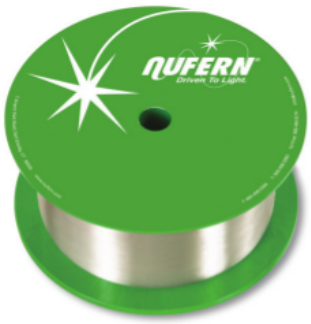
Ytterbium-Doped Single-Mode Single Clad Fiber



Nufern single-mode Yb-doped fibers are designed to support low power fiber lasers and amplifiers based on single-mode diode pump technology, rather than the multimode pumps used in high-power applications. For applications where high efficiency and very short device lengths are critical, these single-mode fibers are compatible with standard "telecom" fiber technology ensuring low splice loss to numerous fiber pigtailed components. The PM variety is designed with the PANDA-style stress structure which delivers linearly polarized light suitable for frequency conversion. These fibers make the ideal gain medium for low average power femtosecond fiber lasers and pre-amplifiers for higher power double-clad amplifiers. These High Performance (-HP) versions provide tighter optical and geometric tolerances, improving device performance, system compatibility and manufacturing process control.

Typical Applications

- Low power CW and pulsed fiber lasers
- Femtosecond fiber lasers
- Pre-amps for high-power, double-clad devices

Features & Benefits

- Single-mode output — Compatiable with standard telecom 980/1060 nm fiber-based components with low splice loss
- PANDA-style stress structure — Linearly polarized output for frequency conversion
- High Ytterbium concentration — Short fiber lengths to reduce detrimental non-linear effects
- High slope efficiency (typically 75%) — Efficient utilization of pump power
- Higher Prooftest Yields — Critical for long-term reliability in tight bend applications

Optical Specifications	**PM-YSF-HI-HP**	**SM-YSF-HI-HP**	**PM-YSF-LO-HP**	**SM-YSF-LO-HP**
Operating Wavelength	1015 – 1115 nm	1015 – 1115 nm	1015 – 1115 nm	1015 – 1115 nm
Core NA	0.110	0.110	0.130	0.130
Mode Field Diameter	7.5 ± 0.7 µm @ 1060 nm	7.5 ± 0.7 µm @ 1060 nm	6.5 ± 0.7 µm @ 1060 nm	6.5 ± 0.7 µm @ 1060 nm
Cutoff	860 ± 50 nm	860 ± 50 nm	860 ± 50 nm	860 ± 50 nm
Core Attenuation	≤ 10.0 dB/km @ 1200 nm	≤ 10.0 dB/km @ 1200 nm	≤ 10.0 dB/km @ 1200 nm	≤ 10.0 dB/km @ 1200 nm
Core Absorption	85.0 ± 10.0 dB/m at 915 nm 250.0 dB/m at 975 nm	85.0 ± 10.0 dB/m at 915 nm 250.0 dB/m at 975 nm	26.0 ± 4.0 dB/m at 915 nm 80.0 dB/m at 975 nm	26.0 ± 4.0 dB/m at 915 nm 80.0 dB/m at 975 nm
Birefringence	> 2.8×10^{-4}	N/A	> 2.8×10^{-4}	N/A
Geometrical & Mechanical Specifications				
Cladding Diameter	125.0 ± 1.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm
Core Diameter	6.0 µm	6.0 µm	5.0 µm	5.0 µm
Coating Diameter	245.0 ± 10.0 µm	245.0 ± 10.0 µm	245.0 ± 10.0 µm	245.0 ± 10.0 µm
Coating Concentricity	< 5.0 µm	< 5.0 µm	< 5.0 µm	< 5.0 µm
Core/Clad Offset	≤ 0.50 µm	≤ 0.50 µm	≤ 0.50 µm	≤ 0.50 µm
Coating Material	Acrylate	Acrylate	Acrylate	Acrylate
Operating Temperature Range	-55 to 85 °C	-55 to 85 °C	-55 to 85 °C	-55 to 85 °C
Prooftest Level	≥ 200 kpsi (1.4 GN/m²)	≥ 200 kpsi (1.4 GN/m²)	≥ 200 kpsi (1.4 GN/m²)	≥ 200 kpsi (1.4 GN/m²)

The passive version of each fiber is also available (1060-XP, PM980-XP, and photosensitive PS1060, PS-PM980)
Estimated 915 nm absorpion based on measured absorption curve @ 950 nm and 1010 nm for fibers PM-YSF-HI-HP and SM-YSF-HI-HP

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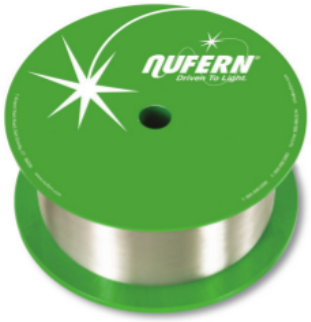
980/1060 nm Select Cutoff Single-Mode Fiber



Nufern's 1060-XP select cutoff single-mode fiber is optimized for use by component manufacturers in the telecommunications wavelengths. This application-specific fiber was developed for pump diode pigtails, unique delivery for components and couplers. 1060-XP offers exceptional uniformity and core/clad concentricity specifications, very tight second mode cut off tolerances, and tighter bend radius for applications in optical packages. These extra high-performance specifications result in superior strength, increased component reliability, improved production yields and reduced component manufacturer costs.

Typical Applications

- Pump diode pigtails
- 980/1550 nm WDM couplers
- Single clad Yb-fiber pigtails

Features & Benefits

- Exceptional uniformity and core/clad concentricity — Low, consistent splice loss to telecom components
- Extremely tight second mode cutoff tolerance — High yield coupler manufacturing
- Higher proof test levels — Critical for long-term reliability in tight bend applications

Optical Specifications	**1060-XP**
Operating Wavelength	980 – 1600 nm
Core NA	0.140
Mode Field Diameter	5.9 ± 0.5 µm @ 980 nm 6.2 ± 0.5 µm @ 1060 nm 9.5 ± 0.5 µm @ 1550 nm
Cutoff	920 ± 30 nm
Core Attenuation	≤ 1.5 dB/km @ 1060 nm ≤ 2.1 dB/km @ 980 nm
Geometrical & Mechanical Specifications	
Cladding Diameter	125.0 ± 0.5 µm
Core Diameter	5.8 µm
Coating Diameter	245.0 ± 10.0 µm
Coating Concentricity	< 5.0 µm
Core/Clad Offset	≤ 0.30 µm
Coating Material	UV Cured, Dual Acrylate
Operating Temperature Range	-55 to 85 °C
Short Term Bend Radius	≥ 6 mm
Long Term Bend Radius	≥ 13 mm
Prooftest Level	≥ 200 kpsi (1.4 GN/m²)

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7 Airport Park Road, East Granby, CT 06026 • 860.408.5000 • Toll-free 866.466.0214 • Fax 860.844.0210 E-mail info @ nufern.com • www.nufern.com Nufern products are manufactured under an ISO 9001:2008 certified quality management system.

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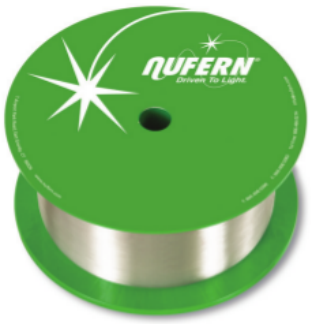
Standard specifications and design parameters are listed above. Specifications are subject to change without notice. Other configurations such as alternative form factors, optimized cut-off and UV cured color coating may be available. Let us know how Nufern can assist with your requirements.

Polarization Maintaining 980 nm Telecommunication Fibers



Nufern's Polarization Maintaining Telco fibers are designed for today's most advanced networks. Optimized for use at 980 nm, these fibers are used in all PM applications for data and telecom. Nufern has applied its unique manufacturing facility and capabilities to this product area and has established leading optical, mechanical and geometrical tolerances. The bend insensitive versions of our fibers offer lowest bend loss and extinction ratios at small bend diameters enabling our customers to reduce package sizes. Available in either 250 or 400 micron coating diameters and prooftested to 200 kpsi, Nufern's PM fibers will meet the demands of all current and future applications.

Typical Applications

- Pump pigtails
- Grating stabilizers
- PM patchcords
- Polarization sensitive devices

Features & Benefits

- Tight specifications — Highly deterministic results, highest product yield
- High fatigue failure resistance — Longest service life
- Bend insensitive — Survives application in tight geometries (B version)
- All fiber proof tested to > 200 kpsi — Critical for ensuring long term reliability

Optical Specifications	**PM980-XP**	**PM980B-XP**	**PM980-400**	**PM980B-400**
Operating Wavelength	970 – 1550 nm	970 – 1550 nm	970 – 1550 nm	970 – 1550 nm
Core NA	0.120	0.120	0.120	0.120
Mode Field Diameter	6.6 ± 0.5 µm @ 980 nm	6.6 ± 0.5 µm @ 980 nm	6.6 ± 0.5 µm @ 980 nm	6.6 ± 0.5 µm @ 980 nm
Maximum Bend Loss	N/A	0.5 dB at 980 nm, 25 mm OD, 10 turns	N/A	0.5 dB at 980 nm, 25 mm OD, 10 turns
Cutoff	920 ± 50 nm	920 ± 50 nm	920 ± 50 nm	920 ± 50 nm
Core Attenuation	≤ 2.5 dB/km @ 980 nm	≤ 2.5 dB/km @ 980 nm	≤ 2.5 dB/km @ 980 nm	≤ 2.5 dB/km @ 980 nm
Beat Length	≤ 2.7 mm @ 980 nm	≤ 2.7 mm @ 980 nm	≤ 2.7 mm @ 980 nm	≤ 2.7 mm @ 980 nm
Normalized Cross Talk	≤ - 40.0 dB at 4 m @ 980 nm ≤ - 30.0 dB at 100 m @ 980 nm	≤ - 40.0 dB at 4 m @ 980 nm ≤ - 30.0 dB at 100 m @ 980 nm	≤ - 40.0 dB at 4 m @ 980 nm ≤ - 30.0 dB at 100 m @ 980 nm	≤ - 40.0 dB at 4 m @ 980 nm ≤ - 30.0 dB at 100 m @ 980 nm
Bending Cross Talk	N/A	-30 dB at 980 nm, 25 mm OD, 10 turns	N/A	-30 dB at 980 nm, 25 mm OD, 10 turns
Geometrical & Mechanical Specifications				
Cladding Diameter	125.0 ± 1.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm
Core Diameter	5.5 µm	5.5 µm	5.5 µm	5.5 µm
Coating Diameter	245.0 ± 15.0 µm	245.0 ± 15.0 µm	400.0 ± 15.0 µm	400.0 ± 15.0 µm
Coating Concentricity	< 5.0 µm	< 5.0 µm	< 10.0 µm	< 10.0 µm
Core/Clad Offset	≤ 0.50 µm	≤ 0.50 µm	≤ 0.50 µm	≤ 0.50 µm
Coating Material	UV Cured, Dual Acrylate	UV Cured, Dual Acrylate	UV Cured, Dual Acrylate	UV Cured, Dual Acrylate
Operating Temperature Range	-40 to 85 °C	-40 to 85 °C	-40 to 85 °C	-40 to 85 °C
Prooftest Level	≥ 200 kpsi (1.4 GN/m²)	≥ 200 kpsi (1.4 GN/m²)	≥ 200 kpsi (1.4 GN/m²)	≥ 200 kpsi (1.4 GN/m²)

Special Core Dopants: SiO2/GeO2.

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