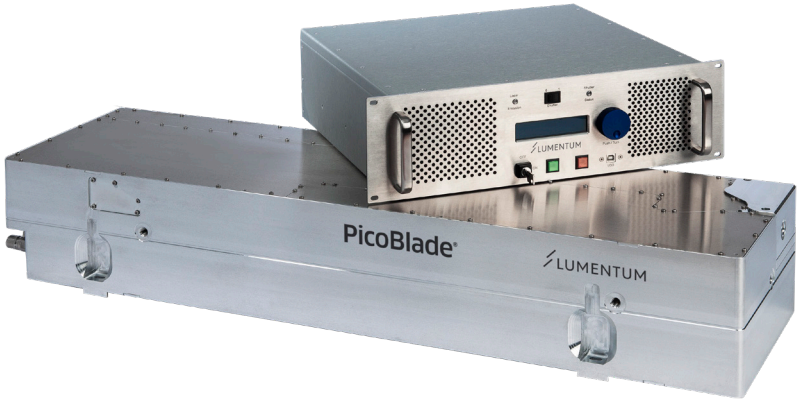
LUMENTUM

PicoBlade® 2 Picosecond Micromachining Laser

Precision and flexibility for optimized processes—a fully featured, machine-ready system



The PicoBlade 2 laser system is a versatile tool for processing virtually any material with the highest precision and reliability.

The newly redesigned PicoBlade platform provides the same flexibility as the former generation in a much smaller package to facilitate the integration and help reduce the footprint of your machine. The PicoBlade system consists of a laser head, an electronic controller and a closed-loop water chiller. The optical components are contained in a hermetically-sealed and temperature-stabilized housing giving the laser its robustness and ensuring excellent long-term stability.

The laser head incorporates an ultra-stable, passively mode-locked seed oscillator that relies on Lumentum-proprietary, wear-and-tear free semiconductor saturable absorber mirror (SESAM®) technology. SESAMs from Lumentum are designed and optimized for the Picoblade lasers to avoid long-term degradation. The laser is based on a master oscillator power amplifier (MOPA) design and is immune to back reflection. Laser head and electronic controller are connected via an umbilical that can be disconnected at both ends. The laser offers a wide range of repetition rates with very fine resolution. Repetition rate changes are possible instantaneously at the push of a button or by sending a corresponding command via computer with only negligible changes in spatial beam properties.

Pulse-on-Demand (PoD)
The PoD feature allows the user to select individual pulses by simply applying a TTL control signal. Its state (high/low) determines whether a given optical pulse exits the laser head. As this gating is done after amplification, the energy of the selected pulse is constant even for arbitrary pulse sequences. There is no so-called “first pulse” effect. Furthermore, the PoD features fast attenuation or modulation by applying an analog control signal. Attenuation or modulation depth is possible down to a few percent over the whole range of repetition rates.

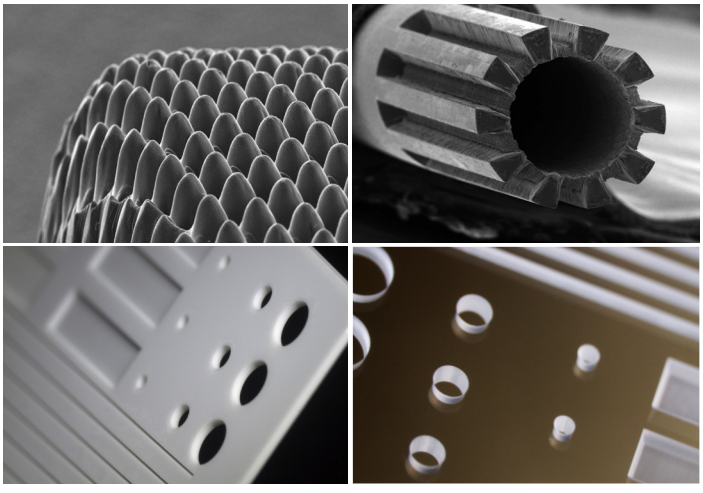
The capabilities of the laser are expanded by the possibility to generate bursts. The FlexBurst technology allows the generation of “micro”-bursts with a temporal pulse spacing of 12 ns. The user can split the energy of a single pulse (single-pulse mode) into a group of pulses (burst mode). In addition, our FlexBurst technology allows the user to freely define the energy of each pulse inside this “micro”-burst, which offers additional degrees of freedom to optimize the machining process. FlexBurst benefits have shown enhanced ablation rate or allowing unique processes to work with transparent materials.

Finally PicoBlade is available at the fundamental wavelength of 1064 nm, as well as green (532 nm) and UV (355 nm), all three models coming in the same package size. Based on the proprietary non-linear conversion module architecture, the PicoBlade achieves unparalleled reliability. By default, the conversion efficiency will be optimized at 200 kHz to maximize the energy, but the peak conversion can be engineered at other repetition rates upon request. This is of particular interest for high-speed scanning in the MHz range.

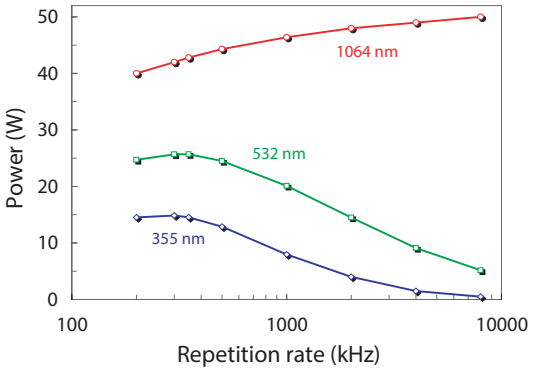
Features
- Compact industrial design
- High-volume manufacturing
- Fully-detachable umbilical
- Easy integration
- High productivity:
  - Wide range of PRF from single shot to 8 MHz standard
  - A/D power modulation capability
  - FlexBurst™ technology
  - Process shutter and safety shutter

Options
- High and medium power models available
- Customized umbilical lengths
- AccuTrig™ triggering function
- MegaBurst™ high-energy burst
- SYNC for high-speed line scanners

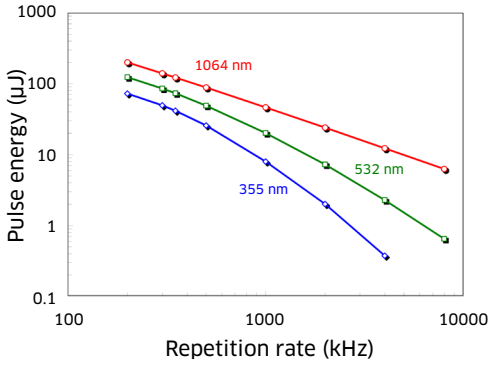
Applications
- Glass cutting, welding, scribing
- Sapphire cutting, scribing
- Display processing
- High-speed precision metal machining
- Selective thin-film ablation
- Semiconductor dicing
- Hard-materials processing (diamond, sapphire, carbide, ceramics, and CVD)



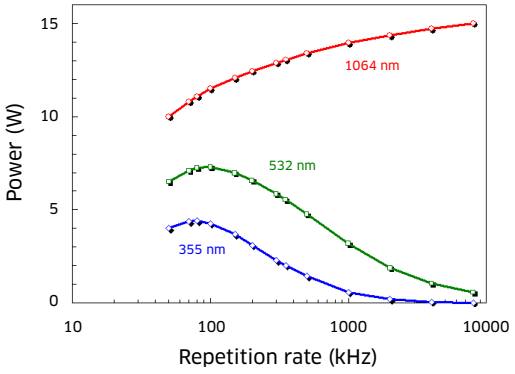
Application photography courtesy of Lightmotif B.V.



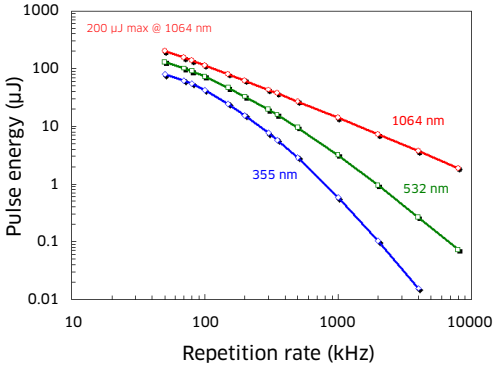
High-power PicoBlade typical output power versus repetition rate for 1064, 532, and 355 nm*



High-power PicoBlade typical pulse energy versus repetition rate for 1064, 532, and 355 nm*



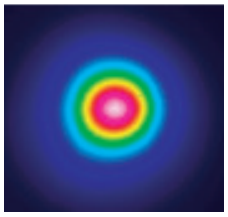
Medium-power PicoBlade typical output power versus repetition rate for 1064, 532, and 355 nm*



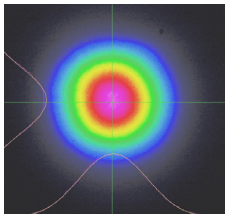
Medium-power PicoBlade typical pulse energy versus repetition rate for 1064, 532, and 355 nm*

* The output power for green and UV wavelengths can be optimized at different repetition rates.

Output Beam Profile

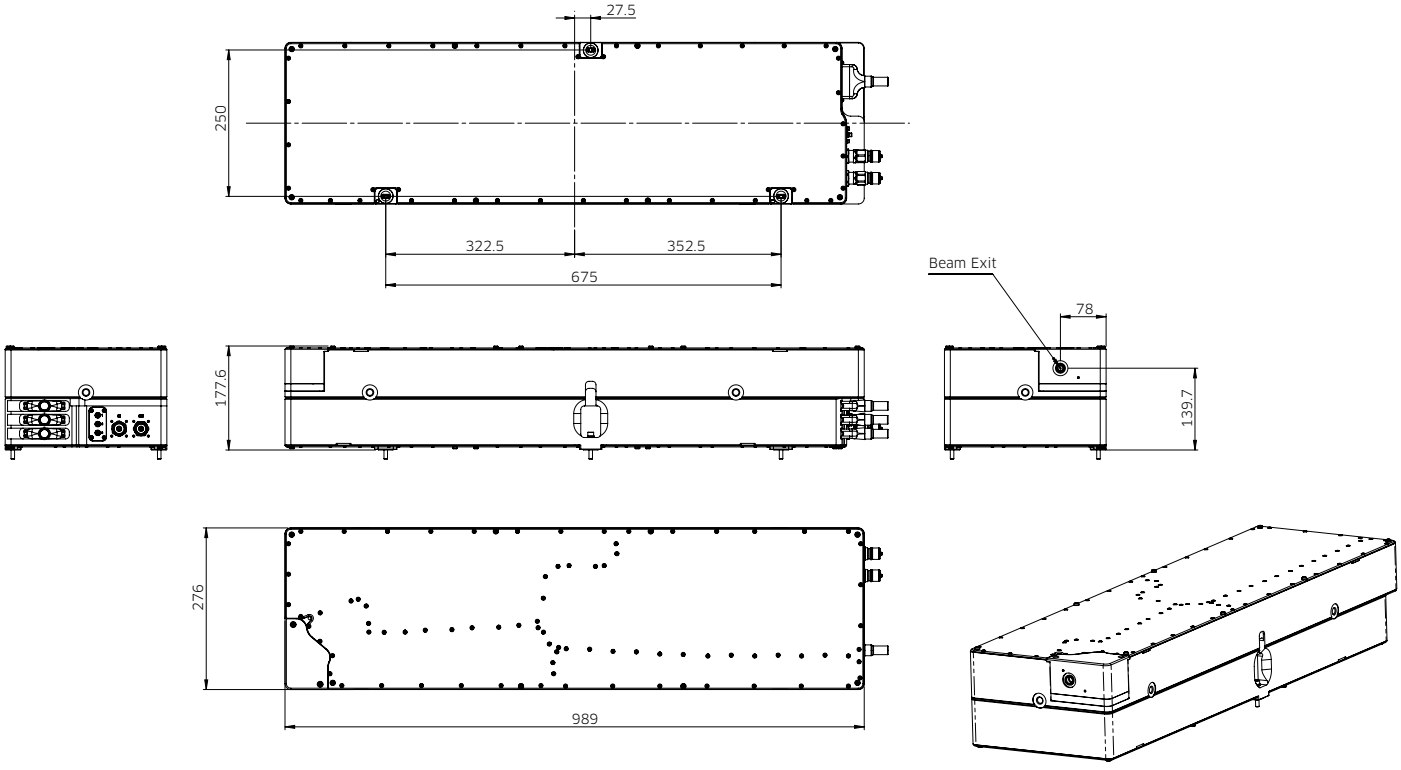


High-power PicoBlade output beam



Medium-power PicoBlade output beam

Dimensions Diagram (mm)



Specifications

General		
Laser Head		
Dimensions (L x W x H)		989 x 276 x 177.6 mm (38.9 x 10.9 x 7.0 in)
Exit beam location and reference (W x H)		78 x 139.7 mm (3.1 x 5.5 in)
Weight		<75 kg (<165 lb)
Controller (fits 19-in rack)		
Dimensions (L x W x H)		399 x 483 x 133 mm (3RU)
Weight		14 kg (30.9 lb)
Chiller (fits 19-in rack)		
Dimensions (L x W x H)		640 x 483 x 267 mm (6RU)
Weight		42 kg (92.6 lb)
Parameter		
Output power	PicoBlade High-power	See graphs on page 3 for typical values
	PicoBlade Medium-power	
Repetition rate		Single shot to 8 MHz
Pulse energy stability (>1 kHz)		<0.75% rms for 1064 nm
		<1% rms for 532/355 nm
Pulse width measured at 1064 nm		10 ps
Spatial mode		TEM_{00}, M^2<1.3
Pointing stability over constant temperature +/-2°C		<50 µrad/ °C
Warm up from cold start		<40 min
Voltage (single phase)		100 – 240 V AC
Frequency		50 – 60 Hz
Input power (single phase)*		2400 VA
Polarization		>100:1 linear horizontal

*Laser controller and chiller

Regulatory Compliance

The products listed in this datasheet comply with the following regulatory standards, and display the certification and laser safety markings shown below. Contact your local Lumentum sales representative for additional information on specific products or configurations.

Regulatory Standards

IEC/EN 61010-1
IEC/EN 60825-1
IEC/EN 61000-6-2
IEC/EN 61000-6-4
CDRH 21 CFR 1040.10

Safety certification markings

Laser safety warning label

Ordering Information

For more information on this or other products and their availability, please contact your local Lumentum account manager or Lumentum directly at customer.service@lumentum.com.

PB2- □ - □ □ □ □ - □ -0000R

Power Level	Code
High	H
Medium	M
Energy*	E

PRF	Code
50 kHz	0050
200 kHz	0200

NLO	Code
1064 nm	R
532 nm	G
355 nm	V

Accessories

Description	Product Code
Controller	
Controller	PB2-PS-H-0000
Chiller	
Water-water, US with 110 V AC	CH-M-W110
Water-water, European with 220 V AC	CH-M-W220
Air-water, US with 110 V AC	CH-M-A110
Air-water, European with 220 V AC	CH-M-A220
Umbilical Cable	
3 m standard	PB2-PS-A30R
5 m standard	PB2-PS-A50R
Chiller Hoses	
3 m chiller hoses	PB2-CH-A30S
5 m chiller hoses	PB2-CH-A50S
Accessories	
ZeroAir generator (only UV)	PB-ZA
AccuTrig	AT-0000R
SYNC	SC-0000R

* For inquiries about MegaBurst option, please contact Lumentum.

Example of a Complete Order

PB2-H-0200-R-0000R (high power and 1064 nm)

PB2-PS-H-0000 (controller)

PB2-PS-A30R (3 m umbilical cable)

CH-M-A220 (chiller, air-water, European with 220 V AC)

PB2-CH-A30S (3 m chiller hoses)

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Toll Free: 800 000 LITE (5483)

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