

**TDFA-1900 - July 7, 2015**

Item # TDFA-1900 was discontinued on July 7, 2015. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

**PICOLUZ THULIUM-DOPED FIBER AMPLIFIER**

- ▶ Broad, 1800 - 2000 nm Gain Region
- ▶ Excellent for Small Signal Amplification
- ▶ Option for Active or Passive Amplifier

**LASER RADIATION**

AVOID EXPOSURE TO BEAM  
CLASS 3B LASER PRODUCT



TDFA-1900-P



TDFA-1900

[Hide Overview](#)

**OVERVIEW****Applications**

- Spectroscopy
- Nonlinear Optics
- Mid-IR Generation
- Broadband ASE Sources
- Component Test and Measurement
- Gas Sensing
- Free-Space Communication

**TDFA-1900 Specifications**

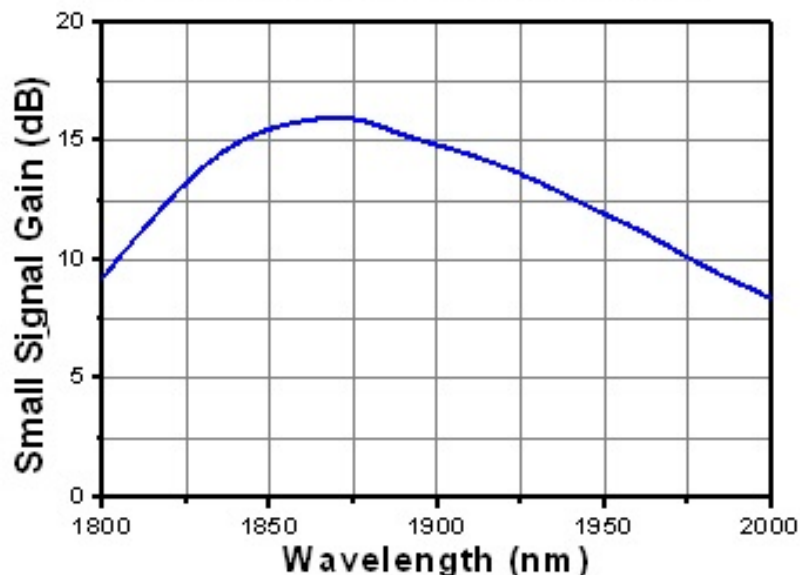
TDFA-1900 Specifications	
Small Signal Gain at Peak Wavelength	>16 dB
Gain Peak Wavelength	1880 ± 20 nm
Gain 3 dB Bandwidth	>110 nm
Small Signal Gain from 1800 - 2000 nm	>8.5 dB
Saturation Power (at Peak Wavelength)	>19 dBm (>80 mW)

The TDFA-1900 and TDFA-1900-P Thulium-Doped Fiber Amplifiers, which are manufactured by PicoLuz, a strategic Partner of Thorlabs, offer gain over a broad, 1800 nm to 2000 nm wavelength range. To span this wide range in an all-fiber device, the amplifier uses broadband fiber components. The core-pumped amplifier is ideal for amplifying low-power inputs with high optical signal-to-noise ratios. These characteristics make the amplifier well suited for amplifying broadly tunable and stable semiconductor seed sources to power levels up to 100 mW.

These amplifiers are designed using a core-pumped gain fiber such that the amplification band matches the tuning range of Thorlabs' Tunable Laser Kits, TLK-L1900M and TLK-L1950R. These InP-based seed sources provide single frequency broadly tunable lasing with excellent stability and high polarization extinction ratios. Our amplifiers increase the power from these sources while maintaining a single-frequency output making them excellent for use in applications such as absorption spectroscopy and nonlinear optics.

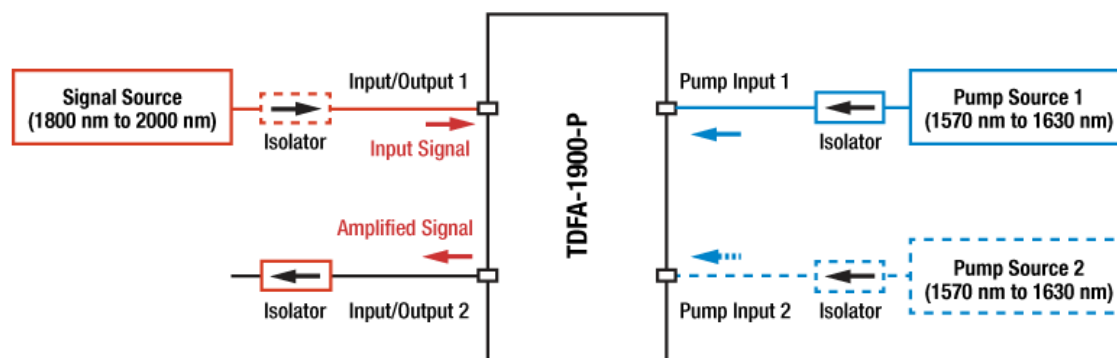
Due to the amplifier's short fiber length, it can be used with short-pulse amplification. Additionally, its broad amplification band makes it suitable for use with broadband ASE sources. Input and output isolators can be added to this amplifier as options. Please contact Technical Support for more information.

## Small Signal Gain vs. Wavelength



### PASSIVE CONFIG.

#### TDFA-1900-P Passive Amplifier Configuration



The TDFA-1900-P Passive Amplifier system allows the user to choose an external pump and signal source laser. The additional choice of external pump laser allows for flexibility in terms of laser source and configuration for amplification. The figure above shows a general layout for amplification using the TDFA-1900-P system. The active fiber that is integrated inside the device requires a pump wavelength between 1570 - 1630 nm in order to generate gain. One or two pump input ports can be used in order to achieve co-propagating, counter-propagating, or bidirectional pumping. Below is a brief explanation of each.

#### Co-Propagating

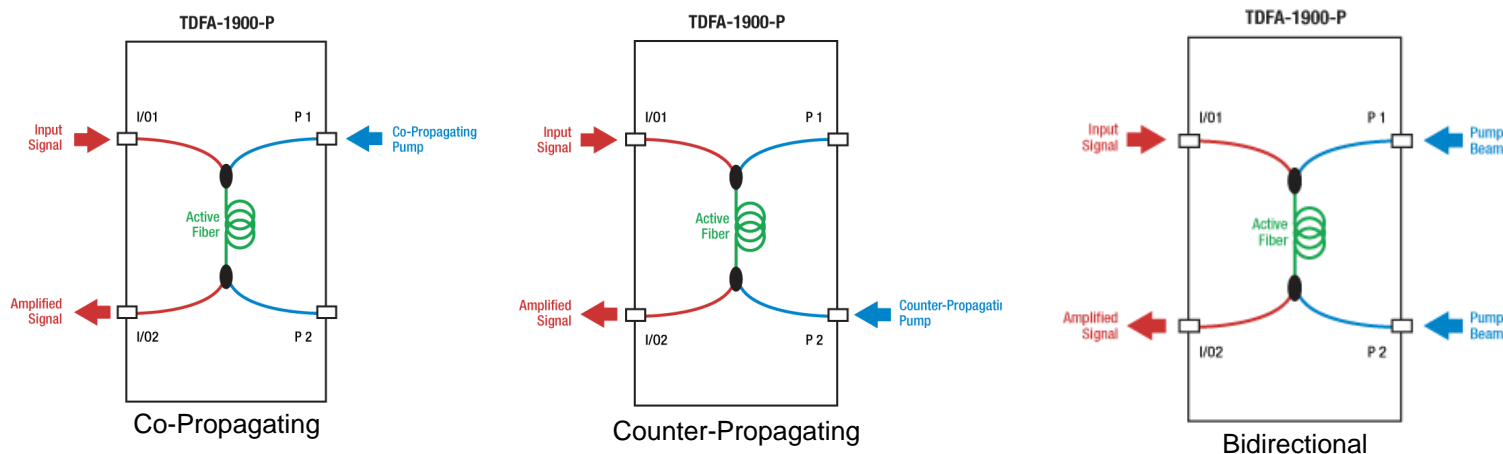
The co-propagating configuration provides better noise figure and is more suitable for amplifying low signal power levels, as compared with the counter-propagating configuration. In addition, the input and pump sources are highly isolated from each other due to propagating in the same direction. The maximum co-propagating pump power that can be safely applied to the device is 400 mW.

#### Counter-Propagating

The counter-propagating configuration provides higher pump-to-signal power conversion efficiencies as compared with the co-propagating configuration. However, there is weaker isolation between pump and signal input ports due to the opposite propagation directions. Fiber isolators may be required on either signal or pump input ports. The maximum counter-propagating pump power that can be safely applied to the device is 400 mW.

#### Bidirectional

The bidirectional configuration provides the highest small-signal gain, conversion efficiency and the best noise performance. Two pump sources or a single pump source with a power splitter is needed to operate the device in this configuration. Because each pump port accepts up to 400 mW of input pump power, this configuration enables pumping at a total pump power of 800 mW, which further enhances the gain and saturation power. Proper isolation on the pump and signal ports may be necessary in this configuration.



[Hide Thulium-Doped Fiber Amplifier \(Active\)](#)

### Thulium-Doped Fiber Amplifier (Active)



- ▶ Active Amplifier System, Includes Pump Laser
- ▶ Simple Turn-Key Operation

The TDFA-1900 Thulium-Doped Fiber Amplifier is a turn-key, active amplifier system that contains a built-in pump laser and drive electronics.

Part Number	Description	Price	Availability
TDFA-1900	Thulium-Doped Fiber Amplifier (1800 - 2000 nm)	\$0.00	Lead Time

[Hide Thulium-Doped Fiber Amplifier \(Passive\)](#)

### Thulium-Doped Fiber Amplifier (Passive)

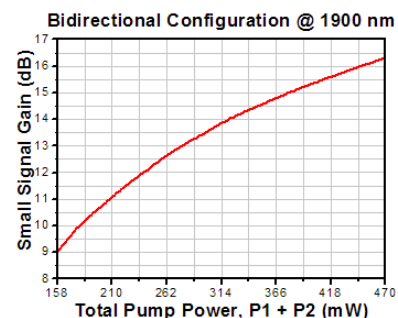


- ▶ Passive Amplifier System, Requires External Pump Laser
- ▶ Allows Flexibility in Pump Source and Configuration
- ▶ Cost Effective Amplifier System

TDFA-1900-P is the passive version of TDFA-1900. This device is designed to operate with external single-mode fiber-coupled optical pump sources between 1570 nm and 1630 nm to provide gain in the signal region of 1800 nm – 2000 nm. When pumped with 500 mW of pump power, the specifications and gain spectrum of TDFA-1900-P is similar to that of TDFA-1900 featured above. This product offers an economical option for fiber amplification in the 2 μm region when Er-doped fiber lasers or amplifiers are available to use as a pump source.

The TDFA-1900-P allows the user to utilize one or two pump input ports in order to achieve co-propagating, counter-propagating, or bidirectional pumping schemes (see *Passive Config.* tab above). Each port may accept a maximum pump power of 400 mW. Depending on the application and pumping configuration, fiber isolators at the signal input/output ports and at the pump input port(s) may be required.

The graph to the right shows the optical gain scales with the applied pump power for the bidirectional pumping configuration. The small signal gain at 1900 nm is plotted as a function of the total pump power (P1+P2), showing a maximum gain of 16.3 dB.



Part Number	Description	Price	Availability
TDFA-1900-P	Passive Thulium-Doped Fiber Amplifier (1800 nm - 2000 nm)	\$5,050.00	Lead Time