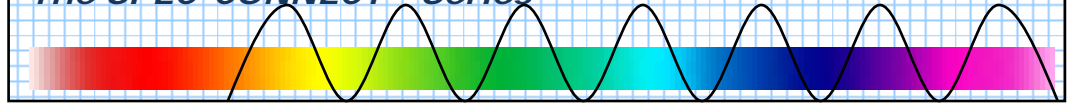




Custom Fiber & Probe Assemblies

The SPEC-CONNECT™ Series



Example: 1x4 Fiber Bundle with SuperGamut™ NIR Spectrometer

BaySpec's SPEC-CONNECT™ series Custom Fiber & Probe Assemblies include everything needed to easily connect or manipulate fibers for experiment or OEM applications.

Product Types:

- Jumpers
- Bundles
- Furcated Bundles
- Probes
- Optical Adapters
- Hardware Adapters

Applications

- Pharmaceuticals
- Medical diagnostics
- Agriculture
- Semiconductors
- Beverage & Brewery
- Cosmetics
- Explosives detection
- Counterfeit detection
- Water quality
- Food safety
- Petrochemical
- Law Enforcement
- Pulp & Paper
- Homeland security

Jumpers

Commonly called jumpers or patchcords, these basic fiber assemblies range from more generic datacom jumpers to the single fiber, large core cable designs utilizing more robust and customized components. Optical coatings to lower the reflection (AR coating) or to create a cutoff wavelength can be added to the fiber, as well as any multi-fiber assembly. We also offer high power SMA's using SS or copper ferrules which have an air pocket surrounding the front of the SMA ferrule, as well as an aluminum or copper heatsink to pull the thermal energy away from the fiber.

Bundles

A fiber bundle assembly is used for transporting light from extended sources using more than one fiber, up to thousands of fibers. The style of termination on each end may be some of our standard types of terminations. However, many products are OEM based and therefore require a specific design that can be manufactured by one of our top quality suppliers to our exacting standards.

The fibers can be arranged into round, ring, a single line or a multi-segment line or arc, or packed into 2D shapes and arrays. V-grooves in the base material are commonly used for interfacing to diode lasers and can be AR coated to maximize light throughput.

Bifurcated Bundles

These assemblies are the same as bundles, but either one side or both sides of the assembly can be separated into a multiple number of standard or custom-designed terminations and fiber configurations to match the physical and optical characteristics required at the terminations. These assemblies can be used to split or combine optical power and are available with various fiber distribution designs from one end to the other.

Bundle assemblies using SM, 50 or 62.5um core fibers generally made for datacom applications are commonly called harnesses and use standard datacom connectors such as FC, ST, LC, SC, MTP, MT-RJ, etc. for short assemblies



Probes

These assemblies can be immersed into a liquid solution in order to obtain spectra of its constituents and are commonly referred to as a Dip Probe or a Transmission Probe. The basic design consists of two fibers with a lens that collimates the light from one fiber through an open section through which the liquid can pass. The light is reflected off of a mirror to pass through the liquid and lens a second time and is refocused onto the second fiber for transmission to the analyzing instrument. For the standard probe design, the liquid absorption pathlength is double the physical opening of the threaded, replaceable tip.

Other designs may call for larger probes or more robust probes designed to meet harsher conditions, or specialized single pass designs.

Optical Adapters

These adapters are designed to fit onto a connector or custom termination, or can be designed to mount onto a piece of equipment. Their purpose is to image or collimate the light from the fiber(s), or to focus light onto the fiber(s) from a light source. Generally they consist of a machined part with the optical element mounted in place, with or without a focusing adjustment. Optical adapters also consist of vacuum feedthroughs where optical testing is performed through a chamber wall. This can be accomplished using a variety of modified vacuum flange designs, such as the standard conflat flanges which are available. The fiber assembly is sealed using Varian Torr Seal and may include a lens to collimate or capture the signal.

Hardware Adapters

This product class generally contains no optical components, but can be used for mounting fiber assemblies to a piece of equipment, to another fiber assembly, or for enclosing optical components or assemblies. Standard adapters include those which mate SMA, FC, ST or any other standard connector to another connector. Other custom adapters are generally made specifically for OEM clients and their applications.

Key design benefits:

- Premium-grade components
- Proven reliability
- Flexible options
- Customizable

*BaySpec "USB201R" GUI
Software included for
ease of integration.*



Component Options

There are many options available to build a fiber optic assembly. These options will be restricted by your specific environmental requirements including: temperature, pressure, chemical media and bundle size, among other criteria. Please detail any requirements that may be present, or if a desired option is not found below.

Fiber Optics:

- SM and Graded Index (50, 50um-10Gig and 62.5um)
- Step-index fibers from <50um to over 2000um
- Wavelength ranges:
 - ◇ UV (180-1100nm) - Standard grade UV/Vis
 - ◇ NIR (<400-2400nm) - Standard grade Vis/NIR
 - ◇ Broad Band (<275-2100nm)
 - Wide range, higher attenuation at select peaks
 - ◇ Solarization Resistant UV
 - For higher power UV sources <280nm
 - ◇ Other specialty fiber ranges include IR grades ranging from <2um to >15um wavelength
- Silica/Silica
 - ◇ Core/clad ratio: 1.10 (standard)
 - Options include 1.05 to 1.40
 - ◇ Numerical Aperture: 0.22 ± 0.02 (standard)
 - Options include 0.10 to 0.53
- Hard/Plastic Clad Silica
 - ◇ Core/clad ratio: core + 30um (typical)
 - ◇ Numerical Aperture 0.37/0.39
 - Options include 0.22 to >0.50
- Plastic optical fiber
 - ◇ Core Diameter
 - Typically .010, .020, .030, .040 & .060"
 - ◇ Numerical Aperture: >0.50
- Fiber Buffers Operating Ranges:
 - ◇ Acrylate -40°C to 85°C
 - ◇ Nylon -40°C to 100°C
 - ◇ Tefzel -40°C to 150°C
 - Intermittent up to 200°C
 - ◇ Silicone -40°C to 150°C
 - ◇ Polyimide -65°C to 300°C
 - Intermittent up to 400°C
 - ◇ Aluminum -269°C to 400°C
 - ◇ Gold -269°C to 700°C
- Bending Radii:
 - ◇ <100x intermittently, to 400x long term. Values depend on factors including the type of fiber, temperature, fiber proof test level, number of fibers and dynamic motion of the installed fiber.

Connectors / Terminations:

- Telecom connectors:
 - LC, SC, ST, FC, MU, E2000, MT-RJ, MTP
- Large core terminations:
 - ◇ SMA-905
 - Options include counterbored copper versions for high power laser applications
 - ◇ ST/FC w/metal ferrule
 - ◇ Ceramic Ferrules
 - ◇ Ø1/4" x 2" or 3" Long SS 303/4
 - ◇ Ø10mm x 50mm SS 303/4
 - ◇ Custom ferrules and materials for your application

Cabling:

- 2.0, 2.8, 3.0 & 3.8mm Furcation Tubing
 - ◇ Various colors
 - ◇ PVC rated for 0°C to 70°C*
 - ◇ Polyurethane for -40°C to 85°C*
 - More flexible/abrasion resistant than PVC
 - Stainless Steel Monocoil with Black PVC Jacket
 - Rated for -40°C to 100°C*
 - SS Monocoil with Fiberglass Braid, Grey Silicon Rubber
 - Rated for -40°C to 200°C*
 - SS Interlock (available with outer jacketing)
 - Polyimide Tubing
 - Various plastic, rubber and blended varieties of tubing
- * Cabling may be used outside of these temperature ranges, but brittleness, flexibility and softening should be considered when operating near the stated minimums and maximum temperature ranges.

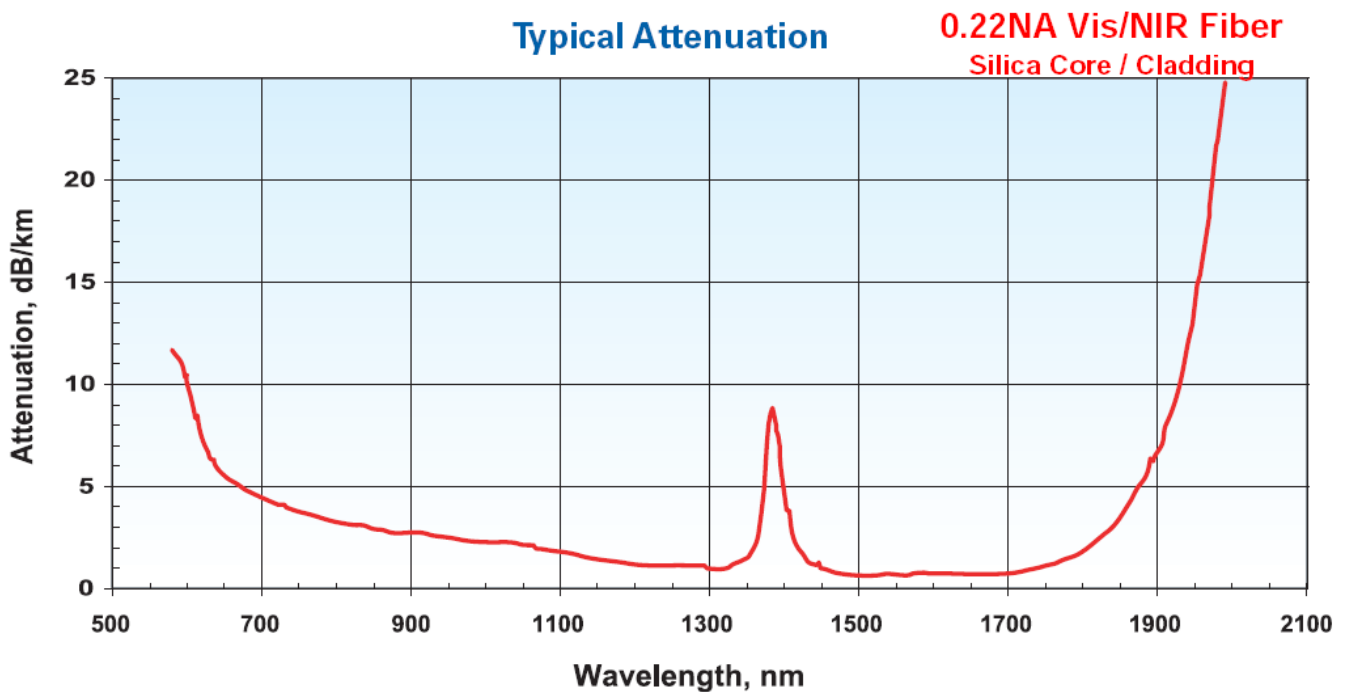
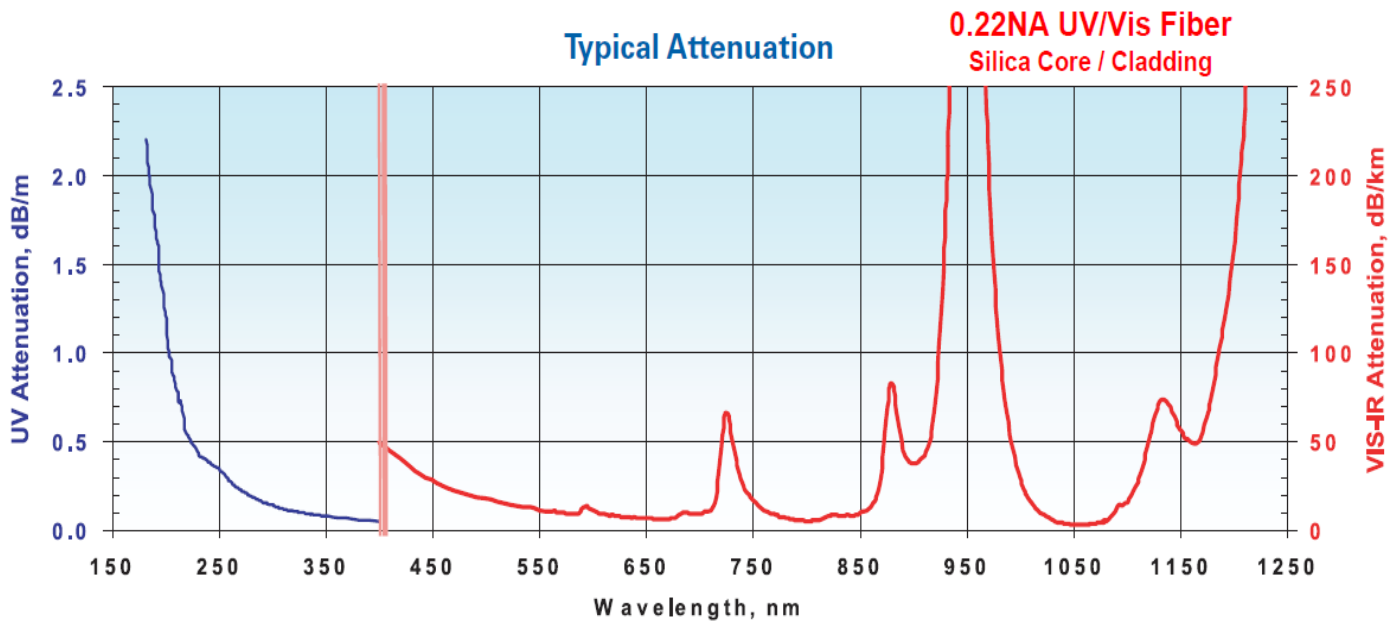
Coatings:

- Anti-reflection optical, AR coatings are optional
 - ◇ These can be a single or dual wavelength V coating, broadband or of a customized design
- Coatings and material treatment for terminations can also be provided.



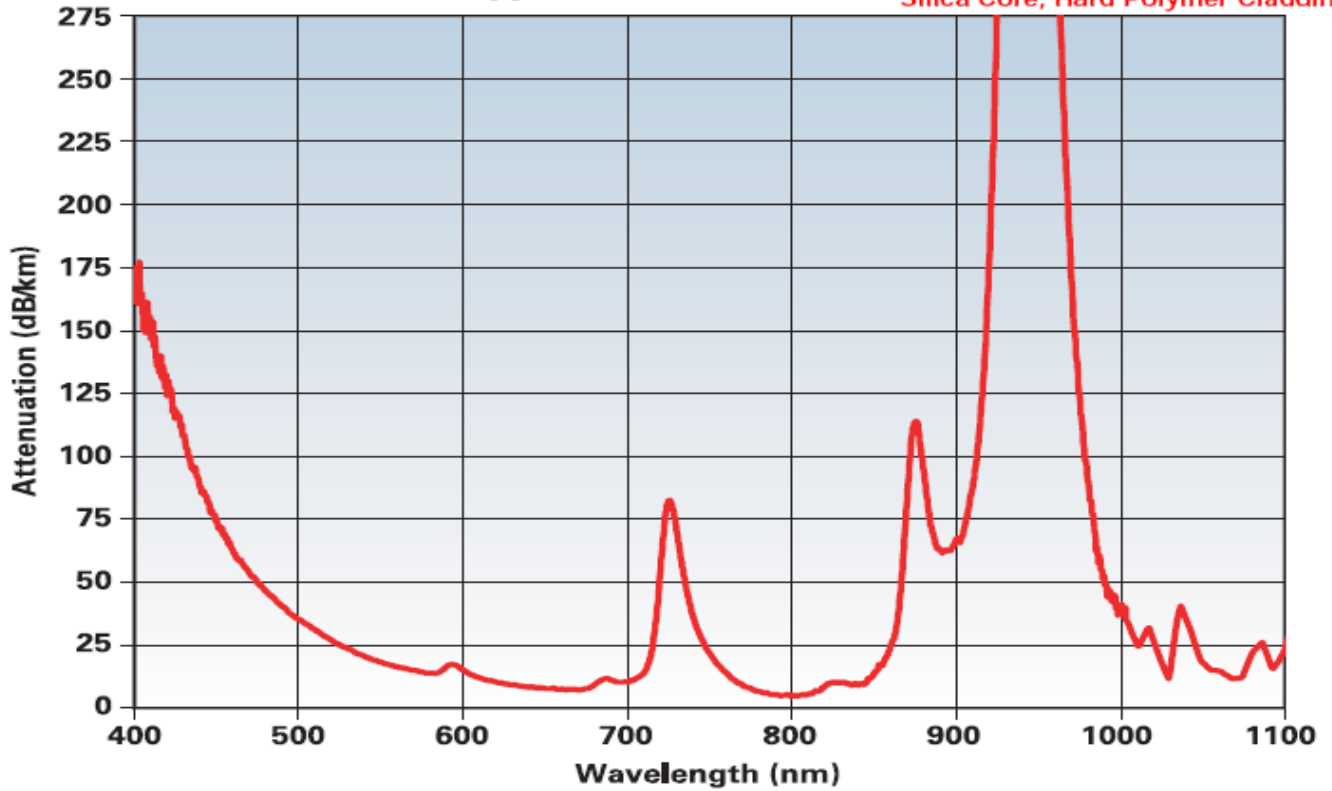
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Silica & Plastic Clad Fiber Attenuation



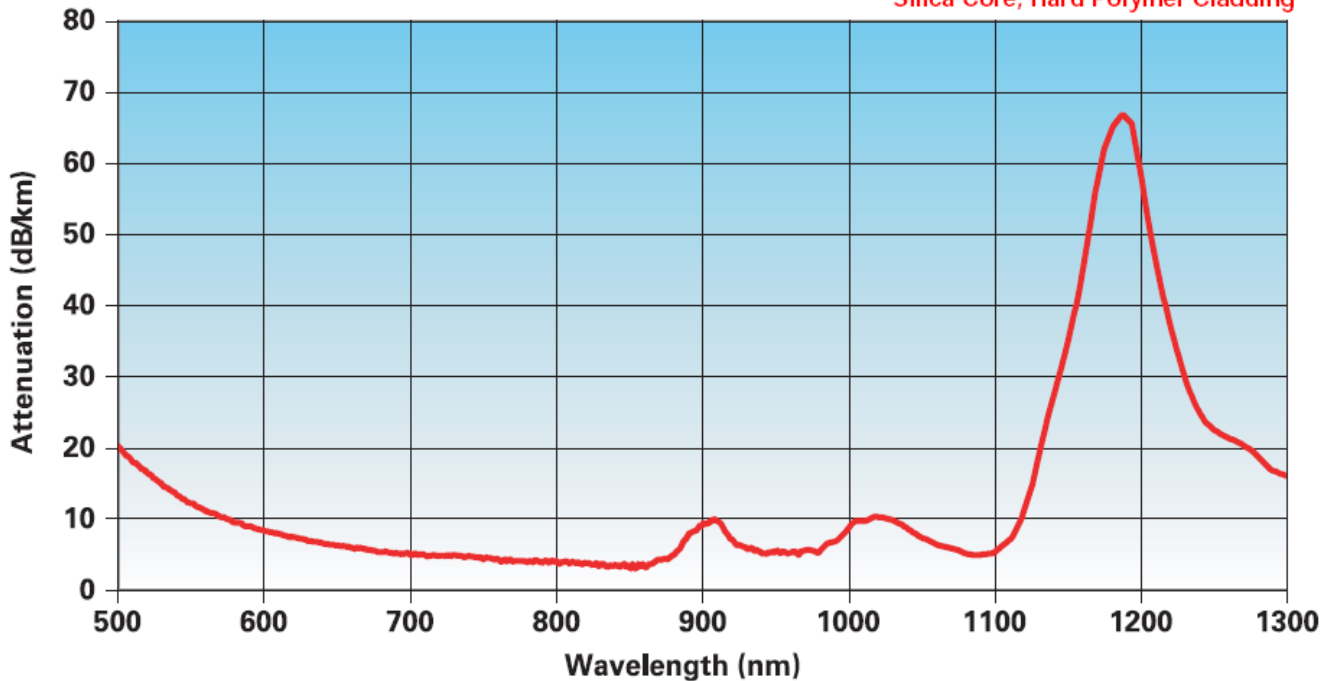
Typical Attenuation

0.37NA UV/Vis Fiber
Silica Core, Hard Polymer Cladding



Typical Attenuation

0.37NA Vis/NIR Fiber
Silica Core, Hard Polymer Cladding

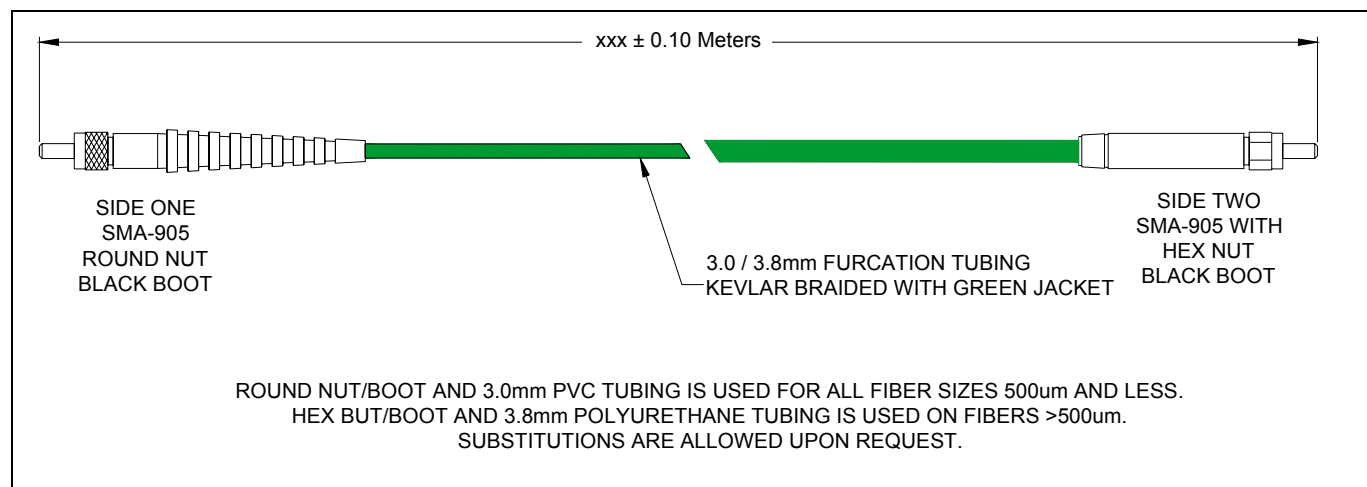




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Jumpers

These basic fiber assemblies are single fiber, large core cable designs made with the standard cable options, or more robust cable designs to meet specific environmental concerns, such as high power using standard or copper ferrules.



Optical coatings to enhance the fiber's properties for reflection or cutoff wavelengths can be added.

Part Number Configurator

(Prefix: Use "J")

J-AA-B-C-D-E-F-G-xxxH, where xxx is the length in meters or cm's

Example: J06U554UG007M : 600um UV, 0.22 NA S/S, SMA-905 to SMA-905 jumper
Ø3.8mm Green Polyurethane Furcation Tubing, 7 meters

Fiber Size AA		Fiber Type B		Connectors C & D		Jacket Type (1) E		Jacket Material F		Color G		Length xxxH
1	100um	P	PMMA	1	10mm OD 303/4 SS x 50mm	1	900um	V	PVC	B	Blue	M Meters
2	200um	U	0.22 UV S/S	2	.250" OD 303/4 SS x 2"	2	2mm Furcation	F	PVDF	O	Orange	C CM's
3	300um	L	0.22 UV S/S Low Solarization	3	.250" OD 303/4 SS x 3"	3	3mm Furcation	T	TEFLON	G	Green	
4	400um	N	0.22 NIR S/S	4	SMA-905 with Round Nut	4	3.8mm Furcation	U	POLYURETHANE	N	Brown	
5	500um	1	0.37 UV HCS	5	SMA-905 with Hex Nut	5	4.5mm PVC Monocoil	R	RISER	S	Slate	
6	600um	2	0.37 NIR HCS	6	SMA-906	6	5.6mm PVC Monocoil	R	PLENUM	W	White	
8	800um	3	0.48 UV HCS	7	SMA-905, Copper Ferrule	7	5.1mm OD SS	P	LSZH/RISER	R	Red	
10	1000um	4	0.48 NIR HCS							K	Black	
15	1500um									Y	Yellow	
20	2000um									V	Violet	
										P	Rose	
										A	Aqua	

Note: 3.0mm furcation tubing is standard in green PVC jacket for 500um and less.
3.8mm furcation tubing is standard in green polyurethane jacket for >500um

All options are available upon request.

Jumpers

Standard SMA-905 to SMA-905, 0.22NA, UV grade jumpers

- Substitute the "U" with an "N" for NIR grade. "xxx" is for Meters or CM's

Fiber Core	Part Number
100um	J01U443VGxxxM
200um	J02U443VGxxxM
300um	J03U443VGxxxM
400um	J04U443VGxxxM
500um	J05U443UGxxxM
600um	J06U554UGxxxM
800um	J08U554UGxxxM
1000um	J10U554UGxxxM

Fiber Core	Part Number
UV Low Solarization	
200um	J02L443VGxxxM
600um	J06L554UGxxxM
UV 0.37NA	
Substitute the 4th digit "1" with "2" for NIR	
200um	J021443VGxxxM
400um	J041443UGxxxM



High Power SMA with Copper Ferrule
Available with Aluminum or Copper Heatsink



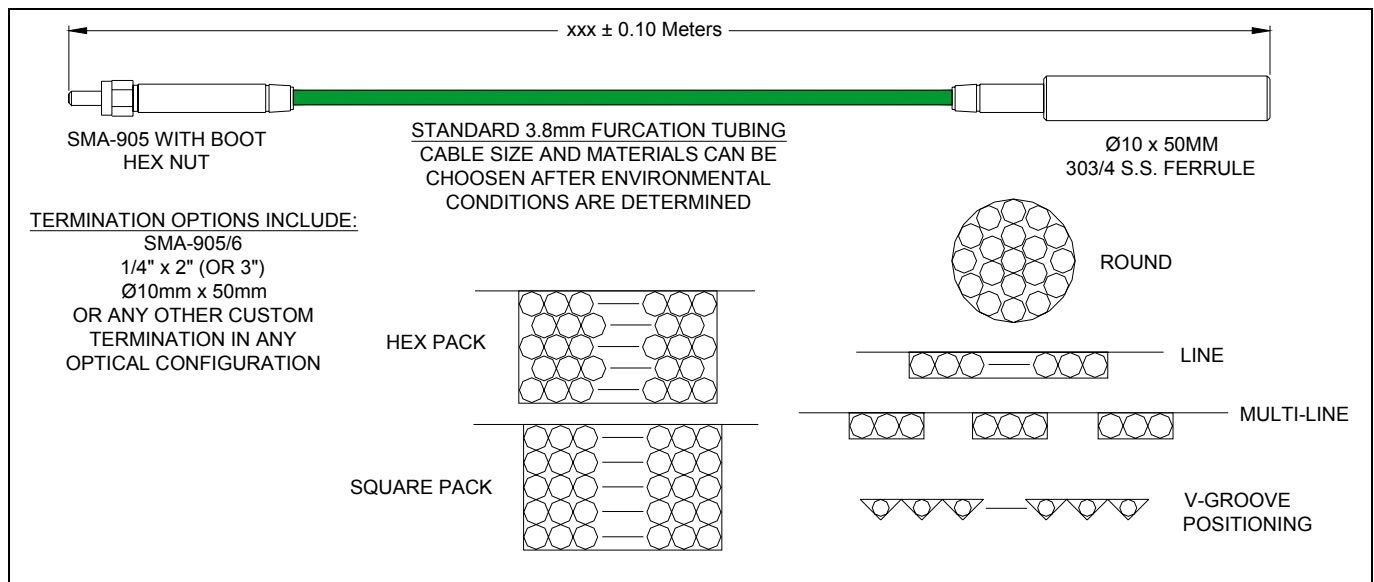
Bundles

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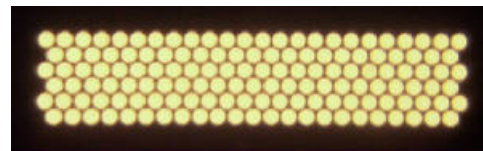
A bundle can be thought of as a jumper assembly, but with many more fibers, and a virtually unlimited number of options available for fiber types, cable materials and construction as well as end terminations. Many of these bundles can have one of our standard types of terminations. However, many products are OEM based and therefore require a specific design that can be manufactured by one of our top quality hardware suppliers.

The fibers can be arranged into a round, ring, continuous or multi-segment line or arc, or packed into 2D shapes or arrays. V-grooves in the base material or silicon are commonly used for coupling to Diode-Pumped Solid-State Lasers (DPSSL) and are generally optically coated to minimize de-stabilizing reflection of energy from the polished fiber surfaces back to the diodes or interface hardware.

Shown below are a standard bundle and various types of configurations for the fibers.



Due to the unlimited variety of configurations possible, customer specific part numbers will be generated upon the RFQ request. Options for high and low temperature applications as well as coatings required for high power applications are available upon request.





Bundles

Some basic assemblies are listed below using 3.8mm green Polyurethane furcation tubing.
For all other designs, please e-mail or call us.

All SMA's use a Hex Nut.

Bundle Type	# of Fibers Fiber Size	Part Number 0.22NA, UV	Part Number 0.22NA, NIR
Round to Round SMA-905 to SMA-905	7 - 100um	BU0001-001M	BU0011-001M
	19 - 100um	BU0002-001M	BU0012-001M
	7 - 200um	BU0003-001M	BU0013-001M
	19 - 200um	BU0004-001M	BU0014-001M
Round to Line SMA-905 to 1/4 x 2" Ferrule	7 - 100um	BU0005-001M	BU0015-001M
	19 - 100um	BU0006-001M	BU0016-001M
	7 - 200um	BU0007-001M	BU0017-001M
	19 - 200um	BU0008-001M	BU0018-001M



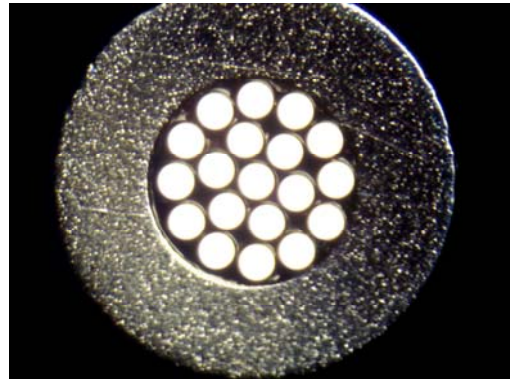
Ø10mm OD x 2" 303/4 SS Ferrule



Close up of 19 x 200um



19 Fibers, 200um SMA-905 to
10mm OD Ferrule



Close up of SMA-905



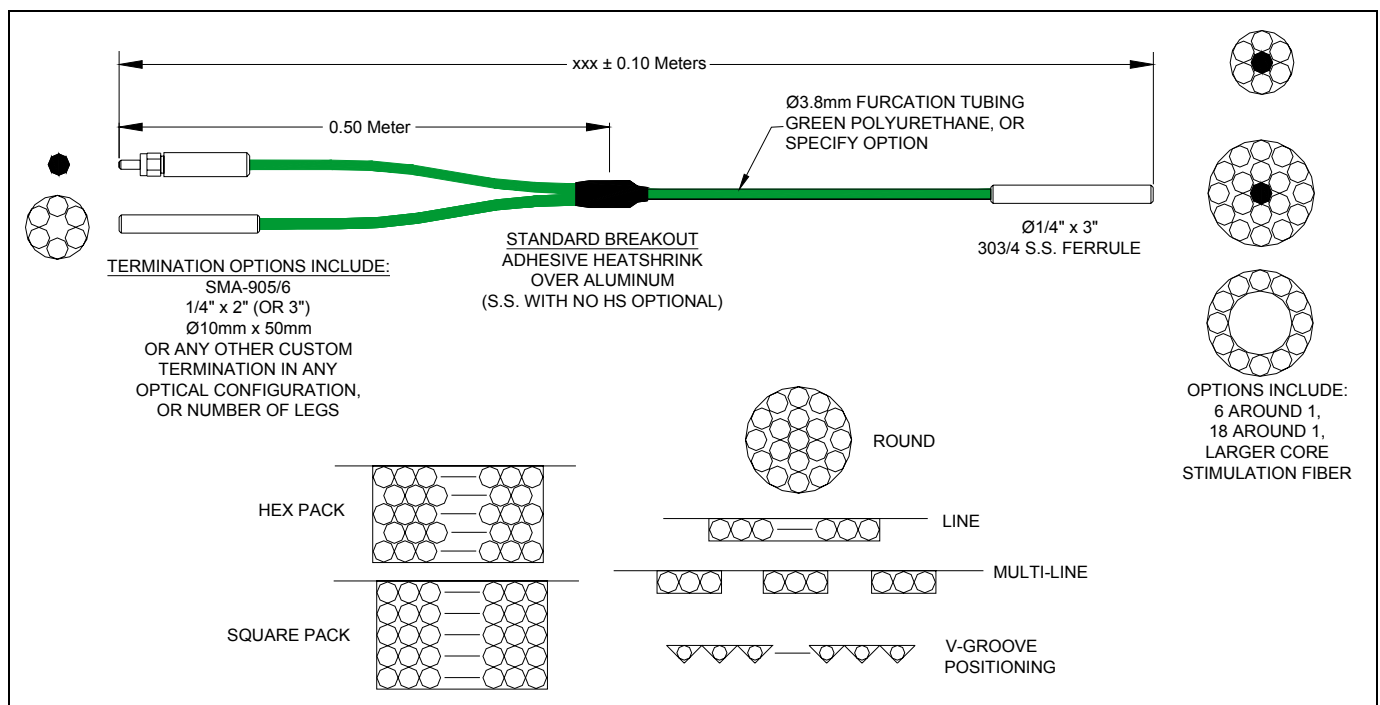
Furcated Bundles

A furcated bundle is the same as a bundle, except that one or both ends can be split into two or more terminated legs. The number of options available for fiber types, cable materials and construction as well as end terminations is unlimited. They may use some of our standard types of terminations, or can be OEM based and therefore require a specific design that can be manufactured to exacting specifications.

Bifurcated assemblies that are used to measure fluorescence, backscattering or reflection from various surfaces may contain anywhere from 2 to >100 fibers. They function by using a single or multitude of fibers as the excitation/illumination source and the remaining fibers as the collection/detection fibers. The fibers can be arranged into a round, ring, continuous or multi-segment line or arc, or packed into 2D shapes or arrays.

V-grooves in the base material or silicon are commonly used for interfacing to multi-channel spectrometers or to Diode-Pumped Solid-State Lasers (DPSSL). Images for DPSSL are generally coated to minimize de-stabilizing reflection of energy from the polished fiber surfaces back to the diodes or interface hardware.

Shown below are a standard bundle and various types of configurations for the fibers.



Options for high and low temperature applications, as well as AR coatings are available upon request. Specific fibers can be routed from the common end termination to specific locations within the leg terminations as required.

For all other designs, please e-mail or call.

Furcated Bundles

Some basic assemblies are listed below using 3.8mm green Polyurethane furcation tubing.

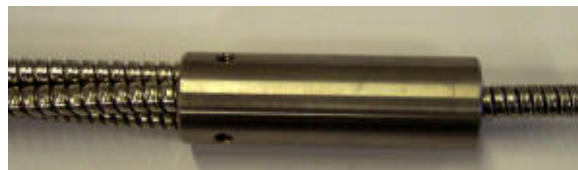
All SMA's use a Hex Nut.

Bundle Type	# of Fibers Fiber Size	Part Number 0.22NA, UV	Part Number 0.22NA, NIR
Ø1/4" x 3" Round to (2) SMA-905's 1 & 6 fiber	7 - 100um	BF0001-001M	BF0021-001M
	19 - 100um	BF0002-001M	BF0022-001M
	7 - 200um	BF0003-001M	BF0023-001M
	19 - 200um	BF0004-001M	BF0024-001M
Ø1/4" x 3" Round to (1) SMA-905 & Ø1/4" x 3" Fiber Line	7 - 100um	BF0005-001M	BF0025-001M
	19 - 100um	BF0006-001M	BF0026-001M
	7 - 200um	BF0007-001M	BF0027-001M
	19 - 200um	BF0008-001M	BF0028-001M

* Legs are 0.5 meters in length



7 Fibers, 200um SMA-905 to
1 & 6 Fiber SMA-905



1 to 3, SS Armored Cable

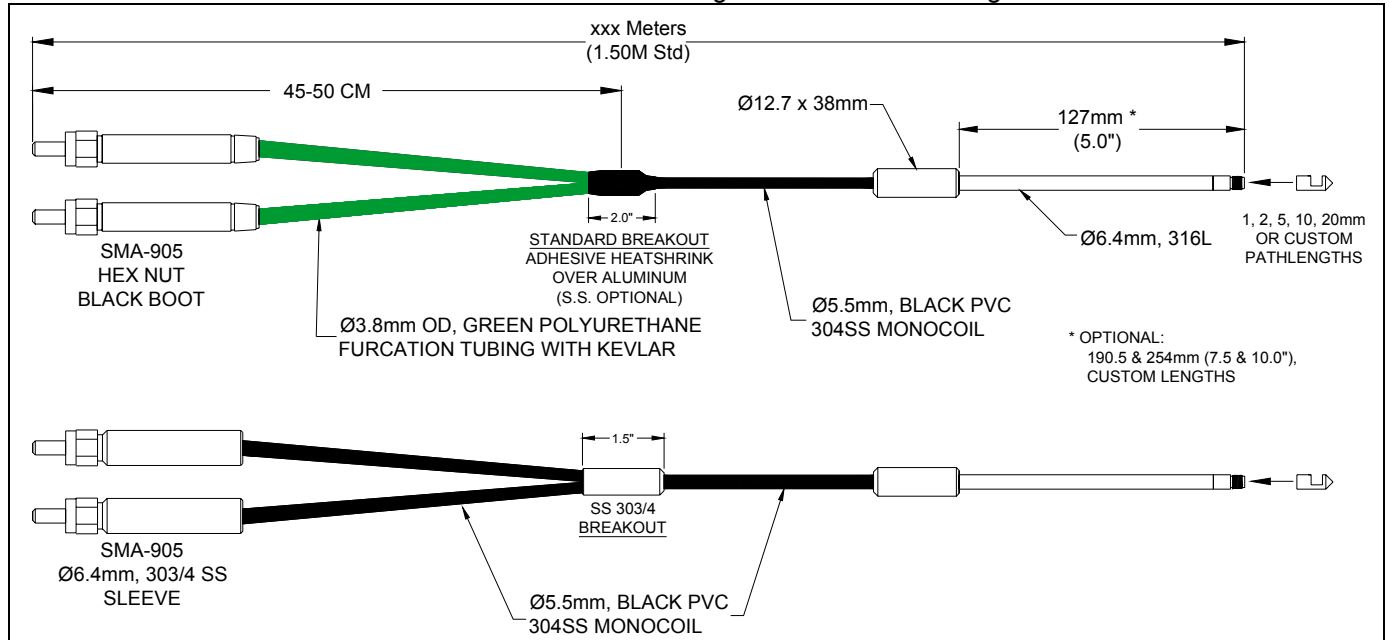


Standard Heatshrink Breakout (Bottom)
Optional SS Breakout

Dip Probes

Commonly referred to as a Dip Probe or Transmission Probe and used for liquids spectroscopy. These assemblies contain two fibers using a lens to collimate the light from one fiber through an open section, through which a liquid can pass. The lights is then reflected off of the mirror, passing through the liquid and lens a second time, and is refocused onto the second fiber for transmission to the analyzing instrument, typically a spectrometer. The optical pathlength in this design is double the physical opening of the replaceable tip. Other designs can be manufactured for specific applications including dissolution and harsh environments.

Shown below are two standard designs for Furcation Tubing and for Monocoil



Ø6.35mm OD x 127mm Long Probe, 0.22NA Fiber, SMA-905 w/boots & Furcation Tubing (Optional all Monocoil Version on bottom)

All SMA's use a Hex Nut.

Fiber Size	Part Number
200um	PD200UF-1.5M
300um	PD300UF-1.5M
400um	PD400UF-1.5M
600um	PD600UF-1.5M
Low Solarization Fiber	
300um	PD300LF-1.5M
600um	PD600LF-1.5M

For NIR grade 0.22 NA fibers, substitute the "U" with an "N" for the probe and tip part numbers.
For Monocoil, substitute the "F" with an "M".

Dip Probe Removable Tips

Standard Specifications:

Fiber Type:

- 0.22 NA

Fiber Size:

- 200 to 600um

Wavelengths:

- UV, NIR &
Low Solarization

Terminations:

- SMA-905's

Cable Designs:

- Polyurethane Furcation Tubing
with PVC Monocoil
- All PVC Monocoil with SS
breakout optional

Probe Body Length:

- 127mm (5.0")

Probe / Tip Material:

- Passivated 316L SS

Max Temperature:

- 100°C (due to Monocoil)



Monocoil 1/4" OD Probe



Furcation Tubing 1/4" OD Probe

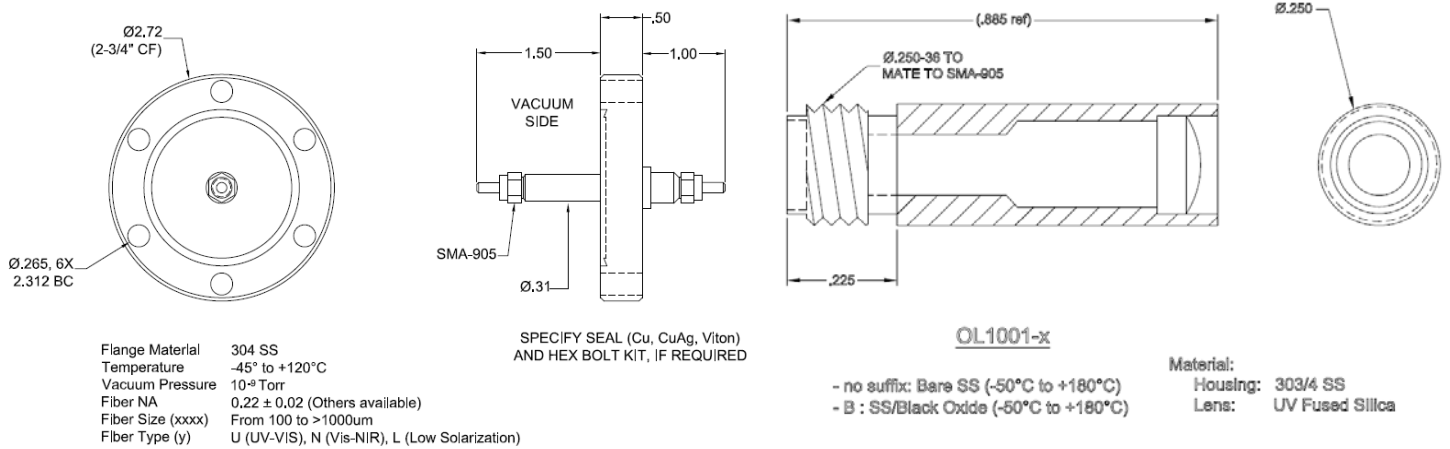


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Optical Adapters

Optical adapters are used for focusing or collimating light to/from fiber optics. These can be made to fit ferrules or connectors such as an SMA-905 or FC. Modified Conflat Flanges using a sealed fiber can be mounted into vacuum chambers. They can be used with a fiber within the chamber or with a screw on collimator. An AR coating can be applied to the optics for less reflection, but will limit the useful wavelength range.

Please contact us with any inquiries.



1/4" OD, SMA-905, 200-2200nm Collimator

All standard sized conflat flanges are available and can be modified to fit multiple fiber or optical feedthroughs. Choose from rotatable, non-rotatable, threaded or non-threaded mounting holes, type of bolts/nuts, seal and flange material.

Shown above is the standard collimator design. Other designs can be made for a larger diameter/collimated beam, for imaging a fiber to a specified distance and/or size, as well as those with a threaded lens for focusing adjustment.

Standard combination is non-rotatable, non-threaded hex bolt & hex nut in 304L SS.