



## **RightWave® Erbium-Doped Optical Fiber**

Critical component for the amplification of optical transmission signals



### **OPTICAL FIBER SOLUTIONS**

RightWave® Erbium-Doped Optical Fiber

World class EDF products and services, combined with a laser like focus on customer needs from specifications to delivery, truly differentiate OFS as a trusted fiber solutions partner. A broad optical fiber portfolio suited for diverse needs. Proven uniformity, quality and performance with impeccable service for supply-chain agility.

[www.ofsoptics.com](http://www.ofsoptics.com)

## Variety, Experience, Repeatability

Erbium-doped fiber (EDF) continues to be a critical component for the amplification of optical transmission signals. In telecom there is a broad range of amplifier applications including EDFA, CATV and DWDM amplifiers, which can be designed for low to very high pump powers. OFS offers the broadest portfolio of EDF in the telecom industry to meet your specific requirements for C- and L-Band amplifiers as well as amplified spontaneous emission (ASE) sources. Since the very onset of EDFA technology, OFS has been investing in and employing state-of-the-art equipment to develop and manufacture its RightWave EDF products.

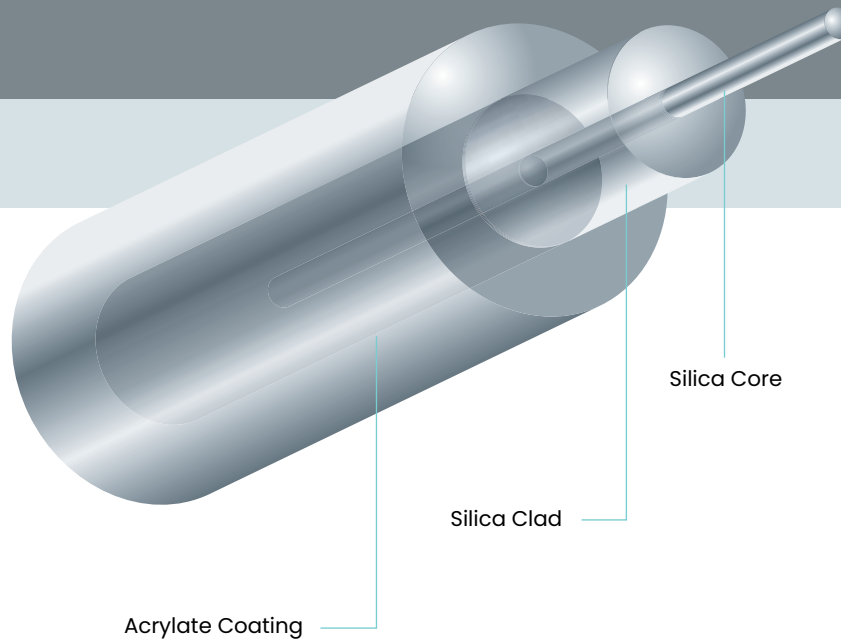
### Applications

#### Amplifiers:

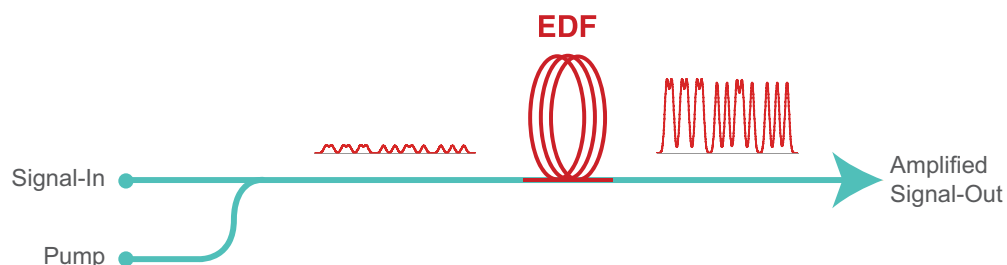
- DWDM Optical Amplifiers
- CATV Amplifiers
- High-Power Optical Amplifiers
- Single-stage or Multi-stage
- Compact On Board Amplifiers

#### Networks:

- Metro and Long Haul Networks
- Storage Networks and Disaster Recovery
- Packet Optical Networks
- Marine Networks



### Principle of Erbium-Doped Fiber Amplifier (using RightWave® Erbium-Doped Fiber)



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### Features and Benefits

Some advantages of selecting OFS, an industry leader in Erbium-Doped Fiber (EDF), as your fiber solutions partner include:

- **Broad EDF Portfolio** – With a strong commitment to the EDF market and its needs, OFS offers the broadest EDF portfolio in the telecom industry today.
- **Experience and Delivery** – OFS holds a strong track record of continually delivering large volumes of high-performance EDF to the general market.
- **Manufacturing Capacity** – Production in an ISO-certified environment helps to ensure a consistently dependable supply of EDF products.
- **Specialty Services** – For more than 30 years, OFS has provided specialty fiber services globally, meeting precise customer specifications for amplifier designs, colored coatings and a variety of spool sizes.
- **Gain Flatness** – OFS achieves broader and flatter gain spectra by using high aluminum levels, making fibers more suitable for DWDM and CATV applications.
- **Uniformity** – Fiber helps ensure low variability within fiber lots and repeatable performance from lot-to-lot, simplifying EDFA design and manufacturing.
- **Hydrogen Immunity** – OFS' patented processes help to prevent hydrogen (H<sub>2</sub>) induced attenuation loss for enhanced performance.
- **Low Polarization Mode Dispersion** – Low PMD allows the fibers to perform in high data rate applications.
- **Quality** — Using ISO 9001 certified manufacturing processes helps ensure that OFS EDF products meet the most stringent standards for quality, performance and reliability.
- **High Power-Conversion Efficiency** – Fibers are optimized to provide maximum efficiency within various pump-power operating ranges.
- **High Reliability** – Processing for H<sub>2</sub> immunity helps ensure highly consistent EDF products.
- **Splicing** – OFS patented processes help deliver splicing improvements (parameters available upon request). OFS also offers custom splicing services for optimum results.

### OASiX® Modeling Software

The OFS OASiX Optical Amplifier Simulation System is a sophisticated simulation software package that helps determine which OFS EDF is best for you. OASiX is provided free of charge to OFS EDF customers to model the performance of OFS EDF in accurate design simulations maximizing performance of system design. This software package, allows the simulation of a wide variety of EDFA types to predict which fiber is best for your application. ASE sources and laser designs are also incorporated in this proprietary software package. This specialized software package allows a system engineer to enter custom setup conditions, which can accurately predict EDF performance at all pump powers. OASiX also includes modeling parameters specific to the lot of EDF purchased, and it is available in a Dynamic Link Library (DLL) version to combine with other external optimization tools. OFS continues to issue new releases of OASiX to keep pace with the evolving needs of EDFA designers. Many customers see value in using OASiX for simulation as it can save them valuable measurement time, reduce fiber waste and also help optimize amplifier design.

OFS has a corporate heritage in EDF going back to 1989. With tens of thousands kilometers shipped in the past ten years alone, OFS' market-leading fibers are the desired choice for amplifier designs deployed throughout the world.

## OPTICAL FIBER SOLUTIONS FOR OPTICAL AMPLIFIER DESIGN

EDF continues to be a critical component in amplifier design for metro, long-haul and marine optical networks.

### Overview

The RightWave EDF portfolio has a broad EDF product line as each fiber type is optimized for different applications. The tables below present an overview of some of our various fiber types.

RightWave EDF for C-Band		
Fiber Type	Part Number	Description and Benefits
<b>GP980</b>	22904	A general purpose fiber designed for a wide range of applications, including single-stage, single-channel, narrow bandwidth and metro amplifiers,
<b>GP980 RH</b>	87152	Variant of GP980 with improved performance in radiation environments.
<b>MP980</b>	27299	A medium power fiber designed for many configurations of EDFAs. It can be used as a single-stage amplifier fiber at higher than 100mW pump powers. The most popular fiber type used in EDFA design, due to a well-balanced combination of broadband gain, gain flatness, bend loss and noise figure.
<b>MP980-II</b>	61376	A high efficiency fiber designed for a wide range of pump powers up to 600 mw. This fiber has a lower noise figure with better transient response time
<b>MP980IIH</b>	83751	A high absorption version of MP980II reducing the length needed in amplifier design.
<b>HP19 125/200</b>	87145	Fiber with optimized flatter gain shape in the C-band, featuring a 200 µm diameter coating for improved packing density
<b>HE980</b>	61380	A high efficiency fiber designed for low to medium pump powers ranging up to 500mW, optimized for pre-amplifier stage in a multi-stage amplifier due to low noise figure with moderate gain. The high NA allows for a smaller bend radius.
<b>R37003X</b>	27270	A high efficiency fiber designed for pump powers in the range 25-300mW. This product has a broad gain profile, excellent spectral reproducibility and bath-to-batch uniformity, supported by precision characterization in a real DWDM amplifier setup. The fiber is designed for improved splice performance for low splice loss.
<b>MP08-G2 125/200</b>	92134	Optimized for pump powers up to 600 mW, with a flattened gain shape offering minimal gain ripple in both the extended and conventional C-band.
<b>HP09-G2 125/200</b>	92135	Optimized for pump powers above 500 mW, with a flattened gain shape offerering minimal gain ripple in both the extended and conventional C-band.
RightWave EDF for L-Band		
Fiber Type	Part Number	Description and Benefits
<b>LSL</b>	61372	L-Band fiber designed for high efficiency, low noise figure, low non-linear effects and spectral flatness in DWDM amplifiers.
<b>LRL</b>	61373	L-Band fiber designed for high efficiency, low noise figure, low non-linear effects and spectral flatness in DWDM amplifiers, increased erbium concentration reduces the length needed in amplifier designs.
<b>LPL</b>	76675	L-Band fiber designed for high efficiency, low noise figure, low non-linear effects and spectral flatness in DWDM amplifiers, further increased erbium concentration for even shorter lengths needed in amplifier designs.
<b>LRL 125/200</b>	87757	LRL variant featuring a 200 µm coating allowing for improved packing density
<b>LRXL</b>	87153	Fiber with a gain shape optimized for operation in the extended L-band, up to 1627 nm. Features a reduced 200 µm coating diameter for high packing density.
<b>R37103e</b>	27325	A fiber designed specifically for L-band amplifiers operating in the 1565-1610 nm range. The fiber has high efficiency and low noise figure with excellent spectral uniformity, supported by precision characterization in DWDM amplifiers and incorporating the latest improvements in splice performance.

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RightWave EDF for ASE Sources and Remote Optically Pumped Amplifiers (ROPA)		
Fiber Type	Part Number	Description and Benefits
<b>HG980</b>	61379	A fiber with high NA and moderate erbium concentration for ASE source applications.
<b>LP980</b>	76943	A low power fiber designed for use in marine applications, where amplifiers are remotely pumped to reduce the number of amplifiers. This may also be used in disaster recovery applications.

RightWave 80 µm EDF for Compact Amplifiers		
Fiber Type	Part Number	Description and Benefits
<b>R37102 80</b>	10816	80 µm EDF with cut-off wavelength below 980 nm to minimize risk multi path interference. The peak absorption around 20 dB/m @ 1530 nm ensures a good compromise between fiber length required and power conversion efficiency penalties.
<b>LSL 80</b>	75882	80 µm version of L-Band fiber, with reduced cladding designed for high efficiency, low non-linear effects, low noise figure and spectral flatness in DWDM amplifiers as well as smaller bend radius for compact amplifier design.
<b>LRL 80</b>	76176	80 µm version of reduced length L-Band fiber, with reduced cladding designed for high efficiency, low noise figure, low non-linear effects and spectral flatness in DWDM amplifiers as well as smaller bend radius needed for compact amplifier design.
<b>LPL 80</b>	76178	80 µm version of reduced length L-Band fiber, with reduced cladding designed for high efficiency, low noise figure, low non-linear effects and spectral flatness in DWDM amplifiers as well as smaller bend radius needed for compact amplifier design.
<b>LNL 80/165</b>	87748	High dopant level fiber allowing for use of very short fibers in compact amplifiers.
<b>LNL 80/135</b>	88950	LNL variant featuring a 135 µm coating allowing for improved packing density
<b>LLL 80/135</b>	90860	Very high dopant level enabling very short fiber lengths in compact amplifiers



## OPTICAL FIBER SOLUTIONS FOR OPTICAL AMPLIFIER DESIGN

### RightWave Polarization Maintaining EDF

Fiber Type	Part Number	Description and Benefits
<b>EDF07 PM</b>	31946	A PM-fiber with absorption of 7 dB/m at 1530 nm. The polarization maintaining properties are achieved by using a stress rods design.
<b>EDF25 PM</b>	27242	A PM-fiber with absorption of 25 dB/m at 1530 nm. The polarization maintaining properties are induced by its elliptical core design.
<b>EDF50 PM</b>	27281	A PM-fiber with absorption of 50 dB/m at 1530 nm. The fiber has an elliptical core design with high erbium concentration making it attractive for very short fiber use in the laser cavity.

### RightWave Highly Doped Erbium EDF, Ytterbium and Thulium Doped EDF

Fiber Type	Part Number	Description and Benefits
<b>EDF80</b>	27308	A fiber with absorption of 80 dB/m at 1530 nm.
<b>EDF150</b>	27307	A fiber with absorption of 150 dB/m at 1530 nm.
<b>EDF150 LD</b>	27326	A low dispersion fiber with absorption of 150 dB/m at 1530 nm.

Quality products, customer part codes,  
flexible capacity production, consistency  
and service agility are just some attributes  
that make OFS the no-risk choice  
for amplifier manufacturers.



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RightWave Erbium-Doped Fibers						
Fiber	Peak Absorption @ 1530 nm	Numerical Aperture	Mode Field Diameter @ 1550 nm	Cutoff Wavelength	Cladding/Coat- ing Diameter	Part Number
C-Band						
<b>GP980</b>	13 ± 1.5 dB/m	0.24	5.5 ± 0.7 μm	920 nm	125/245 μm	22904
<b>GP980 RH</b>	10 ± 1.5 dB/m	0.25	5.6 ± 0.5 μm	950 nm	125/245 μm	87152
<b>MP980</b>	6.5 ± 1.0 dB/m	0.21	6.2 ± 0.7 μm	910 nm	125/245 μm	27299
<b>MP980-II</b>	7.5 ± 1.0 dB/m	0.22	5.5 ± 0.7 μm	1170 nm	125/245 μm	61376
<b>MP980IIH</b>	18.0 ± 3.0 dB/m	0.22	5.5 ± 0.7 μm	1100 nm	125/245 μm	83751
<b>HP19 125/200</b>	19 ± 3 dB/m	0.24	5.2 ± 0.7 μm	1270 nm	125/200 μm	87145
<b>HE980</b>	4.0 ± 1.0 dB/m	0.26	5.1 ± 0.7 μm	910 nm	125/245 μm	61380
<b>R37003X</b>	7.0 ± 1.0 dB/m	0.26	5.3 ± 0.7 μm	920 nm	125/245 μm	27270
<b>MP08-G2</b>	8.0 ± 1.0 dB/m	0.22	5.7 ± 0.5 μm	1100 nm	125/200 μm	92134
<b>HP09-G2</b>	9.0 ± 1.0 dB/m	0.20	6.0 ± 0.5 μm	1250 nm	125/200 μm	92135
L-Band						
<b>LSL</b>	17.0 ± 2.0 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	125/245 μm	61372
<b>LRL</b>	30.0 ± 3.0 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	125/245 μm	61373
<b>LPL</b>	37 ± 3.0 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	125/245 μm	76675
<b>LRL 125/200</b>	30.0 ± 3.0 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	125/200 μm	87757
<b>LRXL</b>	35 ± 5 dB/m	0.21	6.1 ± 0.5 μm	1550 nm	125/200 μm	87153
<b>R37103e</b>	18.0 ± 2.0 dB/m	0.25	5.3 ± 0.7 μm	940 nm	125/245 μm	27325
ASE Sources and Remote Optically Pumped Amplifiers						
<b>HG980</b>	17.0 ± 2.0 dB/m	0.26	5.1 ± 0.7 μm	920 nm	125/245 μm	61379
<b>LP980</b>	5.5 ± 1.0 dB/m	0.32	4.3 ± 0.7 μm	940 nm	125/245 μm	76943
<b>ASE 25 80</b>	25 ± 3 dB/km	0.31	4.3 ± 0.7 μm	930 nm	80/165 μm	35644
80 μm EDF for Compact Amplifiers						
<b>R37102 80</b>	20.0 ± 3.0 dB/m	0.26	5.0 ± 0.5 μm	960 nm	80/165 μm	10816
<b>LSL 80</b>	17.0 ± 2.0 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	80/165 μm	75882
<b>LRL 80</b>	30.0 ± 3.0 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	80/165 μm	76176
<b>LPL 80</b>	37 ± 3.0 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	80/165 μm	76178
<b>LNL 80/165</b>	55 ± 5 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	80/165 μm	87748
<b>LNL 80/135</b>	55 ± 5 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	80/135 μm	88950
<b>LLL 80/135</b>	85 ± 5 dB/m	0.26	4.9 ± 0.7 μm	1230 nm	80/135 μm	90860
Polarization-Maintaining EDF						
<b>EDF07 PM SR</b>	7 dB/m	0.21	5.5 ± 0.7 μm	920 nm	125/245 μm	31946
<b>EDF25 PM EC</b>	25 dB/m	0.27	5.2 ± 0.7 μm	1150 nm	125/245 μm	27242
<b>EDF50 PM EC</b>	50 dB/m	0.27	5.4 ± 0.7 μm	1260 nm	125/245 μm	27281
Highly Doped EDF						
<b>EDF 80</b>	80 dB/m	0.28	4.3 ± 0.7 μm	950 nm	125/245 μm	27308
<b>EDF150</b>	150 dB/m	0.28	4.3 ± 0.7 μm	925 nm	125/245 μm	27307
<b>EDF150 LD</b>	150 dB/m	0.22	5.6 ± 0.7 μm	930 nm	125/245 μm	27326



**For additional information please contact your sales representative.**

You can also visit our website at [www.ofsoptics.com](http://www.ofsoptics.com)  
or call 1-888-fiberhelp (1-888-342-3743) USA or 1-770-798-5555 outside the USA.



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SOLUTIONS

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