Erbium Doped Fiber Amplifier for Narrowline Pulse Laser Space Qualifiable

1540–1560 nm up to 100 W pulse

DATASHEET

Return to the Webpage

The EDFA-P serial single-frequency pulsed erbium-doped fiber amplifier is designed for narrow-linewidth pulse amplification, supporting input laser pulses with spectral linewidths down to the kHz level while effectively suppressing nonlinear effects and delivering high pulse energy with peak power up to 100 W. It is available with single-mode or polarization-maintaining fiber output and is well suited for applications such as distributed sensing and Doppler lidar, with a special version optimized for space communications. The EDFA-P is offered as either a compact module with a universal control-interface PCB for system integration or a turnkey benchtop unit featuring a computer interface and GUI for laboratory use. The default operating mode is a hybrid pumping scheme that combines a low DC bias pump with a pulsed pump boost synchronized to the input signal, keeping the population inversion ready, minimizing turn-on delay, providing excellent pulse-to-pulse energy stability, and strongly suppressing amplified spontaneous emission (ASE).

For narrow-linewidth CW seeds below several MHz, the maximum output power is limited by stimulated Brillouin scattering (SBS). As an example, for linewidths around 500 kHz, SBS limits output powers above a few watts.

Features

- Wide Wavelength Range
- High Output Power
- Suppress Nonlinearity

Applications

- Doppler LiDAR
- Fiber Optic Distributed Sensing
- Fiber Laser

Specifications

Parameter		Min	Typical	Max	Unit
Wavelength		1540	1550	1560	nm
Pulse Width		10		200	ns
Pulse Frequency		5		20	kHz
Input Pulse Peak Power		10		50	mW
Output Pulse Peak Power		10		100	W
Output Single Pulse Energy (@200 ns, 10 kHz)		10		20	uJ
Input/Output Isolation			≥ 35		dB
Fiber Type		SMF-28			
Connector		FC/APC			
Operating Mode		ACC			
Dimensions	Benchtop	255(W)×285(D)×115(H)			mm
	Module	125(W)×150(D)×31.5(H)			
Power Supply	Benchtop	AC 100~240V, ≤15W			V
	Module	DC 12V, ≤15W			
Control Mode (Module)		RS232 Serial communication			
Communication Interface (Module)		DB9 Female			
Operating Temperature		–5 ~ +55			°C
Operating Humidity Range		0 ~ 70			%

Notes:

ACC mode-automatic current control: EDFA pumping working current is set by the user and automatically locked by EDFA to achieve constant pumping current. When the input optical power fluctuates, the output power will also fluctuate accordingly, which is applicable to all EDFA models.

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link]:

Note: EDFAs are susceptible to damage from strong back-reflections, which internal isolators may not adequately prevent. We offer a special isolator that redirects reflected light to a separate fiber port. **Back-reflection damage is covered under warranty only for EDFAs equipped with this protective isolator.**

RoHS COMPLIANT

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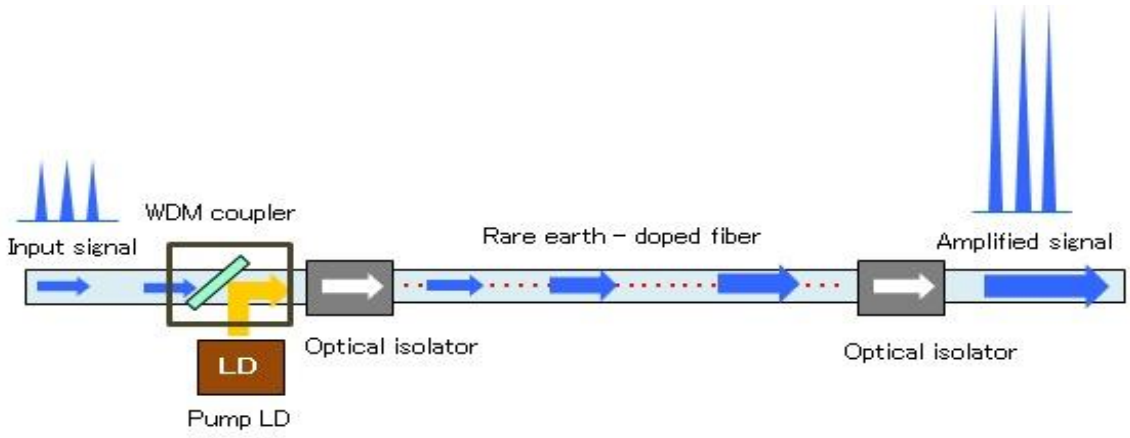
Function Diagram



Package Choices

Component

Benchtop- USB/GUI

GUI Adapting PCB

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Mechanical Dimensions (mm)

Module 125(W)×150(D)×31.5(H)

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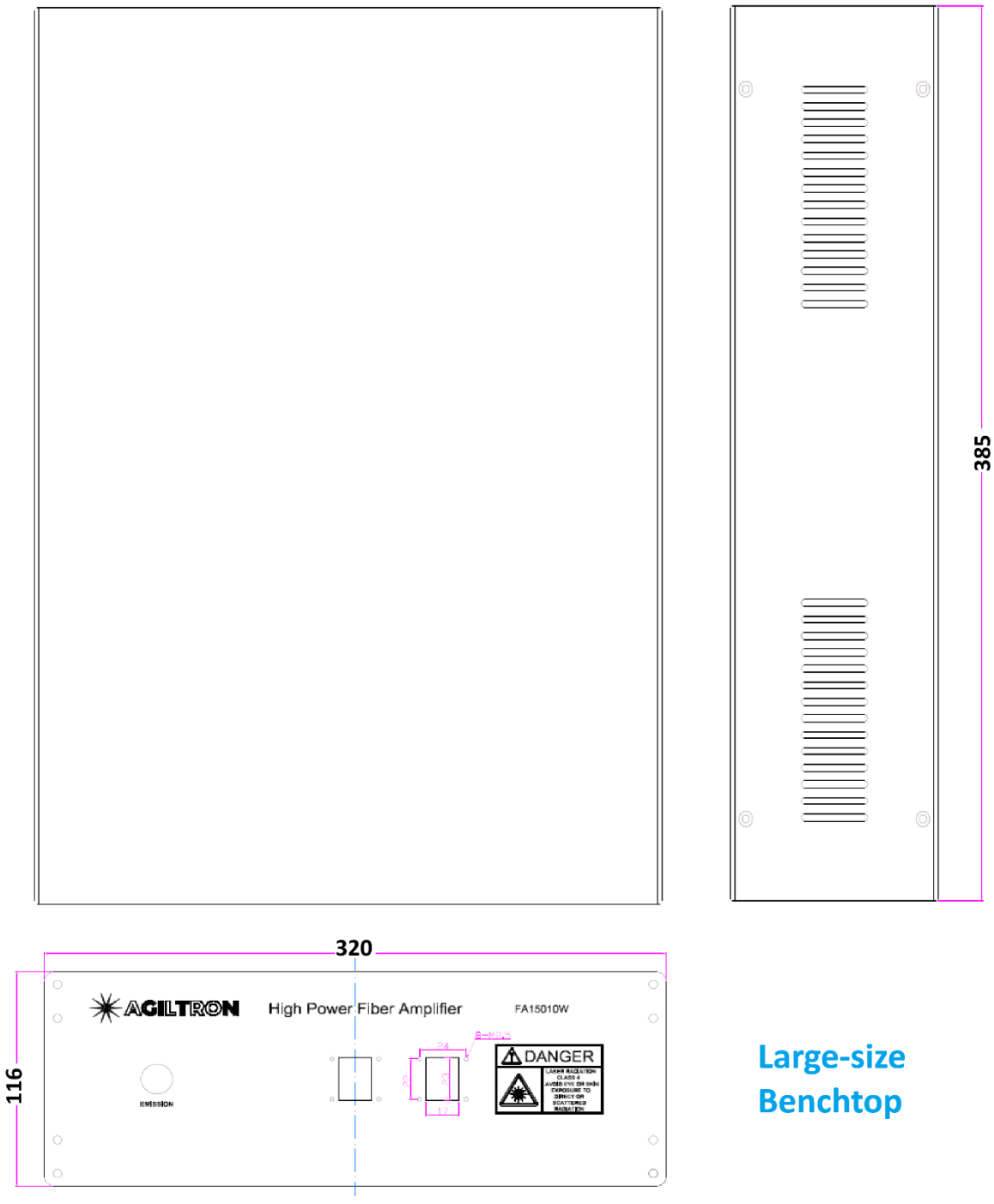

Large-size Benchtop

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Ordering Information (Part Number)

	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Pulse Power/Energy**	**Package [1]**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector [2][3]**	**Low Temperature**	**High Temperature**	**Grade**	**Reflection Protector**
EDFA-	Pulse = P	100W/20µJ = 1 Special = 0	Component = 1 Benchtop = 2 Special = 0	SM28 = 1	0.9mm tube = 3 Special = 0	0.25m = 1 0.5m = 2 1.0m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 LC/PC = 7 LC/APC = A LC/UPC = U High Power FC/PC = H Special = 0	-5°C = 1 -30°C = 2 Special = 0	40°C = 1 70°C = 2 Special = 0	Standard = 1 Space = 2 Special = 0	Non = N Yes = Y

[1]: The component format is designed for OEM integration. For laboratory and university use, only the benchtop protected version has one year warranty.

[2]: Regular fiber connectors are rated for optical powers up to 0.5 W. Use regular connector for >0.5 W will cause damage to the core, thus no warrantee for this configuration. For outputs above 1 W, only bare fiber or high-power fiber connectors (HPFC) are suitable. We offer a special beam-expanded HPFC connector capable of handling up to 10 W of optical power. The HPFC is used in pairs, with a matching patch cable that has one end terminated with the HPFC connector and the other end left as bare fiber for splicing into the system. The HPFC connector and matching cable are priced at $850.

[3]: The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

Application Notes

Fiber Core Alignment

Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

Fiber Cleanliness

Fibers with smaller core diameters (<5 µm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

Maximum Optical Input Power

Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.

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Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191. All versions of this laser are Class 1M laser products, tested according to IEC 60825-1:2007 / EN 60825-1:2007. An additional warning for Class 1M laser products. For diverging beams, this warning shall state that viewing the laser output with certain optical instruments (for example eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. For collimated beams, this warning shall state that viewing the laser output with certain instruments designed for use at a distance (for example telescopes and binoculars) may pose an eye hazard.

Wavelength = 1.3/1.5 µm.

Maximum power = 30 mW.

*Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
*IEC is a registered trademark of the International Electrotechnical Commission.

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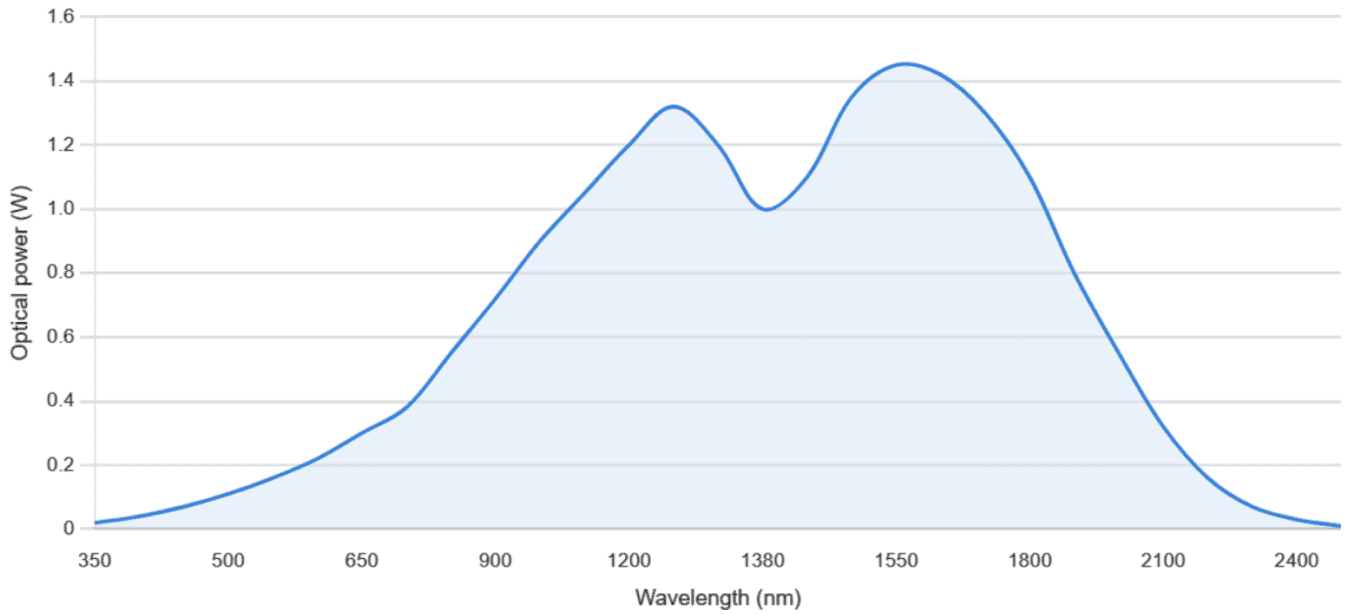
Regular Single Mode / Polarization Maintaining Fiber Optical Power Handing vs Wavelength



Single mode fiber optical power is limited by nonlinear effects in addition to absorption that increase loss and generate heat. The curve shows the approximate safe CW power envelope for standard single-mode fiber. Actual limits depend on fiber design, core size, length, and laser characteristics. Specialty fibers can significantly increase the power limit.

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