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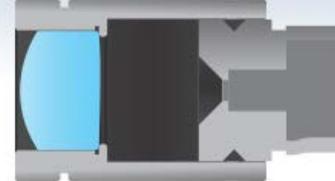
## F021FC-2000 - January 26, 2016

Item # F021FC-2000 was discontinued on January 26, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

### FIXED FOCUS COLLIMATION PACKAGES: FC/PC CONNECTORS

- ▶ **Mates with FC/PC Connectors**
- ▶ **Simplifies Collimation of Output from Single Mode Fiber**
- ▶ **Collimated Beam Diameters Ranging from 0.7 mm to 4.0 mm**
- ▶ **Models Aligned at 12 Key Wavelengths from 405 nm to 4.55  $\mu\text{m}$**

Fixed Focus Collimators Contain  
 One Factory-Aligned Aspheric Lens



**F240FC-B**  
 Shown with Patch Cable



**F280FC-A**  
 Back Front



Ø11 mm Collimator  
 Shown with AD11F  
 SM1-Threaded  
 Mounting Adapter

[Hide Overview](#)

#### OVERVIEW

##### Features

- Fiber Collimation for Single Mode Patch Cables with FC/PC Connectors
- Collimators Aligned at Wavelengths from 405 nm to 4.55  $\mu\text{m}$  (See Table to the Right)
- Each Collimation Package is Factory Aligned
- Simplifies Fiber-Coupled Detection Systems
- Non-Magnetic Stainless Steel Housing
- Compatible with Narrow and Wide Key FC/PC Connectors
- Custom Options, Including Custom Alignment Wavelengths, Available by Contacting Tech Support

These fiber collimation packages are pre-aligned to collimate light from an FC/PC-terminated fiber with diffraction-limited performance. Because these fiber collimators have no movable parts, they are compact and easy to integrate into an existing setup. Due to chromatic aberration, the effective focal length (EFL) of the aspheric lens is wavelength dependent. The design wavelength indicates the wavelength of ideal beam divergence (see the *Divergence Info* tab for more information).

The aspheric lens is factory aligned for collimation at the design wavelength when connected to its specified single mode fiber patch cable. In addition, the aspheric lens has an AR coating on both sides that minimizes surface reflections (see the *AR Coating Plots* tab). For some applications they may also be used at other wavelengths within the AR coating range; please refer to the theoretical divergence plot for each collimator to determine if it is appropriate for your application. The operating temperature range for these collimators is -40 °C to 93 °C. Please note that these collimation packages are not vacuum compatible. Collimation packages with custom alignment wavelengths, operating temperature ranges, or vacuum compatibility are available by contacting Technical Support.

We recommend using these collimators with our AR-coated single mode fiber optic patch cables. These cables feature an antireflective coating on one fiber end for increased transmission and improved return loss at the fiber-to-free-space interface. Alternatively, our large selection of standard fiber patch cables can also be used.

To mount these fiber collimation packages, we recommend using our collimator mounting adapters. In addition to Ø1/2" and Ø1" unthreaded versions, options are available with external SM05 (0.535"-40), RMS (0.800"-36), or SM1 (1.035"-40) threading. We also offer kinematic collimator mounting adapters that provide pitch and yaw adjustment.

##### Fixed Focus Collimation Packages

SMA905
FC/PC
FC/APC

##### Quick Links to Available Wavelengths

405 nm
532 nm
543 nm
633 nm
780 nm
980 nm
1064 nm
1310 nm
1550 nm
2 $\mu\text{m}$
3.45 $\mu\text{m}$
4.55 $\mu\text{m}$



Click to Enlarge  
 AD12BA Adapter Used to  
 Mount an F240FC-A Fixed  
 Focus Collimation Package  
 into a Ø1/2" POLARIS-  
 K05 Mirror Mount

### Mid-IR Collimators

For our collimators with an alignment wavelength of 3.45  $\mu\text{m}$  and 4.55  $\mu\text{m}$ , we recommend using our fluoride fiber patch cables; these collimators include a tightly toleranced ceramic sleeve to protect the fluoride fiber tip during insertion and improve pointing stability. Although these collimators are factory aligned for a specific wavelength, they have low divergence angles over a broad range of wavelengths. Therefore, they may be used at other wavelengths within the AR coating range. Please refer to the theoretical divergence plot for each collimator to determine if it is appropriate for your application.

### Alternatives

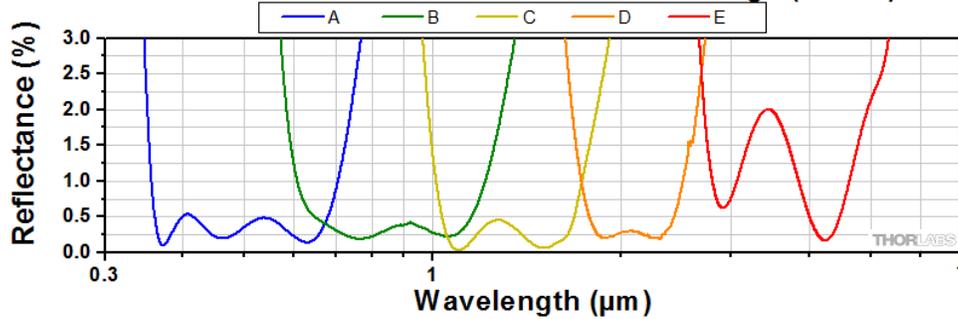
We also offer a line of adjustable collimation packages called FiberPorts that are well suited for a wide range of wavelengths. These are ideal solutions for adjustable, compact fiber couplers. For other collimation and coupling options, please see our *Collimator Guide* tab or contact Tech Support.

[Hide AR Coating Plots](#)

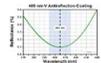
## AR COATING PLOTS

Coating Information							
Coating Designation	405	A	B	1064	C	D	E
Coating Range	395 - 415 nm	350 - 700 nm	650 - 1050 nm	1050 - 1075 nm	1050 - 1620 nm	1.8 - 3.0 $\mu\text{m}$	3 - 5 $\mu\text{m}$
Reflectance	<0.25% @ 405 nm	$R_{\text{avg}} < 0.5\%$ within Coating Range	$R_{\text{avg}} < 0.5\%$ within Coating Range	<0.25% @ 1064 nm	$R_{\text{avg}} < 0.5\%$ within Coating Range	$R_{\text{avg}} < 1.0\%$ within Coating Range	$R_{\text{avg}} < 1.0\%$ within Coating Range

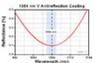
### Thorlabs' Standard Broadband AR Coatings (8° AOI)



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[Hide Divergence Info](#)

## DIVERGENCE INFO

### Theoretical Approximation of the Divergence Angle

The divergence angle listed in the specifications tables below is the theoretical beam divergence angle when using the fiber collimator at its design wavelength with the specific fiber denoted in the specifications table footnote. A plot of the theoretical divergence angle over a range of wavelengths is also available in the specifications table below. This divergence angle is easy to approximate theoretically using the formula shown below as long as the light emerging from the fiber has a Gaussian intensity profile. This works well for single mode fibers, but will underestimate the divergence angle for multimode fibers where the light emerging from the fiber has a non-Gaussian intensity profile.

The divergence angle (in Degrees)

$\theta$	Divergence Angle
D	Mode-Field Diameter (MFD)
f	Focal Length of Collimator

$$\theta \approx \left( \frac{D}{f} \right) \left( \frac{180}{\pi} \right)$$

where D and f must be in the same units.

### Example Calculation:

When the F220FC-A collimator is used to collimate 515 nm light emerging from a 460HP fiber with a mode field diameter (D) of 3.5  $\mu\text{m}$  and a focal length (f) of approximately 11.0 mm (not exact since the design wavelength is 543 nm), the divergence angle is approximately given by

$$\theta \approx (0.0035 \text{ mm} / 11.0 \text{ mm}) \times (180 / 3.1416) \approx 0.018^\circ.$$

When the beam divergence angle was measured for the F220FC-A collimator, a 460HP fiber was used with 543 nm light. The result was a divergence angle of 0.018°.

[Hide Collimator Guide](#)

COLLIMATOR GUIDE

Fiber Collimator Selection Guide

Click on the collimator type or photo to view more information about each type of collimator.

Type		Description
Fixed FC, APC, or SMA Fiber Collimators		These fiber collimation packages are pre-aligned to collimate light from an FC/PC-, FC/APC-, or SMA-terminated fiber. Each collimation package is factory aligned to provide diffraction-limited performance for wavelengths ranging from 405 nm to 4.55 μm. Although it is possible to use the collimator at detuned wavelengths, they will only perform optimally at the design wavelength due to chromatic aberration, which causes the effective focal length of the aspheric lens to have a wavelength dependence.
Air-Spaced Doublet, Large Beam Collimators		For large beam diameters (Ø6.6 - Ø8.5 mm), Thorlabs offers FC/PC, SMA, and FC/APC air-spaced doublet collimators. These collimation packages are pre-aligned at the factory to collimate a laser beam propagating from the tip of an FC or SMA-terminated fiber and provide diffraction-limited performance at the design wavelength.
Adjustable Fiber Collimators		These collimators are designed to connect onto the end of an FC/PC or FC/APC connector and contain an AR-coated aspheric lens. The distance between the aspheric lens and the tip of the FC-terminated fiber can be adjusted to compensate for focal length changes or to recollimate the beam at the wavelength and distance of interest.
Zoom Fiber Collimators		These collimators provide a variable focal length between 6 and 18 mm, while maintaining the collimation of the beam. As a result, the size of the beam can be changed without altering the collimation. This universal device saves time previously spent searching for the best suited fixed fiber collimator and has a very broad range of applications. They are offered with FC/PC, FC/APC, or SMA905 connectors with three different antireflection wavelength ranges to choose from.
FiberPorts		These compact, ultra-stable FiberPort micropositioners provide an easy-to-use, stable platform for coupling light into and out of FC/PC, FC/APC, or SMA terminated optical fibers. It can be used with single mode, multimode, or PM fibers and can be mounted onto a post, stage, platform, or laser. The built-in aspheric or achromatic lens is available with three different AR coatings and has five degrees of alignment adjustment (3 translational and 2 pitch). The compact size and long-term alignment stability make the FiberPort an ideal solution for fiber coupling, collimation, or incorporation into OEM systems.
Triplet Collimators		Thorlabs' High Quality Triplet Fiber Collimation packages use air-spaced triplet lenses that offer superior beam quality performance when compared to aspheric lens collimators. The benefits of the low-aberration triplet design include an $M^2$ term closer to 1 (Gaussian), less divergence, and less wavefront error.
Reflective Collimators		Thorlabs' metallic-coated Reflective Collimators are based on a 90° off-axis parabolic mirror. Mirrors, unlike lenses, have a focal length that remains constant over a broad wavelength range. Due to this intrinsic property, a parabolic mirror collimator does not need to be adjusted to accommodate various wavelengths of light, making them ideal for use with polychromatic light. Our reflective collimators are ideal for single-mode fiber.
Pigtailed Collimators		Our pigtailed collimators come with one meter of either single mode or multimode fiber, have the fiber and AR-coated aspheric lens rigidly potted inside the stainless steel housing, and are collimated at one of six wavelengths: 532, 830, 1030, 1064, 1310, or 1550 nm. Although it is possible to use the collimator at any wavelength within the coating range, the coupling loss will increase as the wavelength is detuned from the design wavelength.
GRIN Fiber Collimators		Thorlabs offers gradient index (GRIN) fiber collimators that are aligned at a variety of wavelengths from 630 to 1550 nm and have either FC terminated, APC terminated, or unterminated fibers. Our GRIN collimators feature a Ø1.8 mm clear aperture, are AR-coated to ensure low back reflection into the fiber, and are coupled to standard single mode or graded-index multimode fibers.
GRIN Lenses		These graded-index (GRIN) lenses are AR coated for applications at 630, 830, 1060, 1300, or 1560 nm that require light to propagate through one fiber, then through a free-space optical system, and finally back into another fiber. They are also useful for coupling light from laser diodes into fibers, coupling the output of a fiber into a detector, or collimating laser light. Our GRIN lenses are designed to be used with our Pigtailed Glass Ferrules and GRIN/Ferrule sleeves.

[Hide 405 nm, FC/PC Fiber Collimation Package](#)

405 nm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (nm)	D <sup>b</sup> (mm)	θ <sup>c</sup>	Theoretical Divergence	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F671FC-405	405 nm	395 - 415 (405)	0.7	0.052°	 Raw Data	0.60	4.02	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

a. R<sub>avg</sub> < 0.25% at the specified design wavelength.

- b. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.
- c. Theoretical full-angle beam divergence; Fiber: S405-HP (405 nm).

Part Number	Description	Price	Availability
F671FC-405	405 nm, f=4.02 mm, NA=0.60 FC/PC Fiber Collimation Pkg.	\$145.00	Today

[Hide 532 nm, FC/PC Fiber Collimation Package](#)

### 532 nm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (nm)	D <sup>b</sup> (mm)	$\theta^c$	Theoretical Divergence  Raw Data	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F240FC-532	532 nm	350 - 700 (A)	1.48	0.03 +0.01 / -0.00°	 Raw Data	0.51	7.86	M12 x 0.5	AD12BA, AD12F, AD12NT KAD12F, KAD12NT
F220FC-532	532 nm	350 - 700 (A)	2.1	0.02 +0.01 / -0.00°	 Raw Data	0.25	10.90	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

- a.  $R_{avg} < 0.5\%$  at the specified design wavelength.
- b. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.
- c. Measured full-angle beam divergence; Fiber: 460HP (532 nm)

Part Number	Description	Price	Availability
F240FC-532	532 nm, f=7.86 mm, NA=0.51 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F220FC-532	532 nm, f=10.90 mm, NA=0.25 FC/PC Fiber Collimation Pkg.	\$145.00	Today

[Hide 543 nm, FC/PC Fiber Collimation Package](#)

### 543 nm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (nm)	D <sup>b</sup> (mm)	$\theta^c$	Theoretical Divergence  Raw Data	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F230FC-A	543 nm	350 - 700 (A)	0.8	0.049°	 Raw Data	0.57	4.34	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F240FC-A	543 nm	350 - 700 (A)	1.5	0.027°	 Raw Data	0.51	7.86	M12 x 0.5	AD12BA, AD12F, AD12NT KAD12F, KAD12NT
F220FC-A	543 nm	350 - 700 (A)	2.0	0.020°	 Raw Data	0.25	10.90	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F260FC-A	543 nm	350 - 700 (A)	2.8	0.01 +0.01 / -0.00°	 Raw Data	0.16	15.01	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F280FC-A	543 nm	350 - 700 (A)	3.3	0.01 +0.01 / -0.00°	 Raw Data	0.15	18.07	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

- a.  $R_{avg} < 0.5\%$  over the specified coating range.
- b. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.
- c. Theoretical full-angle beam divergence; Fiber: 460HP (543 nm)

Part Number	Description	Price	Availability
F230FC-A	543 nm, f= 4.34 mm, NA=0.57 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F240FC-A	543 nm, f = 7.86 mm, NA=0.51 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F220FC-A	543 nm, f = 10.90 mm, NA=0.25 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F260FC-A	543 nm, f = 15.01 mm, NA=0.17 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F280FC-A	543 nm, f = 18.07 mm, NA=0.15 FC/PC Fiber Collimation Pkg.	\$145.00	Today

[Hide 633 nm, FC/PC Fiber Collimation Package](#)

**633 nm, FC/PC Fiber Collimation Package**

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (nm)	D <sup>b</sup> (mm)	$\theta^c$	Theoretical Divergence	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F230FC-B	633 nm	650 - 1050 (B)	0.8	0.056°	 Raw Data	0.56	4.43	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F240FC-B	633 nm	650 - 1050 (B)	1.5	0.031°	 Raw Data	0.50	7.93	M12 x 0.5	AD12BA, AD12F, AD12NT, KAD12F, KAD12NT
F220FC-B	633 nm	650 - 1050 (B)	2.1	0.022°	 Raw Data	0.25	10.99	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F260FC-B	633 nm	650 - 1050 (B)	2.8	0.02 +0.01 / -0.00°	 Raw Data	0.16	15.15	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F280FC-B	633 nm	650 - 1050 (B)	3.4	0.01 +0.01 / -0.00°	 Raw Data	0.15	18.24	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

a.  $R_{avg} < 0.5\%$  over the specified coating range.

b. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.

c. Theoretical full-angle beam divergence; Fiber: SM600 (635 nm).

Part Number	Description	Price	Availability
F230FC-B	633 nm, f = 4.43 mm, NA=0.56 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F240FC-B	633 nm, f = 7.93 mm, NA=0.50 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F220FC-B	633 nm, f = 10.99 mm, NA=0.25 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F260FC-B	633 nm, f = 15.15 mm, NA=0.16 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F280FC-B	633 nm, f = 18.24 mm, NA=0.15 FC/PC Fiber Collimation Pkg.	\$145.00	Today

[Hide 780 nm, FC/PC Fiber Collimation Package](#)**780 nm, FC/PC Fiber Collimation Package**

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (nm)	D <sup>b</sup> (mm)	$\theta$	Theoretical Divergence	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F230FC-780	780 nm	650 - 1050 (B)	0.98	0.06 +0.01 / -0.00° <sup>c</sup>	 Raw Data	0.55	4.51	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F240FC-780	780 nm	650 - 1050 (B)	1.5	0.036° <sup>d</sup>	 Raw Data	0.50	8.00	M12 x 0.5	AD12BA, AD12F, AD12NT, KAD12F, KAD12NT
F220FC-780	780 nm	650 - 1050 (B)	2.1	0.026° <sup>d</sup>	 Raw Data	0.26	11.07	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F260FC-780	780 nm	650 - 1050 (B)	3.33	0.02 +0.01 / -0.00° <sup>c</sup>	 Raw Data	0.16	15.29	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F280FC-780	780 nm	650 - 1050 (B)	4.00	0.01 +0.01 / -0.00° <sup>c</sup>	 Raw Data	0.15	18.40	M11 x 0.5	AD11BA, AD1109F, AD11F, AD11NT, KAD11F, KAD11NT

a.  $R_{avg} < 0.5\%$  over the specified coating range.

b. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.

c. Measured full-angle beam divergence; Fiber: 780HP (780 nm).

d. Theoretical full-angle beam divergence; Fiber: 780HP (780 nm).

Part Number	Description	Price	Availability
F230FC-780	Customer Inspired!780 nm, f = 4.51 mm, NA = 0.55 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F240FC-780	780 nm, f = 8.0 mm, NA = 0.50 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F220FC-780	780 nm, f = 11.07 mm, NA = 0.26 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F260FC-780	Customer Inspired!780 nm, f = 15.29 mm, NA = 0.16 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F280FC-780	Customer Inspired!780 nm, f = 18.40 mm, NA = 0.15 FC/PC Fiber Collimation Pkg.	\$145.00	Today

[Hide 980 nm, FC/PC Fiber Collimation Package](#)

### 980 nm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (nm)	D <sup>b</sup> (mm)	θ <sup>c</sup>	Theoretical Divergence  Raw Data	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F240FC-980	980 nm	650 - 1050 (B)	1.7	0.04 +0.01 / -0.00°	 Raw Data	0.50	8.06	M12 x 0.5	AD12BA, AD12F, AD12NT KAD12F, KAD12NT
F220FC-980	980 nm	650 - 1050 (B)	2.4	0.03 +0.01 / -0.00°	 Raw Data	0.25	11.16	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F280FC-980	980 nm	650 - 1050 (B)	4.0	0.02 +0.01 / -0.00°	 Raw Data	0.15	18.53	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

- a. R<sub>avg</sub> < 0.5% over the specified coating range.
- b. Collimated Beam Diameter: Theoretical 1/e<sup>2</sup> diameter at 1 focal length from lens.
- c. Measured full-angle beam divergence; Fiber: SM980-5.8-125 (980 nm).

Part Number	Description	Price	Availability
F240FC-980	980 nm, f = 8.06 mm, NA = 0.50 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F220FC-980	980 nm, f = 11.16 mm, NA = 0.25 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F280FC-980	980 nm, f = 18.53 mm, NA = 0.15 FC/PC Fiber Collimation Pkg.	\$145.00	Today

[Hide 1064 nm, FC/PC Fiber Collimation Package](#)

### 1064 nm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (nm)	D <sup>b</sup> (mm)	θ <sup>c</sup>	Theoretical Divergence  Raw Data	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F220FC-1064	1064 nm	1050 - 1075 (1064)	2.4	0.032°	 Raw Data	0.25	11.17	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

- a. R < 0.25% at the specified design wavelength.
- b. Collimated Beam Diameter: Theoretical 1/e<sup>2</sup> diameter at 1 focal length from lens.
- c. Theoretical full-angle beam divergence; Fiber: SM980-5.8-125 (1064 nm).

Part Number	Description	Price	Availability
F220FC-1064	1064 nm, f = 11.17 mm, NA=0.25 FC/PC Fiber Collimation Pkg.	\$145.00	Today

[Hide 1310 nm, FC/PC Fiber Collimation Package](#)

### 1310 nm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (nm)	D <sup>b</sup> (mm)	θ <sup>c</sup>	Theoretical Divergence  Raw Data	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F230FC-C	1310 nm	1050 - 1620 (C)	0.8	0.114°	 Raw Data	0.53	4.64	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F240FC-C	1310 nm	1050 - 1620 (C)	1.5	0.065°	 Raw Data	0.49	8.13	M12 x 0.5	AD12BA, AD12F, AD12NT KAD12F, KAD12NT
F220FC-C	1310 nm	1050 - 1620 (C)	2.0	0.047°	 Raw Data	0.24	11.23	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F260FC-C	1310 nm	1050 - 1620 (C)	2.8	0.034°	 Raw Data	0.16	15.52	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F280FC-C	1310 nm	1050 - 1620 (C)	3.4	0.028°	 Raw Data	0.15	18.67	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

- a. R<sub>avg</sub> < 0.5% over the specified coating range.

- b. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.
- c. Theoretical full-angle beam divergence; Fiber: SMF-28-J9 (1310 nm).

Part Number	Description	Price	Availability
F230FC-C	1310 nm, f = 4.64 mm, NA=0.53 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F240FC-C	1310 nm, f = 8.13 mm, NA=0.49 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F220FC-C	1310 nm, f = 11.23 mm, NA=0.24 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F260FC-C	1310 nm, f = 15.52 mm, NA=0.16 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F280FC-C	1310 nm, f = 18.67 mm, NA=0.15 FC/PC Fiber Collimation Pkg.	\$145.00	Today

[Hide 1550 nm, FC/PC Fiber Collimation Package](#)

### 1550 nm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (nm)	D <sup>b</sup> (mm)	$\theta^c$	Theoretical Divergence	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F230FC-1550	1550 nm	1050 - 1620 (C)	0.9	0.128°	 Raw Data	0.53	4.67	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F240FC-1550	1550 nm	1050 - 1620 (C)	1.6	0.073°	 Raw Data	0.49	8.18	M12 x 0.5	AD12BA, AD12F, AD12NT, KAD12F, KAD12NT
F220FC-1550	1550 nm	1050 - 1620 (C)	2.1	0.053°	 Raw Data	0.24	11.29	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F260FC-1550	1550 nm	1050 - 1620 (C)	3.0	0.038°	 Raw Data	0.16	15.58	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F280FC-1550	1550 nm	1050 - 1620 (C)	3.6	0.032°	 Raw Data	0.15	18.75	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

- a.  $R_{avg} < 0.5\%$  over the specified coating range.
- b. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.
- c. Theoretical full-angle beam divergence; Fiber: SMF-28-J9 (1550 nm).

Part Number	Description	Price	Availability
F230FC-1550	1550 nm, f = 4.67 mm, NA=0.53 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F240FC-1550	1550 nm, f = 8.18 mm, NA=0.49 FC/PC Fiber Collimation Pkg.	\$145.00	3-5 Days
F220FC-1550	1550 nm, f = 11.29 mm, NA=0.24 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F260FC-1550	1550 nm, f = 15.58 mm, NA=0.16 FC/PC Fiber Collimation Pkg.	\$145.00	Today
F280FC-1550	1550 nm, f = 18.75 mm, NA=0.15 FC/PC Fiber Collimation Pkg.	\$145.00	Today

### 2 μm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating <sup>a</sup> (μm)	D <sup>b</sup> (mm)	θ <sup>c</sup>	Theoretical Divergence	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F028FC-2000	2 μm	1.8 - 3.0 (D)	1.2	0.13°	 Raw Data	0.56	5.95	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F021FC-2000	2 μm	1.8 - 3.0 (D)	2.88	0.056°	 Raw Data	0.18	11.00	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

- a.  $R_{avg} < 1.0\%$  over the specified coating range.
- b. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.
- c. Theoretical full-angle beam divergence; Fiber: SM2000 (2000 nm).

Part Number	Description	Price	Availability
F028FC-2000	2 μm, f = 5.95 mm, NA = 0.56 FC/PC Fiber Collimation Pkg.	\$532.00	Today
F021FC-2000	Customer Inspired! 2 μm, f = 11.00 mm, NA = 0.18 FC/PC Fiber Collimation Pkg.	\$532.00	Lead Time

### [Hide 3.45 μm, FC/PC Fiber Collimation Package](#)

### 3.45 μm, FC/PC Fiber Collimation Package

Although this collimator is factory aligned for a specific wavelength, it has a low divergence angle over a broad range of wavelengths. Therefore, it may be used at other wavelengths within the AR coating range. Please refer to the theoretical divergence plot for this collimator to determine if it is appropriate for your application.

Item # <sup>a</sup>	Alignment Wavelength	AR Coating <sup>b</sup> (μm)	D <sup>c</sup> (mm)	θ <sup>d</sup>	Theoretical Divergence	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F028FC-3450	3.45 μm	3 - 5 (E)	1.00	0.125 ± 0.01°	 Raw Data	0.56	5.95	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

- a. This collimator contains a tightly toleranced ceramic ferrule that protects the tips of our fluoride fiber patch cables as they are being inserted and provides improved pointing repeatability.
- b.  $R_{avg} < 1.0\%$  over the specified coating range.
- c. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.
- d. Measured full-angle beam divergence; Fiber: ZrF<sub>4</sub> (3.45 μm), MFD = 13.0 μm.

Part Number	Description	Price	Availability
F028FC-3450	3.45 μm, f = 5.95 mm, NA = 0.56 FC/PC Fiber Collimation Pkg.	\$540.00	Today

### [Hide 4.55 μm, FC/PC Fiber Collimation Package](#)

### 4.55 μm, FC/PC Fiber Collimation Package

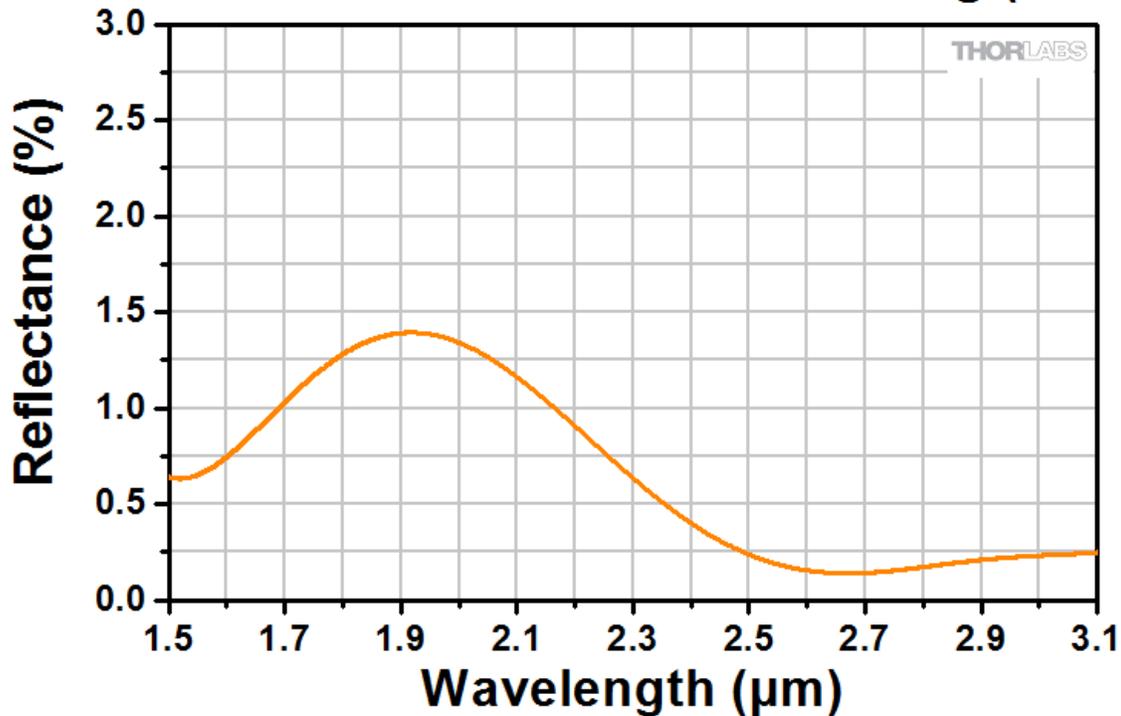
Although this collimator is factory aligned for a specific wavelength, it has a low divergence angle over a broad range of wavelengths. Therefore, it may be used at other wavelengths within the AR coating range. Please refer to the theoretical divergence plot for this collimator to determine if it is appropriate for your application.

Item # <sup>a</sup>	Alignment Wavelength	AR Coating <sup>b</sup> (μm)	D <sup>c</sup> (mm)	θ <sup>d</sup>	Theoretical Divergence	NA <sub>Lens</sub>	f (mm)	External Threading	Suggested Adapters
F028FC-4950	4.55 μm	3 - 5 (E)	1.08	0.15 +0.05 / -0°	 Raw Data	0.56	5.95	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

- a. This collimator contains a tightly toleranced ceramic ferrule that protects the tips of our fluoride fiber patch cables as they are being inserted and provides improved pointing repeatability.
- b.  $R_{avg} < 1.0\%$  over the specified coating range.
- c. Collimated Beam Diameter: Theoretical  $1/e^2$  diameter at 1 focal length from lens.
- d. Measured full-angle beam divergence; Fiber: InF<sub>3</sub> (4.55 μm), MFD = 16.0 μm.

Part Number	Description	Price	Availability
F028FC-4950	4.55 μm, f = 5.95 mm, NA = 0.56 FC/PC Fiber Collimation Pkg.	\$500.00	Today

### -D Broadband Antireflection Coating (8° AOI)



### Full-Angle Divergence: F021-2000

