



Your Photonics Partner

Laser Solution

## CLEANLAZE®

### Turnkey Spectrum Stabilized Laser Systems

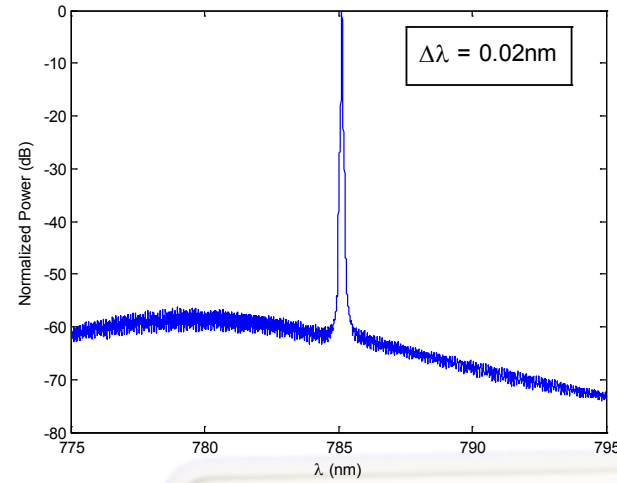


### Features

- Narrow Linewidth (< 0.03nm)
- Power Output from 50mW to 4W
- Lifetime > 10,000 Hours
- Plug-and-play Design
- Excellent Spectral and Power Stability
- Free-space or Fiber Coupled
- USB Software Interface Available
- Rugged Environmentally Sealed Design

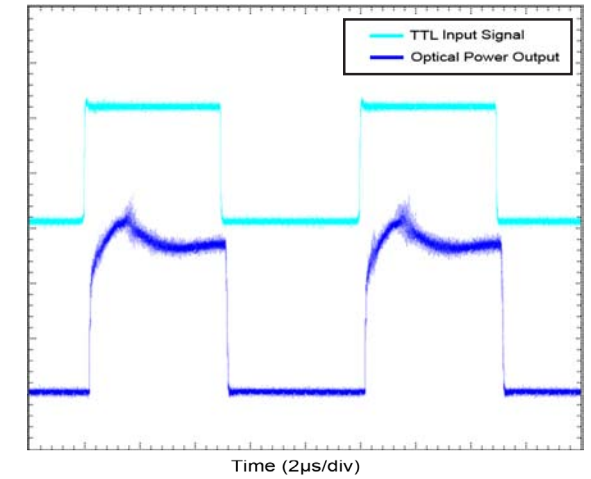
## About CleanLaze®

The CleanLaze® laser series is capable of maintaining a linewidth of less than 0.03nm (15GHz) in single transverse mode operation at 785nm. The core part of this laser is a high-power broad-stripe laser diode with its output spectrum narrowed and stabilized using a novel cavity technology. Conventional external cavity lasers are both delicate and high in maintenance cost due to the inclusion of external reflective dispersive elements resulting in a long cavity length. While in the CleanLaze®, the wavelength selective element is an integral part of the laser diode through a hybrid integration process, resulting in an ultra compact footprint (4mm x 4mm x 3mm) which is stable against environmental changes (temperature, vibration, humidity, etc.). The utilization of a broad-stripe laser diode guarantees a low cost module while delivering higher output power than its DFB and DBR counterparts. The wavelength selective element filters out unwanted spectral sidelobes from the broad-stripe laser diode and locks its output wavelength to the filter's central wavelength.

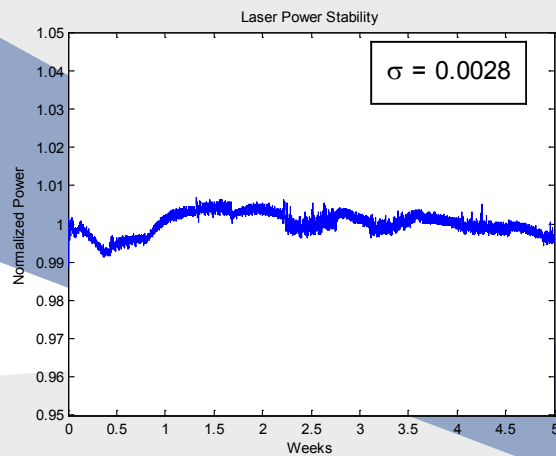


## External TTL and AM Modulation Available

With the TTL modulation option the laser can be digitally pulsed in on/off mode up to 100kHz in multi-mode with a modulation depth greater than 100:1. With a rise / fall time of less than one microsecond the TTL signal can be incorporated 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 application where the source and the detector need to be precisely triggered.

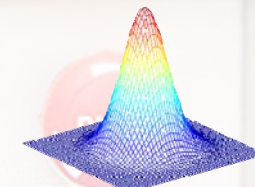


With analog modulation (AM) the laser output power is controlled by applying an arbitrary 0-5V input signal from a function generator. With the AM option the laser can be modulated up to 1kHz in multi-mode operation with a modulation depth greater than 100:1.



## Long Term Power Reliability

The CleanLaze® includes an integrated laser driver, thermoelectric cooling and optical fiber coupling with an expected lifetime greater than 10,000 hours. The CleanLaze® has a proven history of reliability with a 5% peak-to-peak long term power stability rating.



## Spatial Mode Profile

The CleanLaze® can provide both single-mode ( $TEM_{00}$ ) and multi-mode spatial beam profiles.  $M^2 < 1.1$  can be achieved by single-mode fiber coupling which acts as a mode filter eliminating any higher order transverse modes.

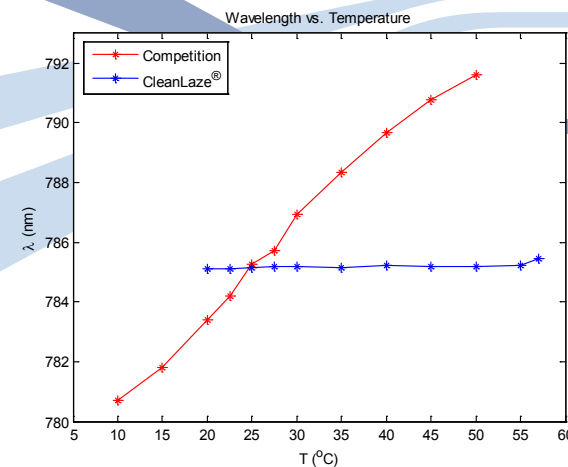
## USB Software Interface Available

The CleanLaze® 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.



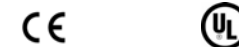
## High Spectral Stability

The CleanLaze® novel cavity design is capable of maintaining a stable clean narrow linewidth source over a wide range of temperatures and drive currents. The temperature sensitivity of the central wavelength is as low as 0.01nm/°C with a -35°C to 50°C operating temperature range.



## 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

## General Specifications: Turnkey Models

Model Number	BRM-785-0.075-FS	BRM-785-0.100-FS	BRM-785-0.05-5-0.13-FC	BRM-785-0.30-100-0.22-SMA	BRM-785-0.45-100-0.22-SMA	BRM-785-0.55-100-0.22-SMA	BRM-785-1.0-100-0.22-SMA	BRM-808-0.45-100-0.22-SMA	BRM-830-0.30-100-0.22-SMA	BRM-976-0.45-100-0.22-SMA	BRM-976-4.0-100-0.22-SMA
Wavelength (nm)	785 +/- 0.5	785 +/- 0.5	785 +/- 0.5	785 +/- 0.5	785 +/- 0.5	785 +/- 0.5	785 +/- 0.5	808 +/- 1	830 +/-1	976 +/--1	976 +/--1
Output Power (mW)	> 75	> 100	> 50	> 300	> 450	> 550	> 1000	> 450	> 300	> 450	> 4000
Spatial Mode	Single-Mode	Single-Mode	Single-Mode	Multi-Mode	Multi-Mode	Multi-Mode	Multi-Mode	Multi-Mode	Multi-Mode	Multi-Mode	Multi-Mode
FWHM Linewidth (nm)	< 0.03	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
M <sup>2</sup>	< 2	< 2	< 1.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beam Diameter at 1/e <sup>2</sup> (mm) (typical)	1.0	1.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beam Divergence (mrad) (typical)	2.5	2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fiber Core Diameter (µm)	N/A	N/A	5	100	100	100	100	100	100	100	100
Fiber Numerical Aperture	N/A	N/A	0.13	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Beam Asymmetry	< 2:1	< 2:1	< 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
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%	< 5%	< 5%	< 5%
<b>RMS Noise</b>											
20Hz to 10MHz	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%	< 0.5%
10MHz to 500MHz	< 2.0%	< 2.0%	< 2.0%	< 2.0%	< 2.0%	< 2.0%	< 2.0%	< 2.0%	< 2.0%	< 2.0%	< 2.0%
<b>Digital Modulation/External Trigger*</b>											
Maximum Bandwidth (kHz)	on/off only	on/off only	on/off only	> 100	> 100	> 100	> 100	> 100	> 100	> 100	> 100
Rise Time (10% to 90%) (µsec)	N/A	N/A	N/A	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Fall time (10% to 90%) (µsec)	N/A	N/A	N/A	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
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
<b>Analog Modulation*</b>											
Maximum Bandwidth (kHz)	N/A	N/A	N/A	> 1	> 1	> 1	> 1	> 1	> 1	> 1	> 1
Rise Time (10% to 90%) (µsec)	N/A	N/A	N/A	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Fall time (10% to 90%) (µsec)	N/A	N/A	N/A	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Modulation Depth (extinction ratio)	N/A	N/A	N/A	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1	> 100:1
Polarization Ratio	> 100:1	> 100:1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Warm-Up Time (minutes)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Beam Position (mm)	38 +/--1	38 +/--1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beam Angle (mrad)	< +/-5	< +/-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pointing Stability (µrad/°C)	< 30	< 30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CDRH Laser Classification	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IV	IIIb	IIIb	IIIb	IV
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

\*External analog and digital modulation interface available



## Applications

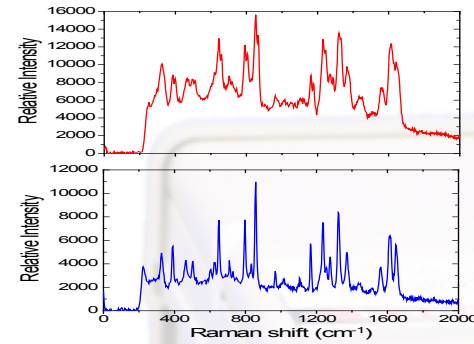
Ideal source for Raman spectroscopy as well as fluorescence spectroscopy. Our patented\* CleanLaze® technology utilizes a clean, narrow bandwidth laser which makes it ideal for Raman spectroscopy since the quality of the Raman peaks are directly related to the sharpness and stability of the delivered light source.

The CleanLaze® offers a long coherence length which is ideal for high resolution metrology, microscopy and digital holography.

The narrow linewidth of the CleanLaze® can be utilized for injection seeding of high power lasers and nonlinear devices, such as optical parametric generation (OPG).

The 808nm CleanLaze® model can also be used as a narrow linewidth pump source for Nd:YAG / Nd:YVO<sub>4</sub> lasers.

And much more...



Comparison of Raman spectrum of an acetaminophen sample excited with the regular broad-stripe diode laser (upper) and the CleanLaze® diode laser (lower).

\*U.S. patent number 7,245,369, applies to the use of CleanLaze® diode laser in Raman spectroscopy

## Enhancements

- Receptacle or pigtailed fiber delivery systems available
- External analog (0-5V) and digital (TTL) modulation interface available
- Collimating lenses available for free space applications of multi-mode systems
- Optional FC connector upgrade for multi-mode systems
- Polarization maintaining fiber available on single-mode systems

## Form Factor



## Ordering Info

BRM-785-0.075-FS	Turnkey package single mode free-space Cleanlaze technology laser, center wavelength 785 +/- 0.5 nm, Max. FWHM linewidth 0.03 nm, typical FWHM linewidth 0.02 nm, output power >75 mW at exit port, including all driving electronics, including key lock and interlock. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-785-0.100-FS	Turnkey package single mode free-space Cleanlaze technology laser, center wavelength 785 +/- 0.5 nm, Max. FWHM linewidth 0.03 nm, typical FWHM linewidth 0.02 nm, output power >100 mW at exit port, including all driving electronics, including key lock and interlock. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-785-0.05-5-0.13-FC*	Turnkey package single mode fiber coupled Cleanlaze Technology laser, center wavelength 785 +/- 0.5 nm, Max. FWHM linewidth 0.03 nm, typical FWHM linewidth 0.02 nm, output power >50 mW at fiber port (not including probe coupling loss), including all driving electronics, fiber coupled via 5 um @ 0.13 NA fiber in FC/APC*. Please specify FC/APC receptacle in bulkhead of laser or fiber feedthrough with FC/APC termination. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-785-0.30-100-0.22-SMA**	Turnkey package narrow spectral width fiber coupled Cleanlaze technology laser, center wavelength 785 +/- 0.5 nm, Max. FWHM linewidth 0.3 nm, typical FWHM linewidth 0.2 nm, output power > 300 mW at fiber port (not including probe coupling loss), including all driving electronics, fiber coupled via 100 um @ 0.22 NA fiber in SMA905. Please specify SMA receptacle in bulkhead or fiber feedthrough with SMA 905 connector pigtail. FC connector upgrade available**. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-785-0.45-100-0.22-SMA**	Turnkey package narrow spectral width fiber coupled Cleanlaze technology laser, center wavelength 785 +/- 0.5 nm, Max. FWHM linewidth 0.3 nm, typical FWHM linewidth 0.2 nm, output power > 450 mW at fiber port (not including probe coupling loss), including all driving electronics, fiber coupled via 100 um @ 0.22 NA fiber in SMA905. Please specify SMA receptacle in bulkhead or fiber feedthrough with SMA 905 connector pigtail. FC connector upgrade available**. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-785-0.55-100-0.22-SMA**	Turnkey package narrow spectral width fiber coupled Cleanlaze technology laser, center wavelength 785 +/- 0.5 nm, Max. FWHM linewidth 0.3 nm, typical FWHM linewidth 0.2 nm, output power > 550 mW at fiber port (not including probe coupling loss), including all driving electronics, fiber coupled via 100 um @ 0.22 NA fiber in SMA905. Please specify SMA receptacle in bulkhead or fiber feedthrough with SMA 905 connector pigtail. FC connector upgrade available**. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-785-1.0-100-0.22-SMA**	Turnkey package narrow spectral width fiber coupled Cleanlaze technology laser, center wavelength 785 +/- 0.5 nm, Max. FWHM linewidth 0.3 nm, typical FWHM linewidth 0.2 nm, output power > 1000 mW at fiber port (not including probe coupling loss), including all driving electronics, fiber coupled via 100 um @ 0.22 NA fiber in SMA905. Please specify SMA receptacle in bulkhead or fiber feedthrough with SMA 905 connector pigtail. FC connector upgrade available**. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-808-0.45-100-0.22-SMA**	Turnkey package narrow spectral width fiber coupled Cleanlaze technology laser, center wavelength 808 +/- 1 nm, Max. FWHM linewidth 0.3 nm, typical FWHM linewidth 0.2 nm, output power > 450 mW at fiber port (not including probe coupling loss), including all driving electronics, output port coupled for 100 um @ 0.22 NA fiber in SMA905. Please specify SMA receptacle in bulkhead of laser or fiber feedthrough with SMA 905 connector pigtail. FC connector upgrade available**. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-830-0.30-100-0.22-SMA**	Turnkey package narrow spectral width fiber coupled Cleanlaze technology laser, center wavelength 830 +/- 1 nm, Max. FWHM linewidth 0.3 nm, typical FWHM linewidth 0.2 nm, output power > 300 mW at fiber port (not including probe coupling loss), including all driving electronics, output port coupled for 100 um @ 0.22 NA fiber in SMA905. Please specify SMA receptacle in bulkhead of laser or fiber feedthrough with SMA 905 connector pigtail. FC connector upgrade available**. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-976-0.45-100-0.22-SMA**	Turnkey package narrow spectral width fiber coupled Cleanlaze technology laser, center wavelength 976 +/- 1 nm, Max. FWHM linewidth 0.3 nm, typical FWHM linewidth 0.2 nm, output power > 450 mW at fiber port (not including probe coupling loss), including all driving electronics, output port coupled for 100 um @ 0.22 NA fiber in SMA905 receptacle in bulkhead. FC connector upgrade available**. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-976-4.0-100-0.22-SMA**	Turnkey package narrow spectral width fiber coupled Cleanlaze technology laser, center wavelength 976 +/- 1 nm, Max. FWHM linewidth 0.3 nm, typical FWHM linewidth 0.2 nm, output power > 4000 mW at fiber port (not including probe coupling loss), including all driving electronics, output port coupled for 100 um @ 0.22 NA fiber in SMA905 receptacle in bulkhead. FC connector upgrade available**. 100-240 VAC, 50/60 Hz main input. Rough dimensions: 152x100x266mm excluding the fiber coupler.
BRM-USB	USB based power control software interface.
BRM-TTL	External digital TTL modulation interface.
BRM-AM	External analog 0-5V modulation interface.

\*Polarization maintaining fiber available upon request

\*\*Specify -FC for FC receptacle

### Additional Laser Products

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



BWF5  
High Power Laser



CleanLaze®  
OEM Package

### Additional Spectroscopy Products

- **UV-Vis-NIR Spectrometer Modules**  
Compact, USB interface, Plug-and-play
- **i-Spec Spectrophotometers**  
Models from 190nm - 2500nm
- **Raman Spectrometer Systems**  
Portable systems, 785nm, 532nm, & 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.*