# NxM Polarization Maintain Fiber Couplers

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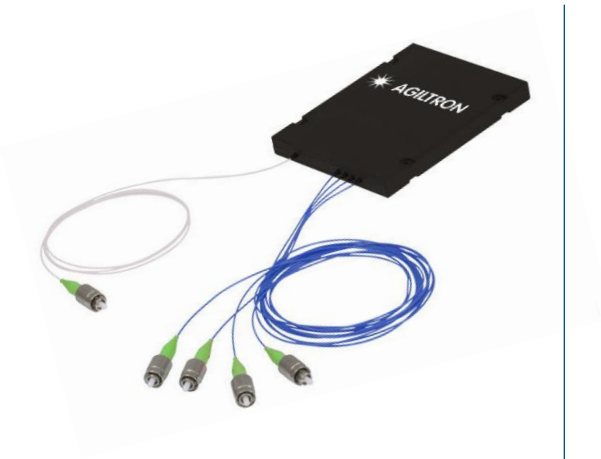
Return to the Webpage




The NxM PM couplers/splitters are based on cascading 2x2 fused couplers in a star/tree configuration, featuring low optical loss, good uniformity, and high extinction ratio. In comparison with other approaches, this device has the best performance in industry for splitting or combining light over a wide wavelength and temperature range. Customer configuration is available. We produce NxM PM Coupler covering the spectral range from 370 to 2400nm.

Couplers are highly efficient in splitting light with little loss, about 0.2dB per joint, but incur significant losses when combining lights; for example, a 50/50 coupler produces a 50% loss to each beam when combined. For beam-combining applications, search Combiner.

## Features

- Ultra-Low PDL
- Low Excess Loss
- Low Insertion Loss
- Highly Directivity
- Stable and Reliable

## Applications

- Sensor System
- Optical Testing System

## Specifications

| Parameter | | Min | Typical | Max | Unit |
|---|---|---|---|---|---|
| Center Wavelength | | 370 | | 2400 | nm |
| Bandwidth | | | ± 15 | | nm |
| Insertion Loss [1] | 3x3 | | 6 | | dB |
| | 4x4 | | 8 | | dB |
| | 8x8 | | 10.5 | | dB |
| | 16x16 | | 15 | | dB |
| Directivity | | | | 60 | dB |
| Splitting Ratio Tolerance | | 1.8 | | | % |
| Polarization Extinction Ratio [2] | | 15 | 18 | 20 | dB |
| Return Loss [3] | | 50 | 55 | | dB |
| Operating Optical Power | | | 0.5 | 1 | W |
| Operating Temperature | | | -20 ~ 70 | | °C |
| Storage Temperature | | | -40 ~ 85 | | °C |
| Package Dimension | | | 90 x 16 x 9 | | mm |

**Notes**:

[1]. without connector. Each connector adds 0.3dB and 0.5dB for wavelength >1310nm. For wavelength < 1310nm, the loss increase proportionally

[2]. without connector. Each connector adds 2dB for wavelength >1310nm. For wavelength < 1310nm, the loss increase proportionally

[3]. without connector. Each connector adds 5dB

RoHS COMPLIANT

**Note:** The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link]:

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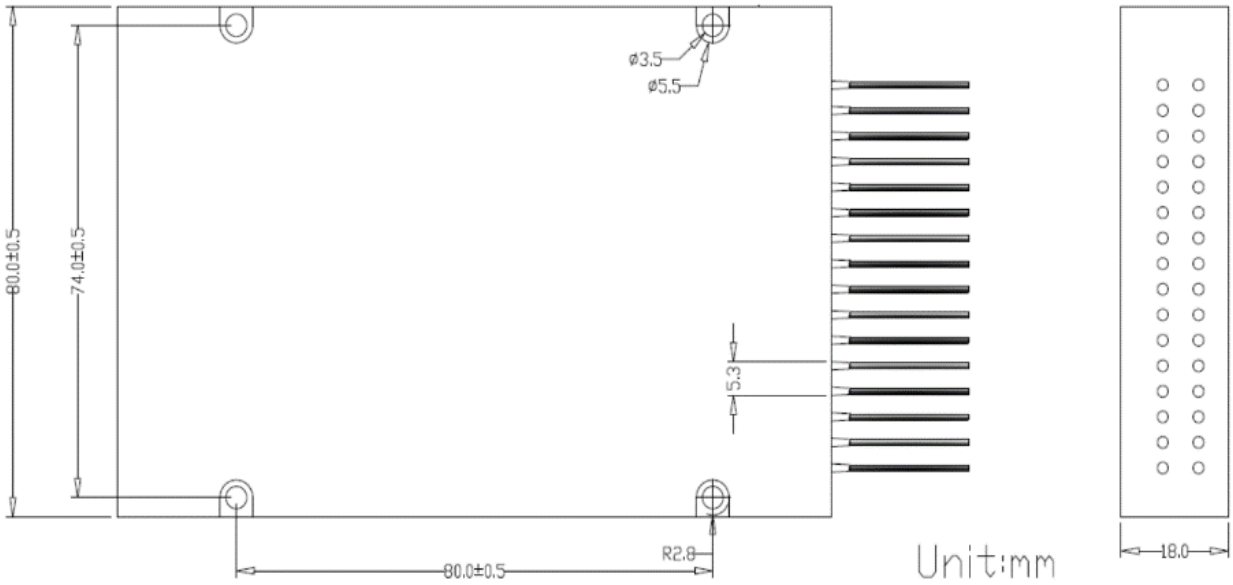
DATASHEET

## Mechanical Dimensions (mm) 16x16 example, different configuration has different size




*Product dimensions may change without notice. This is sometimes required for non-standard specifications.



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## Ordering Information (Part Number)

| | ☐ | ☐☐ | ☐☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
|---|---|---|---|---|---|---|---|---|
| **Prefix** | **Wavelength** | **Input** | **Output** | **PER** | **Axis** | **Cable Type** | **Fiber Length** | **Connector[4]** |
| **PMFC-** | 980 = 9<br>1060 = 1<br>1310 = 3<br>1480 = 4<br>1550 = 5<br>2000 = 2<br>400 = A<br>450 = B<br>520 = C<br>650 = B<br>750 = C<br>850 = D<br>Special = 0 | 1 Port = 01<br>2 Port = 02<br>3 Port = 03<br>...<br>99 Port = 99<br>Special = 00 | 1 Port = 01<br>2 Port = 02<br>3 Port = 03<br>...<br>99 Port = 99<br>Special = 00 | 15dB = 1<br>18dB = 2<br>20db = 4<br>23dB = 5<br>Special = 0 | Slow Axis Work [1] = 1<br>Both Axis Work [2] = 2<br>Fast Axis Blocked [3] = 3<br>Special = 0 | Bare = 1<br>0.9mm tube = 2<br>3mm tube = 3<br>Special = 0 | 0.5m = 1<br>0.75m = 2<br>1.0m = 3<br>Special = 0 | None = 1<br>FC/PC = 2<br>FC/APC = 3<br>SC/PC = 4<br>SC/APC = 5<br>ST/PC = 6<br>LC/PC = 7<br>Special = 0 |

**Notes**:

[1]. **Slow Axis Work** – optimized for polarization along slow axis

[2]. **Both Axis Work** – both polarizations work, but only polarization along the slow axis meets the spec

[3]. **Fast Axis Blocked** – adding a polarizer to block fast axis and only output slow axis signal. This version has higher PER but higher cost.

[4]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

## Application Notes

**Fiber Core Alignment**

Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

**Fiber Cleanliness**

Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

**Maximum Optical Input Power**

Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.



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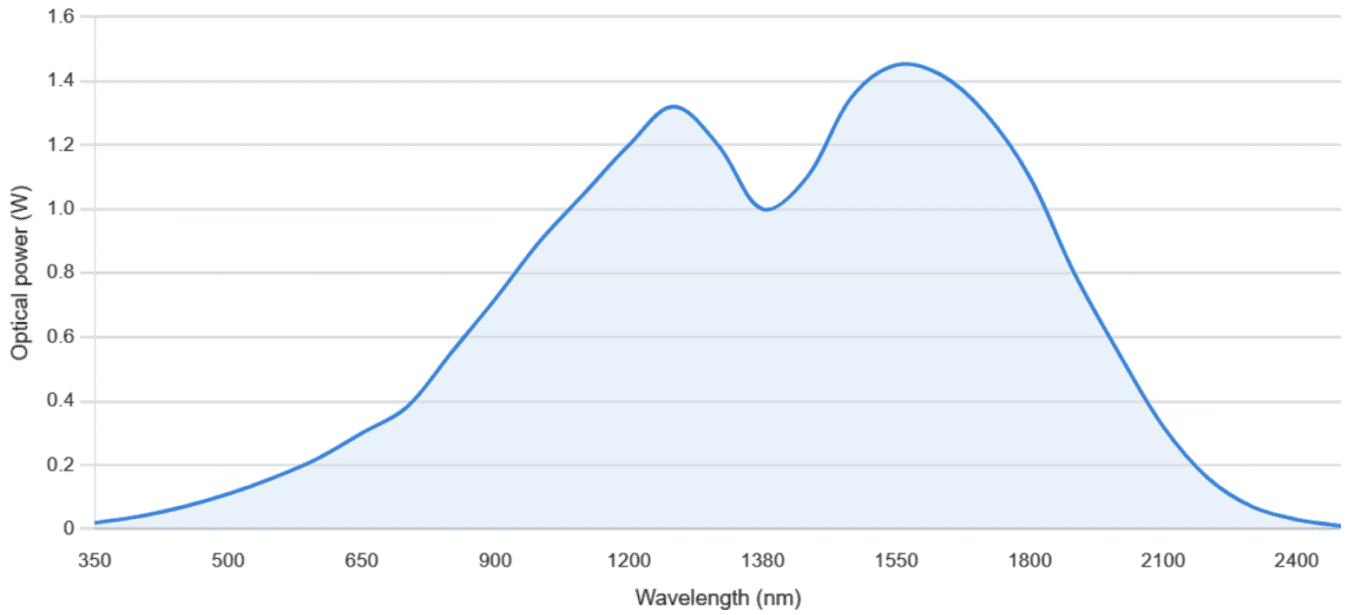
## Regular Single Mode / Polarization Maintaining Fiber Optical Power Handing vs Wavelength




Single mode fiber optical power is limited by nonlinear effects in addition to absorption that increase loss and generate heat. The curve shows the approximate safe CW power envelope for standard single-mode fiber. Actual limits depend on fiber design, core size, length, and laser characteristics. Specialty fibers can significantly increase the power limit.



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