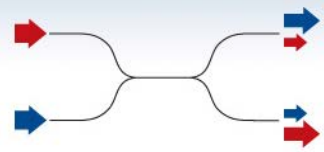
Item # PC1310-50-APC was discontinued on April 12, 2017. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

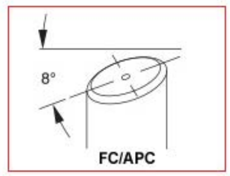
1310 NM 2X2 POLARIZATION-MAINTAINING FIBER OPTIC COUPLERS / TAPS

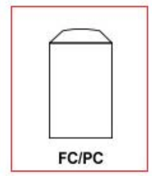
- PM Couplers with 1310 nm Center Wavelength
- 50:50, 75:25, 90:10, and 99:1 Split Ratios
- Standard and Premium Versions Available



Combine or "Tap Off" Signals







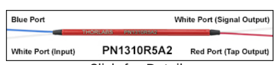
Hide Overview

OVERVIEW

Features

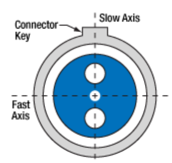
- 1310 nm Polarization-Maintaining Fiber Optic Couplers
- Two Versions Available
  - Standard: ≥18 dB PER Excluding Connectors
  - Premium: ≥20 dB PER Including Connectors
- 50:50, 75:25, 90:10, or 99:1 Split Ratios
- Bidirectional Coupling (Either End Can Be Used as an Input)
- 2.0 mm Narrow Key FC/PC or FC/APC Connectors
- Individual Test Report Included with Each Premium Coupler (See the *PER Measurement* Tab; Click Here for a Sample Data Sheet)
- Contact Us for Custom Wavelength, Coupling Ratio and Connector Options

2x2 PM Coupler Selection Guide	
Center Wavelength	**Bandwidth**
1064 nm	±15 nm
1310 nm	±15 nm
1550 nm	±15 nm



Click for Details
Each premium coupler is engraved with the Item #, serial number, and key specifications for easy identification. When the white port on the left is used as the input, the coupling ratios listed below correspond to the ratio of the measured output power from the white (signal output) port to the red (tap output) port.

Panda PM Fiber Cross Section



These 2x2 Polarization-Maintaining (PM) Fiber Couplers are designed for operation at 1310 nm and are available with 50:50, 75:25, 90:10, or 99:1 coupling ratios. 2x2 couplers are bidirectional and can be used to both split and combine signals (see the *2x2 Coupling Examples* tab).

PM couplers are manufactured using panda-style PM fiber which allows them to maintain a high polarization extinction ratio (PER) when light is launched along the slow axis of the fiber. As seen in the diagram to the right, stress rods run parallel to the fiber's core and apply stress that creates birefringence in the fiber's core, allowing polarization-maintaining operation. Typical applications for PM couplers include optical sensors, optical amplifiers, and fiber gyroscopes.

Thorlabs' Premium PM Couplers (indicated by Item #'s starting with PN) provide an improved PER as compared to our standard couplers and a wide -40 °C to 85 °C operating range. These couplers undergo extensive testing and verification of the PER; details of our testing procedures are provided on the *PER Measurement* tab. Testing results are included with a data sheet that is shipped with premium couplers. A sample data sheet for the 1310 nm PM couplers can be viewed here.

These couplers are offered from stock with 2.0 mm narrow key FC/APC connectors while premium couplers are available with 2.0 mm narrow key FC/PC and FC/APC connectors, as outlined in the tables below. When using the couplers as a combiner, connect a fiber terminator to the unused output port, as a fraction of the light will travel through this leg of the device. Fiber leads are jacketed in Ø900 µm Hytrel® tubing and the leads are 0.8 m long. Custom coupler configurations with other wavelengths, fiber types, coupling ratios, aligment axes, or port configurations are also available. Please contact Tech Support with inquiries.

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 PER Measurement

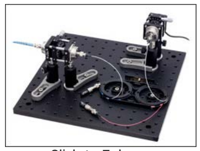
PER MEASUREMENT

Measurement of Polarization Extinction Ratio (PER)

The polarization extinction ratio (PER) is a measure of how well a polarization-

Item #[a]	Description	Qty.
Light Source (Not Shown)		
S5FC1005P	PM Benchtop SLD Source, 1550 nm	1

maintaining (PM) fiber or device can prevent cross coupling between the different polarization axes of the fiber. External stress on a fiber from sources such as heating, bending, or pulling can all cause the PER to change.



Click to Enlarge
Setup to Measure Extinction Ratio of a 1550 nm PM Coupler

P1-1550PM-FC-1	Patch Cable, FC/PC, 1550 nm, PM Panda Style, 1 m	1
Linear Polarizer Module		
PAF-X-11-PC-C	FiberPort, FC/PC, 1050 nm - 1620 nm	2
CP08FP	Cage Plates for Mounting FiberPorts	2
LPNIR050-MP2	Linear Polarizer	1
CRM1P	Cage Rotation Mount	1
SM1A6T	Adapter with External SM1 Threads and Internal SM05 Threads	1
ER2-P4	2" (50.8 mm) Long Cage Rods, 4 Pack	1
Analyzer Module		
PAF-X-11-PC-C	FiberPort, FC/PC, 1050 nm - 1620 nm	1
CP08FP	Cage Plates for Mounting FiberPorts	1
LPNIR050-MP2	Linear Polarizer	1
CRM1P	Cage Rotation Mount	1
SM1A6T	Adapter with External SM1 Threads and Internal SM05 Threads	1
CP02	SM1-Threaded (1.035"-40) Cage Plate	1
PM122D	Digital Power Meter, 700 - 1800 nm	1
ER2-P4	2" (50.8 mm) Long Cage Rods, 4 Pack	1

- Item list does not include the posts, post holders, clamps, breadboard, or fiber component tray shown in the photo to the left.

There are two accepted techniques for measuring PER in a fiber coupler. The most common method uses a low-coherence (unpolarized or circularly polarized) broadband light source and measures the extinction ratio with a linear polarizer and power meter. An alternative method uses a narrowband, high-coherence light source and measures the PER with a polarimeter.

Thorlabs uses the power meter method to characterize the extinction ratio performance of the premium PM fiber couplers sold on this page. An example of the power meter setup is shown in the image and table to the right. A broadband light source is input into the linear polarizer module, which sets the polarization of light input into the coupler. The output from one of the legs is sent to the analyzer module, which contains another polarizer and the power meter for measuring the output. Alternatively, the analyzer module can be replaced with an extinction ratio meter (Item # ERM100).

The PER is measured using the test procedure below.

Testing Procedure

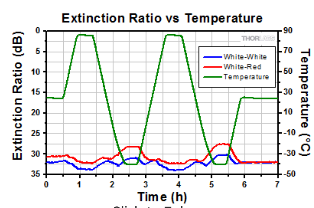
- Prepare the fiber end faces of the PM coupler to connect to the measurement setup.
    - For bare fiber ends, strip and cleave the fibers. Use a bare fiber terminator, such as the BFT1, to create a temporary fiber termination.
    - For terminated fiber ends, clean and inspect the connector end faces.
    - Attach a fiber optic light trap to any fiber leads not being measured.
- Adjust the polarizers in the linear polarizer and analyzer modules sequentially until a minimum power value is measured by the power meter. Record the measured value as P_{min}.
- Rotate the analyzer rotation mount by 90°. Then record the measured value as P_{max}.

After P_{min} and P_{max} are measured, the extinction ratio can be calculated using the equation:

$$PER(dB) = -10\log\left(\frac{P_{min}}{P_{max}}\right)$$

Temperature Cycling Tests

PM couplers typically exhibit diminished PER performance when used at sub-zero temperatures due to the contraction of the adhesives that are used in the coupler package. This effect disrupts the polarization state of light within the coupler that leads to a decrease in PER. Soft adhesives can be used to mitigate the impact of cold-temperature operation, but can create reliability issues at higher temperatures. At high temperatures, adhesives can soften permanently, which changes the optical properties of the coupler.



Click to Enlarge
PER measured using the white-white path and white-red path through a PN1550R5A1 PM coupler.

Thorlabs' Premium PM Couplers use a proprietary packaging process and design as well as careful selection of adhesives to enable operation over a very wide temperature range (from -40 °C to 85 °C) without significant changes to PER and other optical specifications. The graph to the right illustrates a 7-hour temperature cycling test performed on a PN1550R5A1 PM fiber coupler showing that the PER remains stable over a wide temperature range.

Hide 2x2 Coupler Tutorial

2X2 COUPLER TUTORIAL

Definition of 2x2 Fused Fiber Optic Coupler Specifications

This tab provides a brief explanation of how we determine several key specifications for our 2x2 couplers. The ports of the coupler are defined as shown in the coupler schematic below. In the sections below, the light is input into port 1. Ports 3 and port 4 would then be considered the signal and tap outputs, respectively.

Excess Loss

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

$$\text{Excess Loss}(dB) = 10\log\frac{P_{port1}(mW)}{P_{port3}(mW) + P_{port4}(mW)}$$

P_{port1} is the input power at port 1 and $P_{port3}+P_{port4}$ is the total output power from Ports 3 and 4, assuming no input power at port 2. All powers are expressed in mW.

Optical Return Loss (ORL) / Directivity

The directivity refers to the fraction of input light that exits the coupler through an input port (i.e., light exiting at port 2) instead of the intended output port . It can be calculated in units of dB using the following equation:

$$\text{Directivity}(dB) = 10\log\frac{P_{port1}(mW)}{P_{port2}(mW)}$$

where P_{port1} and P_{port2} are the optical powers (in mW) in port 1 and port 2, 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 3 and 4. 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 2x2 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 3 or port 4), the equation is rewritten as:

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

$$\text{Insertion Loss}_{port1\rightarrow port4}(dB) = 10\log\frac{P_{port1}(mW)}{P_{port4}(mW)}$$

A similar equation can be used to define the insertion loss at port 2 for input at port 1. However, as seen above, this is already defined as the directivity of the coupler.

Insertion loss inherently includes both coupling (e.g., light transferred to the other output leg) and excess loss (e.g., light lost from the coupler) effects.
The maximum allowed insertion loss for each output, signal and tap, are both specified. Because the insertion loss in each output is correlated to light coupled to the other output, no coupler will ever have the maximum insertion loss in both outputs simultaneously.

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:

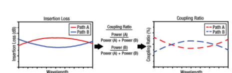
$$P(dBm) = 10\log P(mW)$$

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

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

Coupling Ratio

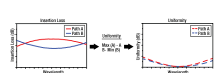
Insertion loss (in dB) is the ratio of the input power to the output power from each leg of the coupler as a function of wavelength. It captures both the coupling ratio and the excess loss. The coupling ratio is calculated from the measured insertion loss. Coupling ratio (in %) is the ratio of the optical power from each output port (A and B) to the sum of the total power of both output ports as a function of wavelength. It is not impacted by spectral features such as the water absorption region because both output legs are affected equally.



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

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 above). The uniformity of Path B is the difference between the solid blue insertion loss



Click to Enlarge
A graphical representation of the Uniformity calculation.

curve and the value of lowest insertion loss.

Hide 2x2 Coupling Examples

2X2 COUPLING EXAMPLES

General Coupling Examples

Animated example of 90:10 splitting and 50:50 mixing.

2x2 fused fiber optic couplers can split or mix light between two optical fibers with minimal loss and at a specified coupling ratio. Thorlabs' couplers are available from stock in one of four ratios: 50:50, 75:25, 90:10, or 99:1. All of our fused fiber optic couplers are bidirectional, meaning that all ports can be used as an input. The animation to the right shows several simple coupling examples.

The terms "Signal Output" and "Tap Output" refer to the higher and lower power outputs, respectively. To illustrate this, if light is input into the white port of the TW1064R1A2A coupler (99:1 coupling ratio), 99% of the transmitted light is coupled into the white port on the other side of the coupler while the other 1% is coupled into the red port. In this example, the second white port is referred to as the signal output port, and the red port is referred to as a tap output port. For a 50:50 coupler, the signal and tap ports would have the same power output.

In our wideband couplers, the signal always propagates from blue to red or white to white, while the tap always propagates from blue to white or white to red. For our narrowband couplers, please refer to the datasheet included with the coupler to determine signal and tap propagation paths.

Specific Coupling Examples

In the examples below, two 2x2 1300 nm Wideband Fiber Optic Couplers (50:50 and 90:10 coupling ratios) are used with input signals A and B. The table to the right lists typical insertion loss (signal and tap outputs) for each coupler. To calculate the power at any given output, subtract the insertion loss for the signal or tap output from the input power (in dBm).

Coupling Ratio	Insertion Loss (Signal)	Insertion Loss (Tap)
90:10	0.6 dB	10.1 dB
50:50	3.2 dB	3.2 dB

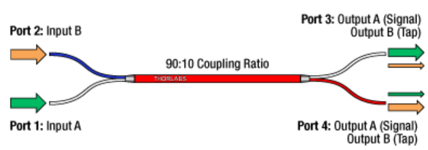
Example 1: Splitting Light from a Single Input

For this example, the couplers are used to split light from a single input into the signal and tap outputs as indicated in the diagrams below. In the table below, the output ports are highlighted in green.

	90:10 Coupling Ratio	50:50 Coupling Ratio
Port	**Signal A**	**Signal A**
1 (Input)	10 dBm (10 mW)	10 dBm (10 mW)
2 (Not Used)	-	-
3 (Signal Output)	9.4 dBm (8.7 mW)	6.8 dBm (4.8 mW)
4 (Tap Output)	-0.1 dBm (1.0 mW)	6.8 dBm (4.8 mW)
Click on the Diagram for Power Distributions at Each Port		

Example 2: Mixing Two Signals from Two Inputs

In this example, the couplers are used to mix light from two inputs, designated Signal A and Signal B. The outputs contain a mixed signal composed of both Signal A and Signal B in ratios depending on the coupling ratio. All ports are indicated in the diagrams below. In the table below, the output ports are highlighted in green.

	90:10 Coupling Ratio		50:50 Coupling Ratio	
Port	**Signal A**	**Signal B**	**Signal A**	**Signal B**
1 (Input A)	5 dBm (3.2 mW)	-	5 dBm (3.2 mW)	-
2 (Input B)	-	8 dBm (6.3 mW)	-	8 dBm (6.3 mW)
3 (Output)	4.4 dBm (2.8 mW)	-2.1 dBm (0.6 mW)	1.6 dBm (1.4 mW)	4.8 dBm (3.0 mW)
4 (Output)	-5.1 dBm (0.3 mW)	7.4 dBm (5.5 mW)	1.6 dBm (1.4 mW)	4.8 dBm (3.0 mW)
Click on the Diagram for Power Distributions at Each Port				

Example 3: Coupling a Return Signal with a Reflector on Port 4

Here, the couplers are used to split light from a single input, however, in this example there is a 100% reflector on port 4, as shown in the diagrams below. As a result, the light is reflected back into the coupler and split again. The ports are indicated in the diagrams below. In the table below, the output ports for the initial pass are highlighted in green.

	90:10 Coupling Ratio		50:50 Coupling Ratio	
Port	**Signal A**	**Reflected Signal A**	**Signal A**	**Reflected Signal A**
1 (Input)	6 dBm (4.0 mW)	-14.2 dBm (0.04 mW)	6 dBm (4.0 mW)	-0.4 dBm (0.9 mW)
2 (No Input)	-	-4.7 dBm (0.34 mW)	-	-0.4 dBm (0.9 mW)
3 (Signal Output)	5.4 dBm (3.5 mW)	-	2.8 dBm (1.9 mW)	-
4 (Reflected Output)	-4.1 dBm (0.39 mW) Reflected	-	2.8 dBm (1.9 mW) Reflected	-
Click on the Diagram for Power Distributions				

at Each Port		

Hide 50:50 Fiber Couplers

50:50 Fiber Couplers

Premium Item #	Info	Center Wavelength	Bandwidth[a]	Coupling Ratio[a] (%)	Extinction Ratio[b]	Insertion Loss[a]	Excess Loss[a]	Fiber Type[c]	Termination[d]
PN1310R5F2		1310 nm	±15 nm	50:50	≥20.0 dB / ≥20.0 dB (Including Connectors)	≤3.4 dB / ≤3.4 dB	≤0.3 dB (Typ.)	PM 13-U25D or Equivalent	FC/PC
PN1310R5A2									FC/APC

- Values are specified with a slow axis launch at room temperature without connectors and measured at the center wavelength through the white input port, as indicated in the diagram above.
- Extinction ratio is specified with a slow axis launch at room temperature with connectors and measured at the center wavelength through the white input port, as indicated in the diagram above. See the *PER Measurement* tab for more information on how extinction ratio is measured.
- The fiber used in this coupler is compatible with PM1300-XP fiber. Other fiber types may be available upon request. Please contact Tech Support with inquiries.
- The connectors are aligned to the slow axis of the fiber.

Standard Item #[a]	Info	Center Wavelength	Bandwidth	Coupling Ratio (%)	Extinction Ratio	Insertion Loss	Excess Loss	Fiber Type[b]	Termination[c]
PC1310-50-APC		1310 nm	±15 nm	50:50	≥18.0 dB / ≥18.0 dB (Excluding Connectors)	≤3.6 dB / ≤3.6 dB	≤0.3 dB (Typ.)	SM13-PR-U25A-H	FC/APC

- All specifications are measured without connectors during the manufacturing process.
- The fiber used in this coupler is compatible with PM1300-XP fiber.
- The connectors are aligned to the slow axis of the fiber.

Part Number	Description	Price	Availability
PN1310R5F2	2x2 PM Coupler, 1310 ± 15 nm, 50:50 Split, ≥20 dB PER, FC/PC Connectors	$495.00	Today
PN1310R5A2	2x2 PM Coupler, 1310 ± 15 nm, 50:50 Split, ≥20 dB PER, FC/APC Connectors	$536.00	Today
PC1310-50-APC	2x2 PM Coupler, 1310 ± 15 nm, 50:50 Split, ≥18 dB PER, FC/APC Connectors	$316.00	Lead Time

Hide 75:25 Fiber Couplers

75:25 Fiber Couplers

Premium Item #	Info	Center Wavelength	Bandwidth[a]	Coupling Ratio[a] (%)	Extinction Ratio[b]	Insertion Loss[a]	Excess Loss[a]	Fiber Type[c]	Termination[d]
PN1310R3F2		1310 nm	±15 nm	75:25	≥20.0 dB / ≥20.0 dB (Including Connectors)	≤1.6 dB / ≤6.5 dB	≤0.3 dB (Typ.)	PM 13-U25D or Equivalent	FC/PC
PN1310R3A2									FC/APC

- Values are specified with a slow axis launch at room temperature without connectors and measured at the center wavelength through the white input port, as indicated in the diagram above.
- Extinction ratio is specified with a slow axis launch at room temperature with connectors and measured at the center wavelength through the white input port, as indicated in the diagram above. See the *PER Measurement* tab for more information on how extinction ratio is measured.
- The fiber used in this coupler is compatible with PM1300-XP fiber. Other fiber types may be available upon request. Please contact Tech Support with inquiries.
- The connectors are aligned to the slow axis of the fiber.

Part Number	Description	Price	Availability
PN1310R3F2	2x2 PM Coupler, 1310 ± 15 nm, 75:25 Split, ≥20 dB PER, FC/PC Connectors	$495.00	Today
PN1310R3A2	2x2 PM Coupler, 1310 ± 15 nm, 75:25 Split, ≥20 dB PER, FC/APC Connectors	$536.00	Today

Hide 90:10 Fiber Couplers

90:10 Fiber Couplers

Premium Item #	Info	Center Wavelength	Bandwidth[a]	Coupling Ratio[a] (%)	Extinction Ratio[b]	Insertion Loss[a]	Excess Loss[a]	Fiber Type[c]	Termination[d]
PN1310R2F2		1310 nm	±15 nm	90:10	≥20.0 dB / ≥20.0 dB (Including Connectors)	≤0.8 dB / ≤10.5 dB	≤0.3 dB (Typ.)	PM 13-U25D or Equivalent	FC/PC
PN1310R2A2									FC/APC

- Values are specified with a slow axis launch at room temperature without connectors and measured at the center wavelength through the white input port, as indicated in the diagram above.
- Extinction ratio is specified with a slow axis launch at room temperature with connectors and measured at the center wavelength through the white input port, as indicated in the diagram above. See the *PER Measurement* tab for more information on how extinction ratio is measured.
- The fiber used in this coupler is compatible with PM1300-XP fiber. Other fiber types may be available upon request. Please contact Tech Support with inquiries.
- The connectors are aligned to the slow axis of the fiber.

		Center		Coupling	Extinction	Insertion	Excess		

Standard Item #[a]	Info	Wavelength	Bandwidth	Ratio (%)	Ratio	Loss	Loss	Fiber Type[b]	Termination[c]
PC1310-90-APC		1310 nm	±15 nm	90:10	≥18.0 dB / ≥18.0 dB (Excluding Connectors)	≤0.95 dB / ≤11.3 dB	≤0.3 dB (Typ.)	SM13-PR-U25A-H	FC/APC

- All specifications are measured without connectors during the manufacturing process.
- The fiber used in this coupler is compatible with PM1300-XP fiber.
- The connectors are aligned to the slow axis of the fiber.

Part Number	Description	Price	Availability
PN1310R2F2	2x2 PM Coupler, 1310 ± 15 nm, 90:10 Split, ≥20 dB PER, FC/PC Connectors	$495.00	Today
PN1310R2A2	2x2 PM Coupler, 1310 ± 15 nm, 90:10 Split, ≥20 dB PER, FC/APC Connectors	$536.00	Today
PC1310-90-APC	2x2 PM Coupler, 1310 ± 15 nm, 90:10 Split, ≥18 dB PER, FC/APC Connectors	$316.00	Today

Hide 99:1 Fiber Couplers

99:1 Fiber Couplers

Premium Item #	Info	Center Wavelength	Bandwidth[a]	Coupling Ratio[a] (%)	Extinction Ratio[b]	Insertion Loss[a]	Excess Loss[a]	Fiber Type[c]	Termination[d]
PN1310R1F2		1310 nm	±15 nm	99:1	≥20.0 dB / ≥20.0 dB (Including Connectors)	≤0.4 dB / ≤21.5 dB	≤0.3 dB (Typ.)	PM 13-U25D or Equivalent	FC/PC
PN1310R1A2									FC/APC

- Values are specified with a slow axis launch at room temperature without connectors and measured at the center wavelength through the white input port, as indicated in the diagram above.
- Extinction ratio is specified with a slow axis launch at room temperature with connectors and measured at the center wavelength through the white input port, as indicated in the diagram above. See the *PER Measurement* tab for more information on how extinction ratio is measured.
- The fiber used in this coupler is compatible with PM1300-XP fiber. Other fiber types may be available upon request. Please contact Tech Support with inquiries.
- The connectors are aligned to the slow axis of the fiber.

Part Number	Description	Price	Availability
PN1310R1F2	2x2 PM Coupler, 1310 ± 15 nm, 99:1 Split, ≥20 dB PER, FC/PC Connectors	$495.00	Today
PN1310R1A2	2x2 PM Coupler, 1310 ± 15 nm, 99:1 Split, ≥20 dB PER, FC/APC Connectors	$536.00	Today

PC1310-50-APC - 2x2 PM Coupler, 1310 ± 15 nm, 50:50 Split, FC/APC Connectors

Specifications

Coupler Specifications[a]	
Coupling Ratio	50:50
Center Wavelength	1310 nm
Bandwidth	±15 nm
Extinction Ratio	≥18.0 dB / ≥18.0 dB
Insertion Loss	≤3.6 dB / ≤3.6 dB
Excess Loss	≤0.3 dB (Typical)
Optical Return Loss (ORL) / Directivity	≥55 dB
Max Power Level	1 W
Fiber Type	SM13-PR-U25A-H
Port Configuration	2x2
Fiber Lead Length and Tolerance	0.8 m +0.075 m / -0.0 m
Connectors[b]	2.0 mm Narrow Key FC/APC
Package Size	Ø0.12" x 2.76" (Ø3.0 mm x 70.0 mm)
Jacket	Ø900 µm Hytrel® Loose Tube
Operating Temperature	-20 to 70 °C
Storage Temperature	-40 to 85 °C

a. All specifications are measured without connectors during the manufacturing process.
b. The connectors are aligned to the slow axis of the fiber.