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THORLABS

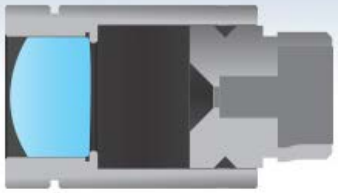
F021FC-3450 - June 16, 2015

Item # FC021FC-3450 was discontinued on June 16, 2015. 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 µm

Fixed Focus Collimators Contain One Factory-Aligned Aspheric Lens



F240FC-B
Shown with Patch Cable

F280FC-A

Front

Back

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 µm (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

Fixed Focus Collimation Packages
SMA905
FC/PC
FC/APC

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

Quick Links to Available Wavelengths
405 nm
532 nm
543 nm
633 nm
780 nm
980 nm
1064 nm
1310 nm
1550 nm
2 µm
3.45 µm
4.55 µm

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.

Mid-IR Collimators
For our collimators with an alignment wavelength of 3.45 µm and 4.55 µm, 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.

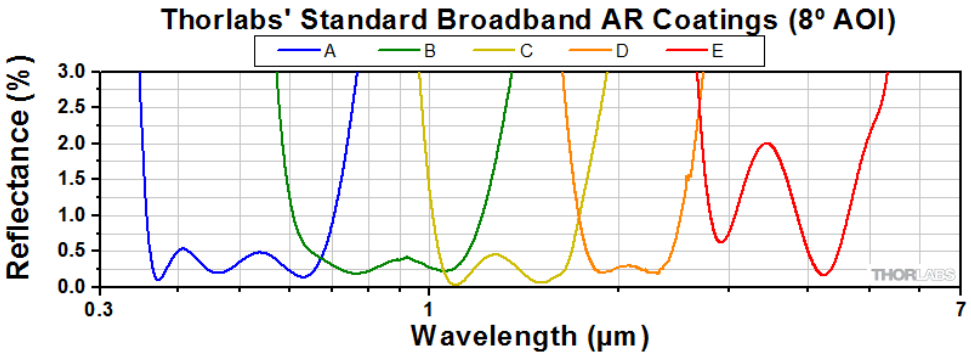
Alternatives
We also offer a line of adjustable collimation packages called FiberPorts that are well suited for a wide range of wavelengths. These are ideal solutions for adjustable, compact fiber couplers. For other collimation and coupling options, please see our *Collimator Guide* tab or contact Tech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

Hide AR Coating Plots

AR COATING PLOTS

Coating Information							
Coating Designation	405	A[a]	B[a]	1064	C	D	E
Coating Range	395 - 415 nm	350 - 700 nm or 400 - 600 nm	600 - 1050 nm or 650 - 1050 nm	1050 - 1075 nm	1050 - 1620 nm	1.8 - 3.0 µm	3 - 5 µm
Reflectance	<0.25% @ 405 nm	R_{avg} < 0.5% within Coating Range	R_{avg} < 0.5% within Coating Range	<0.25% @ 1064 nm	R_{avg} < 0.5% within Coating Range	R_{avg} < 1.0% within Coating Range	R_{avg} < 1.0% within Coating Range

a. See the tables below for the designated coating ranges for specific collimators.



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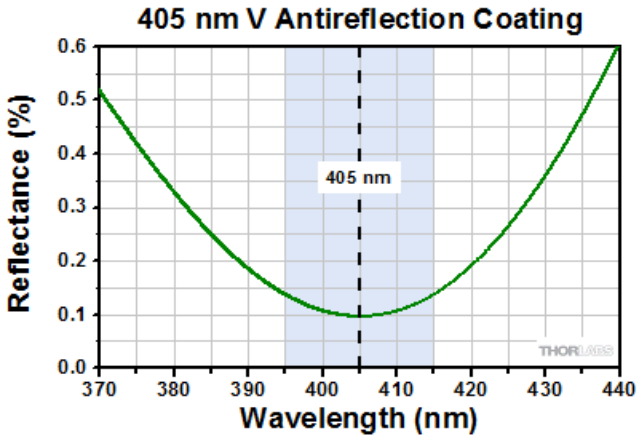
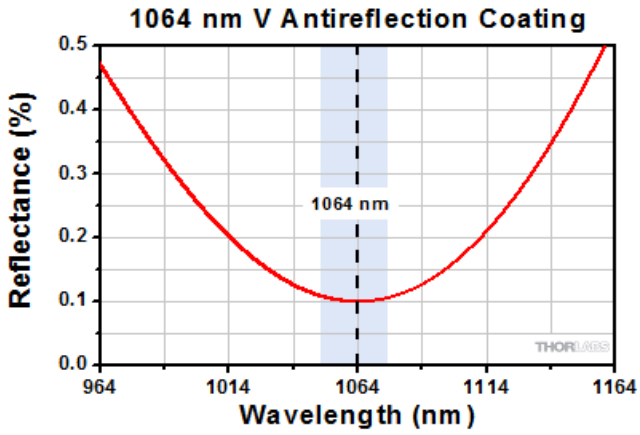




Hide Divergence Info

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.

θ	Divergence Angle
D	Mode-Field Diameter (MFD)
f	Focal Length of Collimator

The divergence angle (in Degrees)

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

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 µm 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

θ ≈ (0.0035 mm / 11.0 mm) x (180 / 3.1416) ≈ 0.018°.

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 405 nm, FC/PC Fiber Collimation Package

405 nm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating[a] (nm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	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_{avg} < 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[a] (nm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	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	**NEW! 532 nm, f=7.86 mm, NA=0.51 FC/PC Fiber Collimation Pkg.**	**$145.00**	**Today**
F220FC-532	**NEW! 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[a] (nm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	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	400 - 600 (A)	2.8	0.014°	Raw Data	0.16	15.29	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F280FC-A	543 nm	400 - 600 (A)	3.3	0.012°	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[a] (nm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	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	600 - 1050 (B)	2.8	0.016°	Raw Data	0.16	15.15	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT
F280FC-B	633 nm	600 - 1050 (B)	3.4	0.014°	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[a] (nm)	D[b] (mm)	θ	Theoretical Divergence	NA_{Lens}	f (mm)	External Threading	Suggested Adapters
F230FC-780	780 nm	650 - 1050 (B)	0.98	0.06 +0.01 / -0.00° [c]	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° [d]	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° [d]	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° [c]	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° [c]	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[a] (nm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	f (mm)	External Threading	Suggested Adapters
F240FC-980	980 nm	600 - 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	600 - 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	600 - 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_{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: 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[a] (nm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	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 $1/e^2$ 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[a] (nm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	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_{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 (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[a] (nm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	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**	**Today**
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**

Hide 2 µm, FC/PC Fiber Collimation Package

2 µm, FC/PC Fiber Collimation Package

Item #	Alignment Wavelength	AR Coating[a] (µm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	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	Today

Hide 3.45 µm, FC/PC Fiber Collimation Package

3.45 µm, FC/PC Fiber Collimation Package

Although these collimators are factory aligned for a specific wavelength, they have low divergence angles over a broad range of wavelengths. 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.

Item #	Alignment Wavelength	AR Coating[a] (µm)	D[b] (mm)	θ[c]	Theoretical Divergence	NA_{Lens}	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
F021FC-3450	3.45 µm	3 - 5 (E)	1.86	0.068 ± 0.01°	Raw Data	0.18	11.00	M11 x 0.5	AD11BA, AD1109F, RMS11P, AD11F, AD11NT, KAD11F, KAD11NT

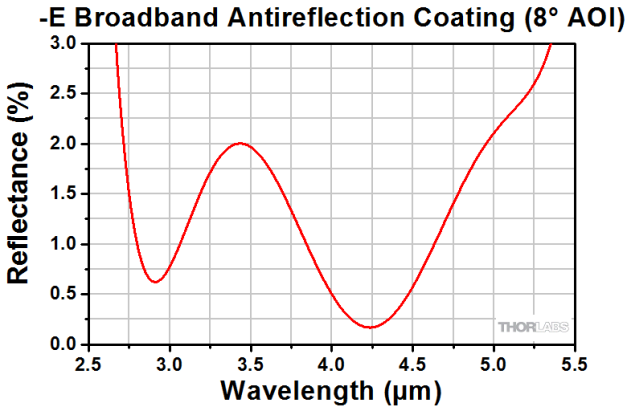
a. These collimators contain a tightly toleranced ceramic ferrule that protects the tips of our fluoride fiber patch cables as they are being inserted and provides improved pointing repeatability.

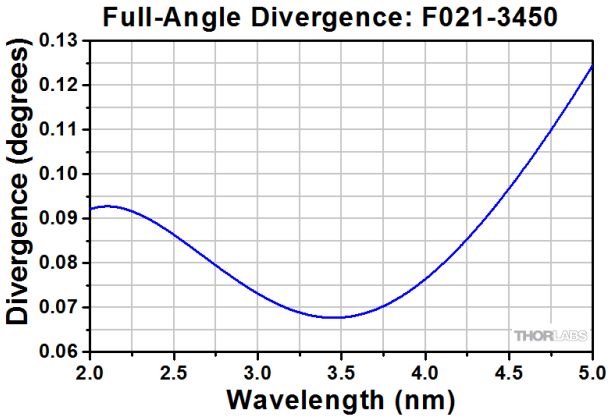
b. R_{avg} < 1.0 % over the specified coating range.

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

d. Measured full-angle beam divergence; Fiber: ZrF_4 (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
F021FC-3450	3.45 µm, f = 11.00 mm, NA = 0.18 FC/PC Fiber Collimation Pkg.	$540.00	Lead Time





Hide 4.55 µm, FC/PC Fiber Collimation Package

4.55 µm, FC/PC Fiber Collimation Package

Although these collimators are factory aligned for a specific wavelength, they have low divergence angles over a broad range of wavelengths. 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.

Item #[a]	Alignment Wavelength	AR Coating[b] (µm)	D[c] (mm)	θ[d]	Theoretical Divergence	NA_{Lens}	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; MFD = 16.0 µm.

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

Visit the *Fixed Focus Collimation Packages: FC/PC Connectors* page for pricing and availability information:
http://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=944