



A Furukawa Company

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

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.

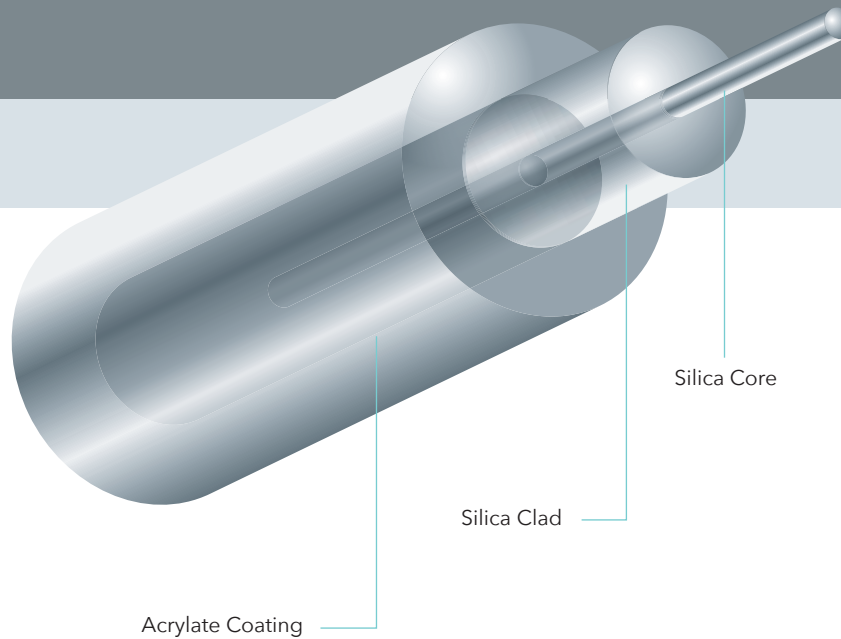
Applications

Amplifiers:

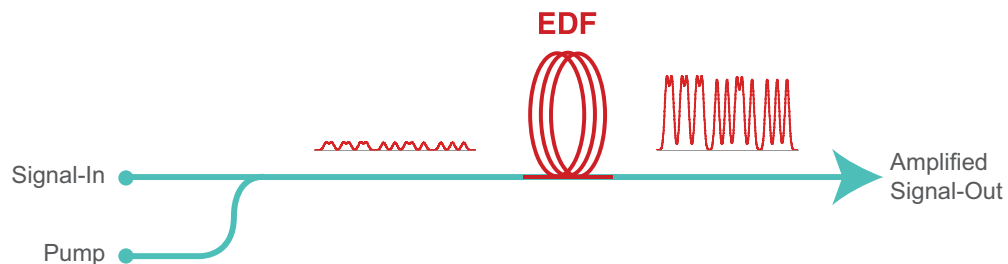
- DWDM Optical Amplifiers
- CATV Amplifiers
- High-Power Optical Amplifiers
- Single-stage or Multi-stage Amplifiers

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 10 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 (H₂) 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 and TL 9000 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 H₂ 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, featuring an enhanced user interface, 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 over 20,000 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 presents an overview of our various fiber types.

RightWave EDF for C-Band			
Fiber Type	Part Number	Description and Benefits	Application
GP980	22904	A general purpose fiber designed for a wide range of applications, including single-stage, single-channel, narrow bandwidth and metro amplifiers, where tight lot tolerances and full blown characterization are not necessary.	CATV, DWDM, Single-stage Amplifiers
MP980	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.	CATV, DWDM, Single-stage Pre-amplifier and Multi-stage Amplifiers
MP980-II	61376	A new high efficiency fiber designed for a wide range of pump powers up to 600mw. This fiber has a lower noise figure with better transient response time	CATV, DWDM, Single-stage, Pre-amplifier and Multi-stage Amplifiers
HP980X	61378	All the high power fiber characteristics with a higher cutoff wavelength resulting in higher efficiency.	CATV, DWDM, Multi-stage Amplifiers
HE980	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.	CATV, DWDM, Single-stage, Pre-amplifier stage and Multi-stage Amplifiers
R37003X	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.	CATV, DWDM, Optical Amplifiers, Splicing applications

RightWave EDF for L-Band			
Fiber Type	Part Number	Description and Benefits	Application
LSL	61372	L-Band fiber designed for high efficiency, low noise figure, low non-linear effects and spectral flatness in DWDM amplifiers.	DWDM, Transport
LRL	61373	L-Band fiber designed for high efficiency, low noise figure, low non-linear effects and spectral flatness in DWDM amplifiers, reducing the length needed in amplifier design.	Compact Amplifiers, DWDM Amplifiers
LPL	76675	L-Band fiber designed for high efficiency, low noise figure, low non-linear effects and spectral flatness in DWDM amplifiers, reducing the length needed in amplifier design.	Compact Amplifiers, DWDM Amplifiers
R37103e	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.	CATV, DWDM
MP980IIH	83751	A high absorption version of MP980II reducing the length needed in amplifier design.	DWDM, Single-stage and Multi-stage Amplifiers

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RightWave EDF for ASE Sources and Remote Optically Pumped Amplifiers (ROPA)			
Fiber Type	Part Number	Description and Benefits	Application
HG980	61379	A fiber with high NA and moderate erbium concentration for ASE source applications.	ASE Sources, pumping at either 980 or 1480 nm
LP980	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.	ROPA for Marine Network Spans, Disaster Recovery, Storage Networks
ASE 25 80	35644	80 μm cladding allows for very tight bend radii without compromising the device reliability.	Small form factor ASE Sources, Pumping at either 980 or 1480 nm
RightWave 80 μm EDF for Compact Amplifiers			
Fiber Type	Part Number	Description and Benefits	Application
R37003X 80	40902	80 μm version of the fiber, reducing the length needed in amplifier design.	C-Band Compact Amplifiers
R37102 80	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.	L-Band Compact Amplifiers
LSL 80	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.	L-Band Compact Amplifiers
LRL 80	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.	L-Band Compact Amplifiers
LPL 80	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.	L-Band Compact Amplifiers

OPTICAL FIBER SOLUTIONS

FOR OPTICAL AMPLIFIER DESIGN

RightWave Polarization Maintaining EDF			
Fiber Type	Part Number	Description and Benefits	Application
EDF07 PM	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.	Fiber Lasers, PM-Amplifiers
EDF25 PM	27242	A PM-fiber with absorption of 25 dB/m at 1530 nm. The polarization maintaining properties are induced by its elliptical core design.	Fiber Lasers, PM-Amplifiers
EDF50 PM	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.	Fiber Lasers, PM-Amplifiers
RightWave Highly Doped Erbium EDF, Ytterbium and Thulium Doped EDF			
Fiber Type	Part Number	Description and Benefits	Application
EDF80	27308	A fiber with absorption of 80 dB/m at 1530 nm.	Fiber Lasers
EDF150	27307	A fiber with absorption of 150 dB/m at 1530 nm.	Fiber Lasers
EDF150 LD	27326	A low dispersion fiber with absorption of 150 dB/m at 1530 nm.	Fiber Lasers
YbDF320 PM EC	40906	A Ytterbium doped polarization maintaining fiber. The fiber birefringence is due to its elliptical core design. The absorption is 320 dB/m at 977 nm, whereas the cladding of the fiber is photosensitive.	Fiber Lasers
YbDF350	40908	A Ytterbium doped fiber with an absorption of 350 dB/m at 977 nm. The cladding of the fiber is photosensitive.	Fiber Lasers
TmDF200	40910	A Thulium doped fiber with an absorption of 200 dB/m at 790 nm. The cladding of the fiber is photosensitive.	Fiber Lasers

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	Numerical Aperture	Mode Field Diameter	Cutoff Wavelength	Cladding/Coating Diameter	Part Number
C-Band						
GP980	@ 1530 nm; 13 ± 1.5 dB/m	0.24 ± 0.02	@ 1550 nm; 5.5 ± 0.7 μm	920 nm	125/245 μm	22904
MP980	@ 1530 nm; 6.5 ± 1.0 dB/m	0.21 ± 0.02	@ 1550 nm; 6.2 ± 0.7 μm	910 nm	125/245 μm	27299
MP980-II	@ 1530 nm; 7.5 ± 1.0 dB/m	0.22 ± 0.02	@ 1550 nm; 5.5 ± 0.7 μm	1170 nm	125/245 μm	61376
HP980X	@ 1530 nm; 7.0 ± 1.0 dB/m	0.18 ± 0.02	@ 1550 nm; 6.8 ± 0.7 μm	1040 nm	125/245 μm	61378
HE980	@ 1530 nm; 4.0 ± 1.0 dB/m	0.26 ± 0.02	@ 1550 nm; 5.1 ± 0.7 μm	910 nm	125/245 μm	61380
R37003X	@ 1530 nm; 7.0 ± 1.0 dB/m	0.26 ± 0.02	@ 1550 nm; 5.3 ± 0.7 μm	920 nm	125/245 μm	27270
L-Band						
LSL	@ 1530 nm; 17.0 ± 2.0 dB/m	0.26 ± 0.02	@ 1550 nm; 4.9 ± 0.7 μm	1230 nm	125/245 μm	61372
LRL	@ 1530 nm; 30.0 ± 3.0 dB/m	0.26 ± 0.02	@ 1550 nm; 4.9 ± 0.7 μm	1230 nm	125/245 μm	61373
LPL	@ 1530 nm; 37 ± 3.0 dB/m	0.26 ± 0.02	@ 1550 nm; 4.9 ± 0.7 μm	1230 nm	125/245 μm	76675
R37103e	@ 1530 nm; 18.0 ± 2.0 dB/m	0.25 ± 0.02	@ 1550 nm; 5.3 ± 0.7 μm	940 nm	125/245 μm	27325
MP980IIH	@ 1530 nm; 18.0 ± 3.0 dB/m	0.22 ± 0.02	@ 1550 nm; 5.5 ± 0.7 μm	1100 nm	125/245 μm	83751
ASE Sources and Remote Optically Pumped Amplifiers						
HG980	@ 1530 nm; 17.0 ± 2.0 dB/m	0.26 ± 0.02	@ 1550 nm; 5.1 ± 0.7 μm	920 nm	125/245 μm	61379
LP980	@ 1530 nm; 5.5 ± 1.0 dB/m	0.32 ± 0.02	@ 1550 nm; 4.3 ± 0.7 μm	940 nm	125/245 μm	76943
ASE 25 80	@ 1530 nm; 25 ± 3 dB/km	0.31 ± 0.02	@ 1550 nm; 4.3 ± 0.7 μm	930 nm	80/165 μm	35644
80 μm EDF for Compact Amplifiers						
R37003X 80	@ 1530 nm; 9.0 ± 2.0 dB/m	0.27 ± 0.02	@ 1550 nm; 4.9 ± 0.7 μm	920 nm	80/165 μm	40902
R37102 80	@ 1550 nm; 20.0 ± 3.0 dB/m	0.26 ± 0.02	@ 1550 nm; 5.0 ± 0.5 μm	960 nm	80/250 μm	10816
LSL 80	@ 1530 nm; 17.0 ± 2.0 dB/m	0.26 ± 0.02	@ 1550 nm; 4.9 ± 0.7 μm	1230 nm	80/165 μm	75882
LRL 80	@ 1530 nm; 30.0 ± 3.0 dB/m	0.26 ± 0.02	@ 1550 nm; 4.9 ± 0.7 μm	1230 nm	80/165 μm	76176
LPL 80	@ 1530 nm; 37 ± 3.0 dB/m	0.26 ± 0.02	@ 1550 nm; 4.9 ± 0.7 μm	1230 nm	80/165 μm	76178
Polarization-Maintaining EDF						
EDF07 PM SR	@ 1530 nm; 7 dB/m	0.21 ± 0.02	@ 1550 nm; 5.5 ± 0.7 μm	920 nm	125/245 μm	31946
EDF25 PM EC	@ 1530 nm; 25 dB/m	0.27 ± 0.02	@ 1550 nm; 5.2 ± 0.7 μm	1150 nm	125/245 μm	27242
EDF50 PM EC	@ 1530 nm; 50 dB/m	0.27 ± 0.02	@ 1550 nm; 5.4 ± 0.7 μm	1260 nm	125/245 μm	27281
Highly Doped EDF						
EDF 80	@ 1530 nm; 80 dB/m	0.28 ± 0.02	@ 1550 nm; 4.3 ± 0.7 μm	950 nm	125/245 μm	27308
EDF150	@ 1530 nm; 150 dB/m	0.28 ± 0.02	@ 1550 nm; 4.3 ± 0.7 μm	925 nm	125/245 μm	27307
EDF150 LD	@ 1530 nm; 150 dB/m	0.22 ± 0.02	@ 1550 nm; 5.6 ± 0.7 μm	930 nm	125/245 μm	27326
Ytterbium and Thulium Doped EDF						
YbDF350	@ 977 nm; 350 dB/m @ 915 nm; 110 dB/m	0.23 ± 0.02	@ 1000 nm; 3.6 μm	890 nm	125/245 μm	40908
YbDF320 PM EC	@ 977 nm; 320 dB/m @ 915 nm; 100 dB/m	0.23 ± 0.02	@ 1000 nm; 3.6 μm	1000 nm	125/245 μm	40906
TmDF200	@ 790 nm; 200 dB/m	0.26 ± 0.02	@ 1700 nm; 5.0 μm	1350 nm	125/245 μm	40910



For additional information please contact your sales representative.

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12/19