B&W TEK INC.

Your Photonics Partner

Laser Solution

Flex™

Compact Low Noise Class IIIb Lasers

Features:

- Wavelengths from 405nm to 1064nm
- Close to Diffraction Limited Beam Quality
- Low Noise and Excellent Power Stability
- User Friendly Graphical User Interface
- Single-Mode Fiber Coupling or External Laser Head for Easy Alignment

About The FLEX Series

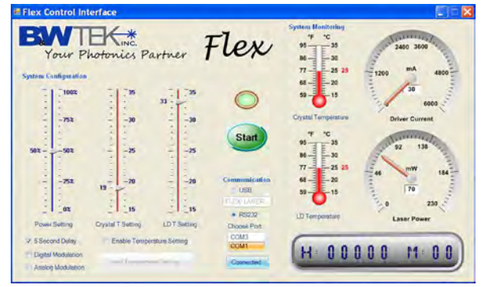
Flex™ is the first all-in-one laser solution from B&W Tek. No more messy cables, driver boards, power supplies and laser heads cluttering up your laboratory table. Internal TE Coolers increase reliability over a temperature range of 10° to 35° C. The Flex™ is powered by a single AC 100 – 240VAC input which runs the internal low consumption (<40W) power supply, supplying a regulated universal DC output. Each Flex™ comes standard with both RS232 and USB 2.0 plug-and-play interfaces and our easy to use software package. The Flex™ software allows full control over output power, base plate temperature, an hour meter to monitor laser usage, and TTL triggering control setup. These turnkey lasers maintain outstanding optical performance over a broad temperature range, guaranteeing minimal fluctuations in power and virtually eliminating high frequency noise. With its compact design, the single-mode fiber coupled Flex™, is the most versatile and valuable system on the market. This version of the Flex™ provides output powers up to 60mW and wavelengths from 635nm to 830nm with a pure TEM_{00} beam and a M^2 value of 1.05 (typical).

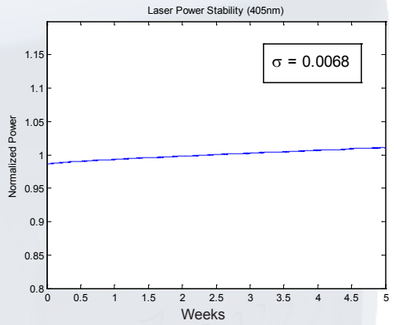
The addition of an external laser head in lieu of fiber-optic coupling, allows for the Flex's universal drivers to power UV diode lasers as well as Vis and NIR DPSS lasers. When used with the external laser head the Flex™ can produce output powers up to 450mW and operate at wavelengths up to 1064nm. These CW solid-state lasers are compact, self-contained, environmentally robust, and reliable. These are ideal for many applications such as optical trapping, precision assembly wafer inspection, material processing, particle counting, interferometer, metrology, printing, illumination, photoluminescence, and a variety of biomedical applications. The 475 and 405nm systems replace bulky, expensive gas ion lasers for biomedical and fluorescence applications with excellent beam quality.

The Flex™ can also support a variety of other custom wavelengths and powers. For more information on these and other options please contact a B&W Tek laser specialist.

Software Interface

The Flex™ laser series comes equipped with USB and RS232 connections and our easy to use software interface for laser power control and real time monitoring of internal laser conditions.



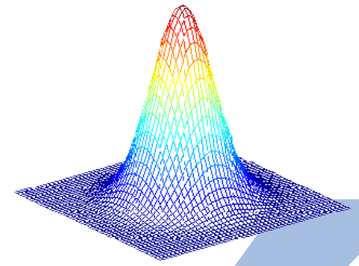


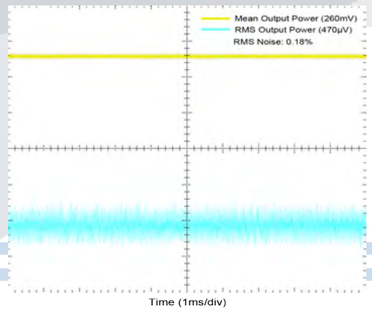
Excellent Power Stability

The Flex™ includes an integrated laser driver, thermoelectric cooling, and optical fiber coupling with an expected lifetime > 10,000 hours. The Flex™ has been proven reliable up to a 3% peak-to-peak long term power stability rating.

Spatial Mode Profile

All Flex™ models deliver a single-mode (TEM_{00}) spatial beam. For wavelengths between 635nm and 830nm, this is achieved by internally coupling the laser output into a single-mode fiber-optic that acts as a mode filter guaranteeing a beam profile with circularity < 1.2:1 and a typical M^2 of 1.05.



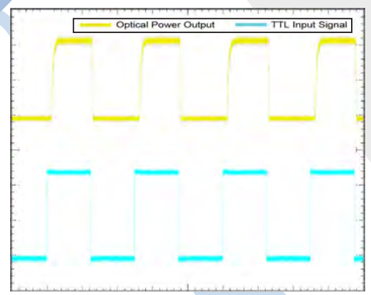


Low Noise

The Flex™ can be operated in a wide temperature range (10°C - 35°C), with a stable and quiet laser output power at most wavelengths. The Flex™ has a proven history of RMS noise stability < 0.5%. The combination of excellent beam characteristics (such as mode quality, low divergence, and brightness), makes the Flex™ laser series suitable for beam focusing, as well as for long distance beam positioning.

External Modulation

The Flex™ can be externally modulated by either an analog or TTL input. These lasers can be modulated up to 20kHz with a modulation depth > 100:1 in TTL mode, and up to 1kHz with a 0 - 5V in analog mode.



For more detailed performance specifications please reference the General Specifications charts on the next six pages ➥

General Specifications: Flex

Model Number	BWI-635-5E	BWI-635-10E	BWI-635-20E	BWI-660-5E	BWI-660-10E	BWI-660-20E	BWI-660-40E	BWI-660-60E	BWI-780-5E	BWI-780-10E	BWI-780-20E	BWI-780-40E	BWI-780-60E	BWI-830-5E	BWI-830-10E
Wavelength (nm)	635 +/- 10	635 +/- 10	635 +/- 10	660 +/- 5	660 +/- 5	660 +/- 5	660 +/- 5	660 +/- 5	780 +/- 5	780 +/- 5	780 +/- 5	780 +/- 5	780 +/- 5	830 +/- 10	830 +/- 10
Output Power (mW)	5	10	20	5	10	20	40	60	5	10	20	40	60	5	10
Fiber Coupling	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC	Single Mode FC/PC
FWHM Linewidth (nm)	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Fiber Core Diameter (µm)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5	5	5	5	5	5	5
Fiber Numerical Aperture	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Mode of Operation	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%
RMS Noise															
20 Hz to 10 MHz	< 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	< 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%
Digital Modulation/External Trigger															
Maximum Bandwidth (kHz)	> 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
Fall time (10% to 90%) (µsec)	< 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
Analog Modulation															
Maximum Bandwidth (kHz)	> 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
Fall time (10% to 90%) (µsec)	< 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
Warm-Up Time (minutes)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
CDRH Laser Classification	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

General Specifications: Flex with External Head

Model Number	BWI-405-20E**	BWI-405-40E**	BWI-405-80E**	BWI-405-100E**	BWI-475-4E	BWI-475-10E	BWI-475-20E	BWI-475-150E	BWI-532-5E**	BWI-532-10E**	BWI-532-20E**
Wavelength (nm)	405 +/- 10	405 +/- 10	405 +/- 10	405 +/- 10	475 +/- 2	475 +/- 2	475 +/- 2	475 +/- 2	532 +/- 1	532 +/- 1	532 +/- 1
Output Power (mW)	20	40	80	100	4	10	20	150	5	10	20
Spatial Mode	TEM_{00}*	TEM_{00}*	TEM_{00}*	TEM_{00}*	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}
M^2	-	-	-	-	< 1.4	< 1.4	< 1.4	< 1.2	< 1.1	< 1.1	< 1.1
Beam Diameter at $1/e^2$ (mm) (typical)	< 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	< 2.0	< 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
Beam Asymmetry	< 3:1	< 3:1	< 3:1	< 3:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.2:1	< 1.2:1	< 1.2:1
Mode of Operation	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%	<+/-3%	< +/- 3%	< +/- 3%
Digital Modulation/External Trigger											
Maximum Bandwidth (kHz)	> 20	> 20	> 20	> 20	on/off only	on/off only	on/off only	on/off only	> 20	> 20	> 20
Rise Time (10% to 90%) (µsec)	< 4	< 4	< 4	< 4	-	-	-	-	< 20	< 20	< 20
Fall time (10% to 90%) (µsec)	< 4	< 4	< 4	< 4	-	-	-	-	< 20	< 20	< 20
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
Analog Modulation											
Maximum Bandwidth (kHz)	> 1	> 1	> 1	> 1	set power only	set power only	set power only	set power only	> 1	> 1	> 1
Rise Time (10% to 90%) (µsec)	< 10	< 10	< 10	< 10	-	-	-	-	< 50	< 50	< 50
Fall time (10% to 90%) (µsec)	< 10	< 10	< 10	< 10	-	-	-	-	< 50	< 50	< 50
Modulation Depth (extinction ratio)	> 100:1	> 100:1	> 100:1	> 100:1	-	-	-	-	> 100:1	> 100:1	> 100:1
Polarization Ratio	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1
Warm-Up Time (minutes)	< 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	30.8 +/- 1	20 +/- 1	20 +/- 1	20 +/- 1
Beam Angle (mrad)	< +/- 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
CDRH Laser Classification	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	15 - 35	10 - 35	10 - 35	10 - 35

Contact B&W Tek for linewidth information
* > 60% energy for TEM_{00} mode.
** RMS Noise of < 0.5%

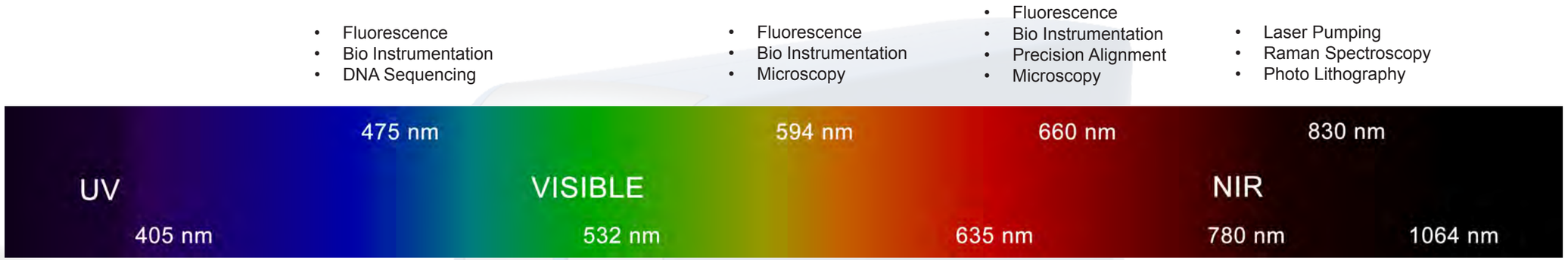
Continued on Next Page ➥

General Specifications: Flex with External Head (Cont.)

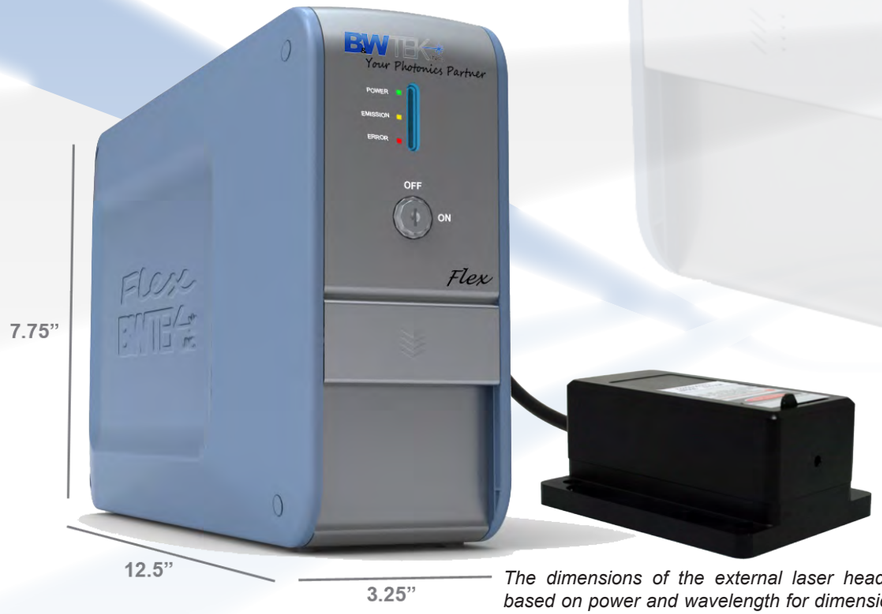
Model Number	BWI-532-50E**	BWI-532-100E**	BWI-532-300E**	BWI-594-5E	BWI-594-10E	BWI-594-20E	BWI-594-50E	BWI-1064-20E	BWI-1064-50E	BWI-1064-100E	BWI-1064-450E
Wavelength (nm)	532 +/- 1	532 +/- 1	532 +/- 1	594 +/- 1	594 +/- 1	594 +/- 1	594 +/- 1	1064 +/- 2	1064 +/- 2	1064 +/- 2	1064 +/- 2
Output Power (mW)	50	100	300	5	10	20	50	20	50	100	450
Spatial Mode	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}
M^2	< 1.1	< 1.1	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.4	< 1.4	< 1.4	< 1.2
Beam Diameter at $1/e^2$ (mm) (typical)	< 1.0	< 1.0	< 2.0	< 1.5	< 1.5	< 1.5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Beam Divergence (mrad) (typical)	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 2.0	< 2.0	< 2.0	< 1.5
Beam Asymmetry	< 1.2:1	< 1.2:1	< 1.2:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Mode of Operation	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)	< +/- 3%	< +/- 3%	< +/- 5%	< +/- 5%	< +/- 5%	< +/- 5%	< +/- 5%	< +/- 5%	< +/- 5%	< +/- 5%	< +/- 5%
Digital Modulation/External Trigger											
Maximum Bandwidth (kHz)	> 20	> 20	on/off only	on/off only	on/off only	on/off only	on/off only	> 5	> 5	> 5	on/off only
Rise Time (10% to 90%) (µsec)	< 20	< 20	-	-	-	-	-	< 50	< 50	< 50	-
Fall time (10% to 90%) (µsec)	< 20	< 20	-	-	-	-	-	< 50	< 50	< 50	-
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
Analog Modulation											
Maximum Bandwidth (kHz)	> 1	> 1	set power only	-	-	-	-	> 1	> 1	> 1	set power only
Rise Time (10% to 90%) (µsec)	< 50	< 50	-	-	-	-	-	< 50	< 50	< 50	-
Fall time (10% to 90%) (µsec)	< 50	< 50	-	-	-	-	-	< 50	< 50	< 50	-
Modulation Depth (extinction ratio)	> 100:1	>100:1	-	-	-	-	-	> 100:1	> 100:1	> 100:1	-
Polarization Ratio	> 100:1	>100:1	>100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1
Warm-Up Time (minutes)	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 5	< 5	< 5	< 5
Beam Position (mm)	20 +/- 1	20 +/- 1	30.8 +/- 1	25 +/- 1	25 +/- 1	25 +/- 1	30.8 +/- 1	15 +/- 1	15 +/- 1	15 +/- 1	30.8 +/- 1
Beam Angle (mrad)	< +/- 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
CDRH Laser Classification	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb
Ambient Temperature (°C)	10 - 35	10 - 35	15 - 35	10 - 35	10 - 35	10 - 35	15 - 35	10 - 35	10 - 35	10 - 35	15 - 35

Contact B&W Tek for linewidth information
** RMS Noise of < 0.5%

Applications



Form Factor



The dimensions of the external laser head can vary based on power and wavelength for dimensions please contact B&W Tek

Model Number Generator

For faster ordering

BWI-□□□□-□□□E

Wavelength (nm)

Choose from one of our nine standard wave-lengths, or contact an applications specialist for a custom wavelength

Power (mW)

Choose from one of our standard powers, or contact an applications specialist for a custom power

Red boxes are optional depending on the number of characters in the wavelength or power

Examples:

BWI-780-10E for a 780nm 10mW laser or
BWI-1064-100E for a 1064nm 100mW laser

B&W TEK INC.

Your Photonics Partner

Additional Laser Products

BWF5
High Power Laser

- **High Power Lasers**
  Up to 200 W with wavelengths from 63 5nm - 2000 nm
- **Solid-State Lasers**
  TEM_{00} 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

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.

*i*nnoRam™
Lab Grade Raman System

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Contact our Application Team for your unique solution

Let us run your sample! - Feasibility Studies Available

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