



Your Photonics Partner

Laser Solution

Trek™

Diode Lasers

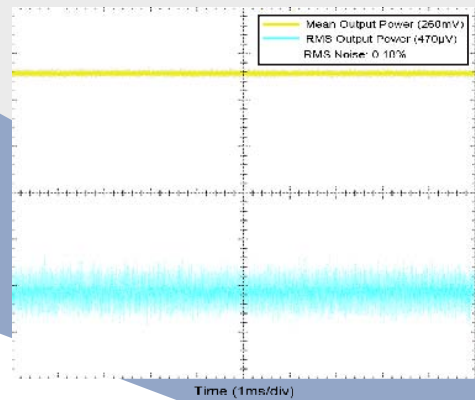


## Features

- UV (375 nm), Violet (405 nm), Blue (440 nm), Red (635 nm, 660 nm, and 685 nm), and NIR (780 nm and 830 nm)
- TEM<sub>00</sub> Beam Quality
- > 10,000 Hours Expected Lifetime
- Low Noise and Excellent Power Stability
- USB Software Interface Available
- Integratable into Larger OEM Systems

## About the Trek™

The Trek™ laser series is a line of solid-state electrically pumped diode lasers. Diode lasers achieve population inversion by applying a sufficiently strong voltage across the p-n junction of the diode to break the Fermi level of the diode into two quasi-Fermi levels. Population inversion occurs when the difference between the two resulting quasi-Fermi levels is greater than the band gap of the material. Compact and self-contained, the Trek™ emits a pure TEM<sub>00</sub> beam with diffraction limited performance and a typical M<sup>2</sup> of 1.05. Available in UV (375 nm), violet (405 nm), blue (440 nm), red (635 nm, 660 nm, and 685 nm), and NIR (780 nm and 830 nm). With variable power options, these modules are ideal for demanding applications, such as metrology, photoluminescence, printing, illumination, scanning, inspection, particle counting, and a variety of biomedical applications. These turnkey lasers maintain outstanding optical performance over a broad temperature range, guaranteeing minimal power fluctuations and virtually eliminating high frequency noise. Its OEM version has the world's smallest OEM controller with power consumption < 5 Watts. It has been qualified for use in some of the most demanding high-end instruments, with deployments in the tens of thousands of units. The 375 nm, 405 nm and 440 nm systems replace bulky, expensive gas ion lasers for biomedical and fluorescence applications, without sacrificing beam quality.

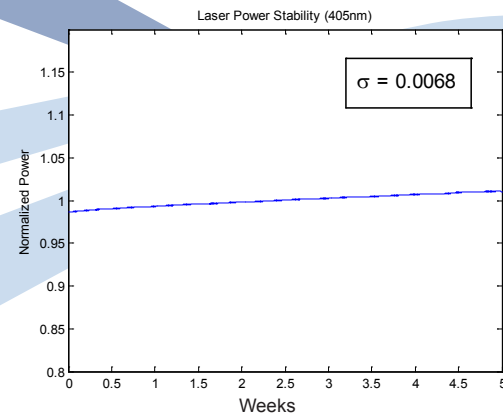


## Low Noise

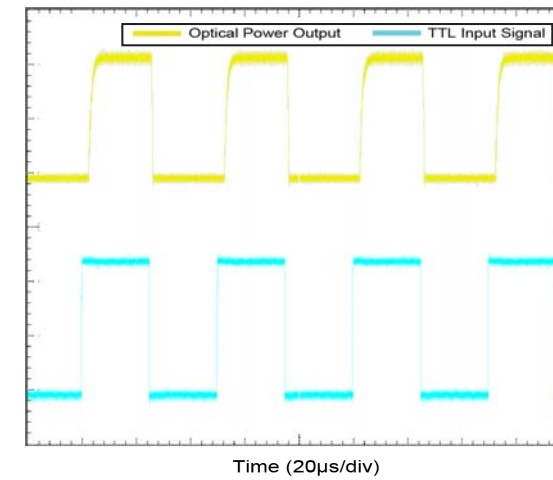
The Trek™ can be operated in a wide temperature range (10°C - 35°C), with a stable and quiet laser output power at most wavelengths. The Trek™ has a proven history of RMS noise stability < 1.0%. The combination of excellent beam characteristics (such as mode quality, low divergence, and brightness), makes the Trek™ laser series suitable for beam focusing, as well as for long distance beam positioning.

## Excellent Power Stability

The Trek™ includes an external laser driver, thermoelectric cooling, and optical fiber coupling with an expected lifetime > 10,000 hours. The Trek™ has been proven reliable up to a 5% peak-to-peak long term power stability rating.



## External Modulation Available

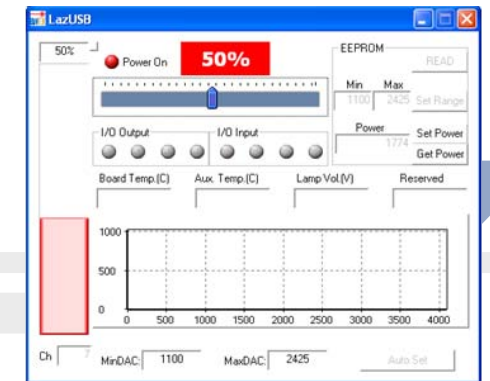


Using the TTL modulation option, the laser can be digitally pulsed in on/off mode up to 20 kHz with a modulation depth > 100:1. With a rise/fall time of < 4 μs, the TTL signal can be used in conjunction with the trigger signal of your detection system to control your measurement cycle and integration time. TTL modulation is ideal for Raman spectroscopy, fluorescence spectroscopy, and other applications where the source and the detector need to be precisely triggered.

With analog modulation (AM), the laser output power is controlled by applying an arbitrary 0 - 5 V input signal from a function generator. Using the AM option, the laser can be modulated up to 1 kHz with a modulation depth > 100:1.

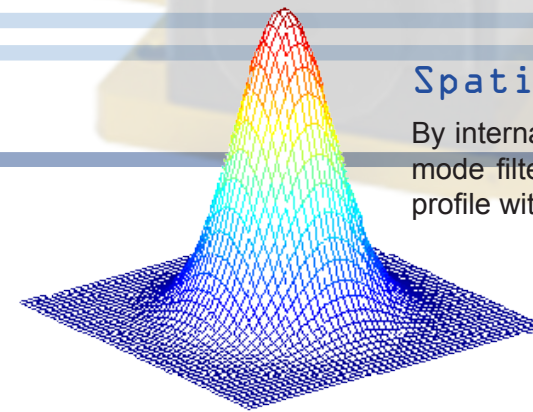
## USB Software Interface Available

The Trek™ laser series can be equipped with an optional USB connection and our easy to use LazUSB™ software interface for laser power control and real time monitoring of internal laser conditions.



## Spatial Mode Profile

By internally coupling the laser output into a single-mode fiber optic that acts as a mode filter, the Trek™ laser series delivers a single-mode (TEM<sub>00</sub>) spatial beam profile with circularity < 1.2:1 and a typical M<sup>2</sup> of 1.05 for lasers above 600 nm.



# General Specifications: Trek™

Model Number	BWB-375-4E	BWB-405-20E	BWB-405-40E	BWB-405-80E	BWB-405-100E	BWB-405-5EN	BWB-405-10EN	BWB-440-4E	BWB-440-10E	BWN-635-5E	BWN-635-10E	BWN-635-20E	BWN-660-5E	BWN-660-10E	BWN-660-20E	BWN-660-40E	BWN-660-60E	BWN-685-5E	BWN-685-10E	BWN-780-5E	BWN-780-10E	BWN-780-20E	BWN-780-40E	BWN-780-60E	BWN-830-5E	BWN-830-10E	
Wavelength (nm)	375 +/- 10	405 +/- 10	405 +/- 10	405 +/- 10	405 +/- 10	405 +/- 10	405 +/- 10	440 +/- 10	440 +/- 10	635 +/- 10	635 +/- 10	635 +/- 10	660 +/- 5	660 +/- 5	660 +/- 5	660 +/- 5	660 +/- 5	685 +/- 10	685 +/- 10	780 +/- 5	780 +/- 5	780 +/- 5	780 +/- 5	780 +/- 5	830 +/- 10	830 +/- 10	
Output Power (mW)	4	20	40	80	100	5	10	4	10	5	10	20	5	10	20	40	60	5	10	5	10	20	40	60	5	10	
Spatial Mode	TEM <sub>00</sub> *	TEM <sub>00</sub> *	TEM <sub>00</sub> *	TEM <sub>00</sub> *	TEM <sub>00</sub> *	TEM <sub>00</sub> *	TEM <sub>00</sub> *	TEM <sub>00</sub> *	TEM <sub>00</sub> *	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	
FWHM Linewidth (nm)	-	-	-	-	-	300 MHz	300 MHz	-	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	
M <sup>2</sup>	-	-	-	-	-	-	-	-	-	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	
Beam Diameter at 1/e <sup>2</sup> (mm) (typical)	< 1.4 x 3.0	< 1.4 x 3.0	< 1.4 x 3.0	< 1.4 x 3.0	< 1.4 x 3.0	< 1.4 x 3.0	< 1.4 x 3.0	< 1.4 x 3.0	< 1.4 x 3.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Beam Divergence (mrad) (typical)	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	
Beam Asymmetry	< 3:1	< 3:1	< 3:1	< 3:1	< 3:1	< 3:1	< 3:1	< 3:1	< 3:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	
Mode of Operation	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW	CW	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	CW / Modulated	
Long-Term Power Stability (pk-pk)	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	
<b>RMS Noise</b>																											
20 Hz to 10 MHz	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%
10 MHz to 500 MHz	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%	< 1.0%
<b>Digital Modulation/External Trigger**</b>																											
Maximum Bandwidth (kHz)	> 20	> 20	> 20	> 20	> 20	-	-	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	> 20	
Rise Time (10% to 90%) (µsec)	< 4	< 4	< 4	< 4	< 4	-	-	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	
Fall time (10% to 90%) (µsec)	< 4	< 4	< 4	< 4	< 4	-	-	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	
Modulation Depth (extinction ratio)	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	-	-	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	
<b>Analog Modulation**</b>																											
Maximum Bandwidth (kHz)	> 1	> 1	> 1	> 1	> 1	-	-	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1	
Rise Time (10% to 90%) (µsec)	< 10	< 10	< 10	< 10	< 10	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	
Fall time (10% to 90%) (µsec)	< 10	< 10	< 10	< 10	< 10	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	
Modulation Depth (extinction ratio)	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	-	-	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	
Polarization Ratio	> 50:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 50:1	> 50:1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Warm-Up Time (minutes)	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	
Beam Position (mm)	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1	
Beam Angle (mrad)	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	< +/- 5	
Pointing Stability (µrad/°C)	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	
CDRH Laser Classification	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	
Ambient Temperature (°C)	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	10 - 35	

\* > 60% energy for TEM<sub>00</sub> mode.

\*\*External analog and digital modulation interface available

## Quality Control

- ISO-9001 and ISO-13485 certified
- FDA/CDRH registration and compliance
- CE Mark and UL Mark
- Application of Six Sigma methodologies
- Mock FDA Quality Systems Inspection Technique (QSIT)
- Extensive Quality Control Check Points including Installation Qualifications (IQs), Operational Qualifications (OQs), Performance Qualifications (PQs), and Product Qualifications, as well as software verifications and validations



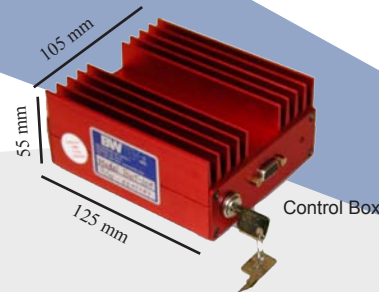
## Applications

- Optical Trapping
- Material Processing
- Metrology
- Wafer Inspection
- Printing
- Medicine
- Particle Counting
- Photoluminescence
- Illumination
- Pointing
- Bio Instrument
- Spectroscopy
- Signal Transmission

## OEM Power Consumption

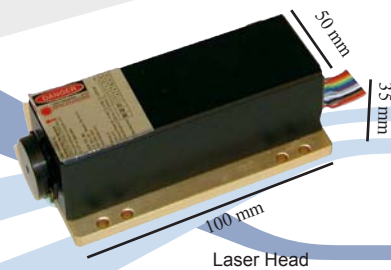
Since the OEM control box does not come with an external power supply, it requires a 5 V input at 2 A.

## Form Factor



- Control Box  
125 x 105 x 55 mm
- Laser Head  
100 x 50 x 35 mm
- Power Supply\*  
91 x 38 x 35 mm

\* Power supply not included with OEM systems



## Enhancements

- Optional USB controlled graphical user interface
- External analog (0-5 V) and digital (TTL) modulation interface available
- Single-mode fiber coupling available for > 600 nm
- Multi-mode fiber coupling available for < 500 nm

## Ordering Info

Low Noise Diode Lasers	
BWB-375-4E	Turnkey low noise diode laser system 375 nm 4 mW
BWB-405-5EN	Turnkey low noise, narrow line diode laser system 405 nm 5 mW
BWB-405-10EN	Turnkey low noise, narrow line diode laser system 405 nm 10 mW
BWB-405-20E	Turnkey low noise diode laser system 405 nm 20 mW
BWB-405-40E	Turnkey low noise diode laser system 405 nm 40 mW
BWB-405-80E	Turnkey low noise diode laser system 405 nm 80 mW
BWB-405-100E	Turnkey low noise diode laser system 405 nm 100 mW
BWB-440-4E	Turnkey low noise diode laser system 440 nm 4 mW
BWB-440-10E	Turnkey low noise diode laser system 440 nm 10 mW
BWN-635-5E	Turnkey low noise diode laser system 635 nm 5 mW
BWN-635-10E	Turnkey low noise diode laser system 635 nm 10 mW
BWN-635-20E	Turnkey low noise diode laser system 635 nm 20 mW
BWN-660-5E	Turnkey low noise diode laser system 660 nm 5 mW
BWN-660-10E	Turnkey low noise diode laser system 660 nm 10 mW
BWN-660-20E	Turnkey low noise diode laser system 660 nm 20 mW
BWN-660-40E	Turnkey low noise diode laser system 660 nm 40 mW
BWN-660-60E	Turnkey low noise diode laser system 660 nm 60 mW
BWN-685-5E	Turnkey low noise diode laser system 685 nm 5 mW
BWN-685-10E	Turnkey low noise diode laser system 685 nm 10 mW
BWN-780-5E	Turnkey low noise diode laser system 780 nm 5 mW
BWN-780-10E	Turnkey low noise diode laser system 780 nm 10 mW
BWN-780-20E	Turnkey low noise diode laser system 780 nm 20 mW
BWN-780-40E	Turnkey low noise diode laser system 780 nm 40 mW
BWN-780-60E	Turnkey low noise diode laser system 780 nm 60 mW
BWN-830-5E	Turnkey low noise diode laser system 830 nm 5 mW
BWN-830-10E	Turnkey low noise diode laser system 830 nm 10 mW
Options*	
BWN**-USB	USB based power control software interface
BWN**-TTL	External digital TTL modulation interface
BWN**-AM	External analog 0-5 V modulation
BWN-SMF	Single-mode fiber coupling for > 600 nm
BWB-MMF	Multi-mode fiber coupling for < 500 nm

\*See General Specifications Chart for Applicability

\*\*Specify BWB when Applicable

### Additional Laser Products

- **High Power Lasers**  
Up to 200 W with wavelengths from 635 nm - 2000 nm
- **Solid-State Lasers**  
TEM<sub>00</sub> beam quality from 4 mW - 2500 mW
- **Fiber Coupled Lasers**  
Multi-mode or single-mode fiber coupled lasers up to 20 W with wavelengths from 635 nm - 2000 nm
- **Multi-channel Lasers**  
Custom configurations 960 nm -1650 nm



BWF5  
High Power Laser



CleanLaze®  
Turnkey End User Package

### Additional Spectroscopy Products

- **UV-Vis-NIR Spectrometer Modules**  
Compact, USB interface, plug-and-play
- **i-Spec Spectrophotometers**  
Models from 190 nm - 2500 nm
- **Raman Spectrometer Systems**  
Portable systems: 785 nm, 532 nm, and custom
- **Sampling Accessories**  
Cuvette holders, optical fibers, fiber probes, etc.



innoRam™  
Lab Grade Raman System



i-trometer™  
Back-thinned CCD  
Array Spectrometer

To find out more:

Contact our Application Team for your unique solution.