

### BL976-PAG500

### Description

Thorlabs' BL976-PAG500 is a 976 nm, 500 mW FBG-stabilized laser with a PM fiber output and FC/APC connector in a 14-pin, hermetically sealed butterfly package. It is well suited for low-noise core pumping of Erbium-doped fiber including CW lasers, mode-locked oscillators and EDFA's, as well as other applications that benefit from an FBG-stabilized or higher power single mode laser. The FBG, which is relatively temperature insensitive by virtue of its design, stabilizes the Fabry-Perot gain chip emission and also reduces the gain chip's sensitivity to external reflection. BL976-PAG500 is Telcordia™ GR-468 CORE qualified.

### Specifications

BL976-PAG500 Absolute Max Ratings<sup>a</sup>

LD Reverse Voltage (Max) <sup>b</sup>	2.0 V
Absolute Max Current <sup>b</sup>	1050 mA
Absolute Max Power <sup>b</sup>	600 mW
PD Reverse Voltage (Max) <sup>b</sup>	15 V
Operating Case Temperature (T <sub>Submount</sub> = 25 °C)	-5 to +75 °C
Storage Temperature	-40 to 85 °C
Max Tightening Torque	150 mN·m

- Absolute Maximum Rating specifications should never be exceeded. Operating at or beyond these conditions can permanently damage the laser.
- T<sub>CHIP</sub> = 25 °C, T<sub>CASE</sub> = -5 °C to 75 °C

**LASER RADIATION**  
AVOID EYE OR SKIN  
EXPOSURE TO DIRECT  
OR SCATTERED RADIATION  
CLASS 4 LASER PRODUCT

BL976-PAG500 Operation Specs

	Symbol	Min	Typical	Max
Peak Wavelength <sup>a</sup>	$\lambda_p$	975 nm	976 nm	977 nm
Spectral Bandwidth, @ -3 dB	$\Delta\lambda$	-	-	1.0 nm
Output CW Operating Power	P <sub>OP</sub>	500 mW	-	-
Kink-Free Power	P <sub>Kink-Free</sub>	-	550 mW	-
Threshold Current	I <sub>TH</sub>	-	64 mA	85 mA
Forward Current (@ P <sub>OP</sub> )	I <sub>OP</sub>	-	830 mA	920 mA
Slope Efficiency	$\Delta P / \Delta I$	0.59 W/A	0.69 W/A	-
Forward Voltage	V <sub>F</sub>	-	1.8 V	2.1 V
Power Stability <sup>b</sup>	P <sub>stab</sub>	-	< 1%	2%
Temp. Coefficient of FBG (@ P <sub>OP</sub> )	$\Delta\lambda / \Delta T$	-	0.01 nm/°C	0.02 nm/°C
Monitor PD Responsivity <sup>c</sup> (@ I <sub>OP</sub> )	I <sub>MON</sub> /P	0.5 μA/mW	-	10 μA/mW

- Vacuum Wavelength, @T<sub>CASE</sub> = T<sub>FBG</sub> = 25 °C
- Peak-to-Peak Operating Power over 60 seconds at 10 Hz to 50 kHz
- The monitor diode indicates the power from the Fabry-Perot chip rear facet and is intended to be used as an approximate indicator of power out of the front.

**BL976-PAG500 Fiber Characteristics**

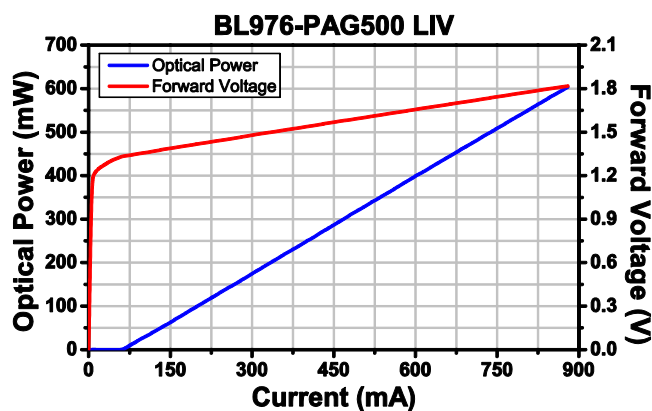
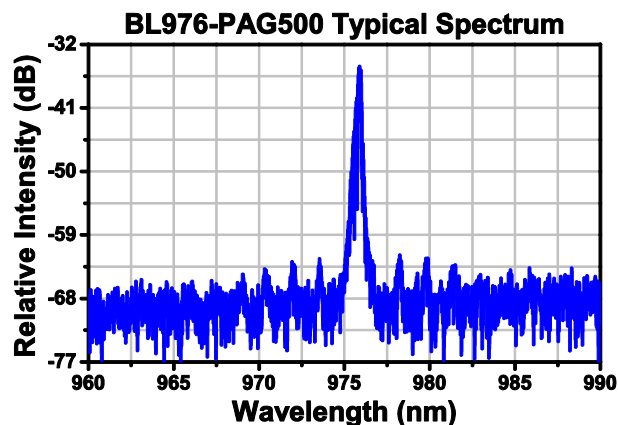
	Min	Typical	Max
Fiber Type	SM98-PS-U25A-H or Equivalent PM Fiber		
Polarization State	Aligned to Slow Axis of Fiber		
Protection Tubing Diameter	900 $\mu\text{m}$		
Fiber Coating Diameter	230 $\mu\text{m}$	250 $\mu\text{m}$	270 $\mu\text{m}$
FBG Coat Diameter	-	-	400 $\mu\text{m}$
Fiber Termination	FC/APC, 2.0 mm Narrow Key		
Key Alignment	Key Parallel to Slow Axis of Fiber		
PER	-	10 dB	-
F-P Gain Chip to FBG Distance <sup>a</sup>	1.9 m	2.0 m	2.1 m
Fiber Distance after FBG	0.4 m	1.0 m	-
Bend Radius	25 mm	-	-

a. To the Center of the FBG - Approximate Location Marked on Outside of Tubing

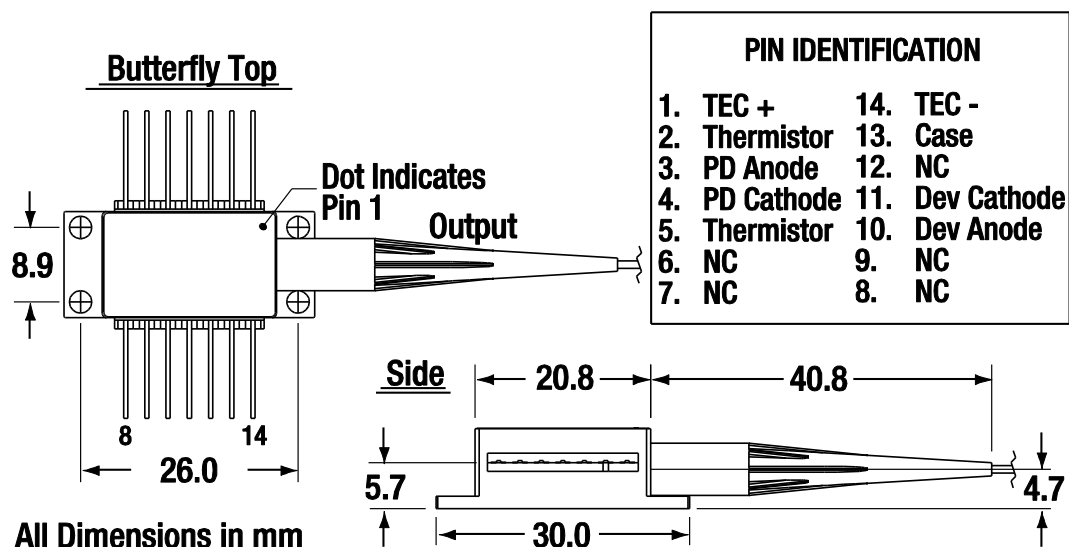
**BL976-PAG500 TEC Characteristics**

	Symbol	Min	Typical	Max
TEC Current	$I_{\text{TEC}}$	-	-	1.5 A
TEC Voltage	$V_{\text{TEC}}$	-	-	3.3 V
Thermistor Resistance (@ 25 °C)	$R_{\text{TH}}$	9.5 k $\Omega$	10 k $\Omega$	10.5 k $\Omega$

## Typical Performance Plots



## Drawings



## Operation Notes and Warnings

- 1) Always inspect and clean the fiber end face of the pigtail and mating fiber prior to mating. Damaged or scratched fibers will have to be re-polished or re-connectorized. The mating sleeve should also remain clean. It is recommended that mating be done only in a clean environment. Failure to properly clean this fiber can cause the fiber end face to become burned or otherwise damaged. Inspecting by eye with the device powered can cause injury and/or permanent blindness.
- 2) Always ensure this device is properly temperature regulated. Thorlabs' recommended mounts are CLD1015 or LM1452. Thermal conductivity can be improved by applying thermal tape, or a small amount of thermal paste, between top of the mount and bottom of the butterfly package. Mounting screws should be used with appropriate torque (i.e., hand-tight, or <150 mNm).
- 3) Short mounting screws should be used (~1/8" or ~3.5 mm thread length is recommended).
- 4) The monitor PD is intended to be used as a soft indicator of relative power. For monitoring absolute power, a 1% fiber tap splitter (coupler) with separate PD is recommended.
- 5) This product is not designed to be modulated. It is suggested to use an external switch such as a Pockels cell if a modulated output is desired.
- 6) If shortening the fiber length, be sure to leave the FBG, which is marked on the outside of the fiber and tubing for convenience.
- 7) To protect the laser diode from damage due to electrostatic discharge (ESD), please follow proper ESD handling precautions.
- 8) This device emits coherent light from the connector end of the fiber and is classified as Class 4 when combined with other components. To ensure safe operation, use only with a suitable power source that complies with the requirements for laser systems, as specified in IEC-60825-1 "Safety of Laser Products."
- 9) Handle the module only by its package. Do not hold by the fiber pigtail.

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