

CAREX 45-343

High power nanosecond UV laser with programmable pulses for high-speed precision micromachining

CAREX, the flexible nanosecond UV fiber laser, delivers fully programmable pulses combining high power and high pulse repetition rates. It is especially designed for high precision micro-processing.

CAREX combines process agility and throughput for demanding applications such as multi-material stack processing. It delivers pulses from 2 ns up to 10 ns with any arbitrary temporal shape and possible burst operation. The innovative fast electronic design enables instantaneous switching between two pulses patterns for optimized complex material processing.

The fiber technology combined with the simply efficient laser head architecture makes CAREX a robust, flexible, and cost-effective UV laser for most demanding industrial applications. Manufactured with field proven and qualified components, good practices and high-quality, CAREX is the right answer to 24/7 operations in extended production cycle environments.

Wavelength	343 nm
Power	45 W
Pulse Duration	2 ns – 10 ns fully adjustable Programmable pulses Burst mode
Pulse Energy	Up to 450 µJ
Beam quality	$M^2 < 1.2$



Advantages

- ✓ High power 45 W
- ✓ High Pulse Repetition Rate up to 1 500 kHz
- ✓ Adjustable pulse duration from 2 ns up to 10 ns
- ✓ Full pulse shaping (1 ns resolution)
- ✓ Excellent beam quality $M^2 < 1.2$ up to 1 500 kHz
- ✓ High peak power up to 45 kW
- ✓ Field proven technology
- ✓ Long UV crystal lifetime
- ✓ HALT designed / HASS Certified

Applications

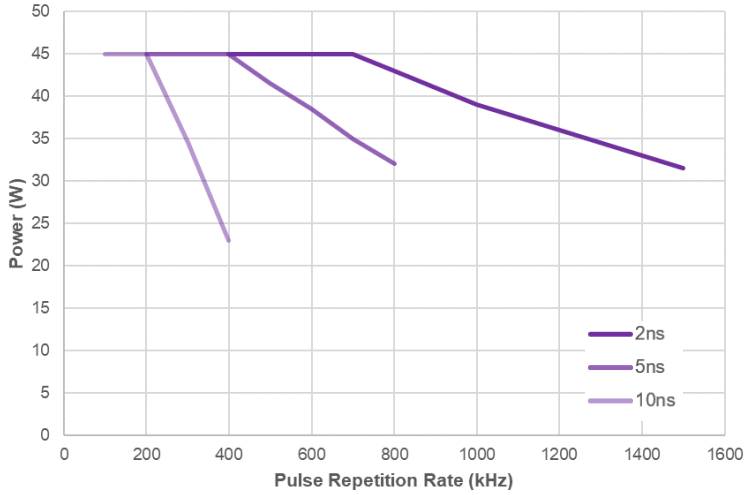
- ✓ Flex PCB via drilling
- ✓ HDI (High Density Interconnect)
- ✓ ITO patterning
- ✓ Wafer scribing and debonding
- ✓ Glass processing
- ✓ CFRP processing
- ✓ Battery processing
- ✓ Ceramic scribing, cutting and drilling



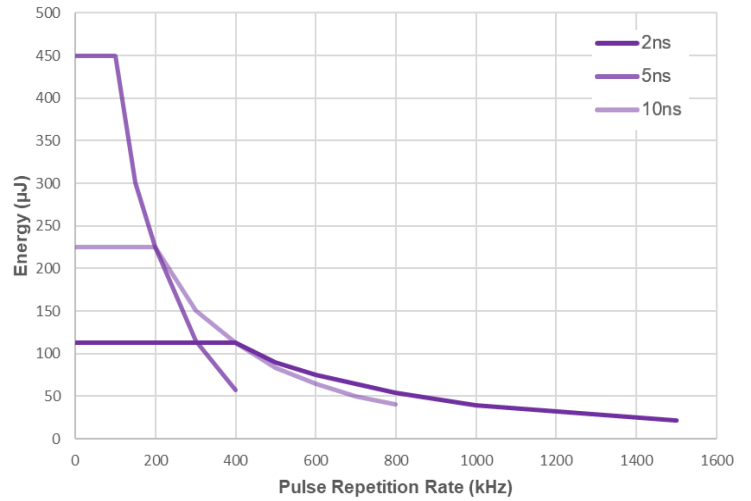
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Typical performances

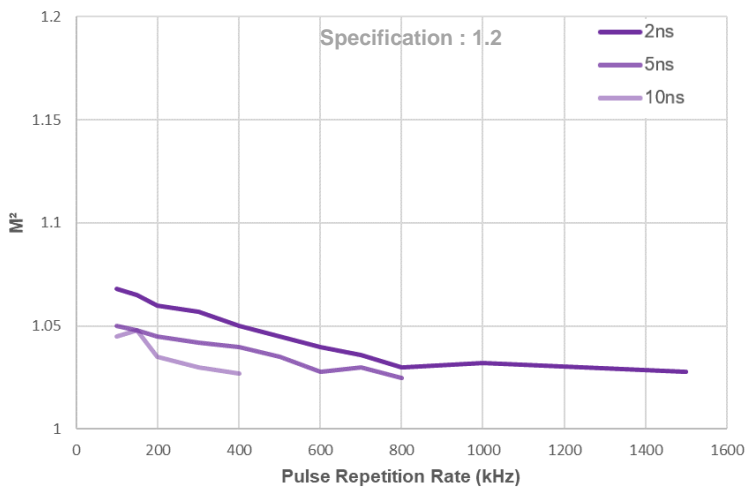
Power



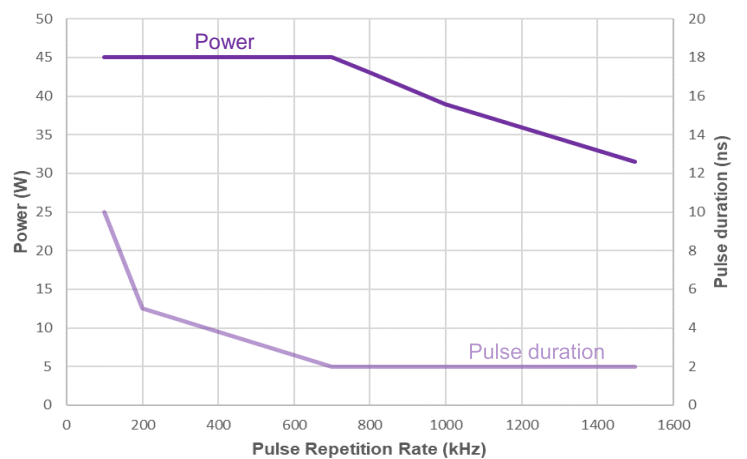
Pulse energy



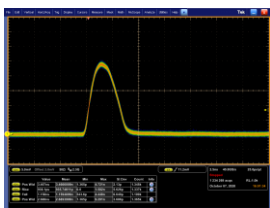
M²



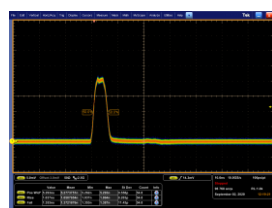
Typical Operating Conditions



Programmable Pulses



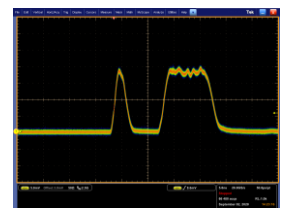
2 ns



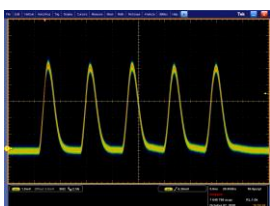
5 ns



10 ns



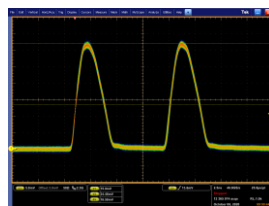
2 ns + 10 ns ; $\Delta = 10$ ns



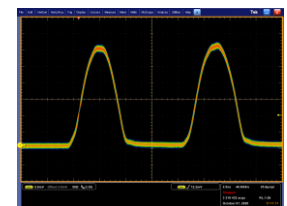
5 x 2 ns ; $\Delta = 2$ ns



5 x 3.5 ns ; $\Delta = 5$ ns



2 x 2 ns ; $\Delta = 2$ ns



2 x 3.5 ns ; $\Delta = 5$ ns



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Specifications

Output Characteristics

Central Wavelength	343.3 nm ± 0.3 nm		
Average Power	2 ns 45 W @ 400 kHz 45 W @ 700 kHz	5 ns 45 W @ 200 kHz 45 W @ 400 kHz	10 ns 45 W @ 100 kHz 45 W @ 200 kHz
Pulse Width	Fully programmable from 2 ns to 10 ns		
Pulse Repetition Rates	Single-shot to 1 500 kHz		
Power Stability	< 2%, 2σ over 8 hours		
Pulse to Pulse Energy Stability	< 3% RMS		

Beam Characteristics

Spatial Mode	TEM ₀₀
M ²	≤ 1.2
Polarization Ratio	≥ 100:1 linear
Polarization Direction	Vertical, ± 2°
Beam Divergence (full-angle)	< 0.3 mrad
4σ Beam Diameter @ exit (nominal)	3.5 mm ± 0.35 mm
Waist Location (from exit face of output window)	0 m ± 12 m
Astigmatism	≤ 30%
Beam Circularity	≥ 90%
Long Term Beam Pointing Stability, over 8 hours	≤ 25 μrad, full-angle

Operating Conditions

External Communications	Ethernet / RS-232 / USB
Warm-up Time	
Cold Start	≤ 30 minutes
Warm Start	≤ 2 minutes
Electrical Requirements	100 – 240V AC
Line Frequency	50 to 60 Hz
Power Consumption	< 900 W
Temperature Range	15°C to 35°C (59°F to 95°F)
Humidity	10% to 95% RH, non-condensing
Storage Conditions	
Temperature	0°C to 50°C (32°F to 122°F)
Humidity	5% to 95% RH
Altitude (non-operational)	Sea level to 11 000 meter

Chiller Requirements

Cooling Water Temperature	25°C +/- 0,1°C
Minimum Cooling Power	700 W
Cooling Water Flow	5 liter/min, 3 liter/min minimum

Physical Characteristics

Dimensions (L x W x H)	Laser Head : 1146 x 250 x 169 mm (45.11 x 9.84 x 6.65 in) Control Unit : 506 x 483 x 177 mm (19.92 x 19.01 x 6.97 in)
Weight	Laser Head : 50 kg (110 lbs) without water Control Unit : 25 kg (55 lbs)

Features

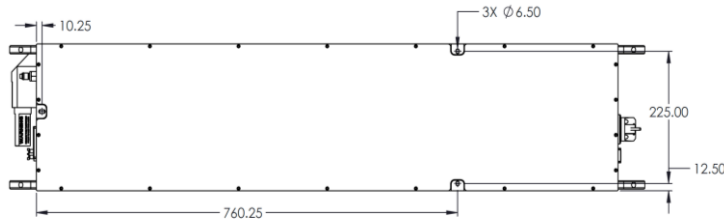
Extended Internal Power Monitoring	Power monitored at each stage of the laser
Ultra Wide Operation Range	Constant pulse width and beam parameters over the whole pulse repetition rate range
Industry Ready Data Logging	Long-term and short-term laser operation log, diagnosis, maintenance
Alignment Beam	Low power mode for laser installation and alignment
Sacrificial Window	Field Replaceable Unit
Advanced Support	Industry 4.0 ready, remote control, remote support, >30 sensors in laser head
Best Practices	Sealed laser head, multi-stage components cleaning and assembled in ISO 6 cleanroom (class 1000)



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Drawings

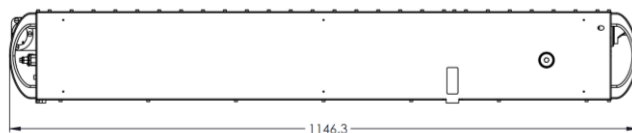
Laser Head (in mm)



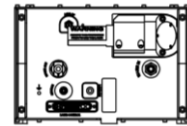
Bottom View



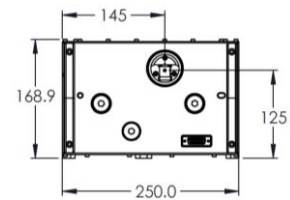
Top View



Side View

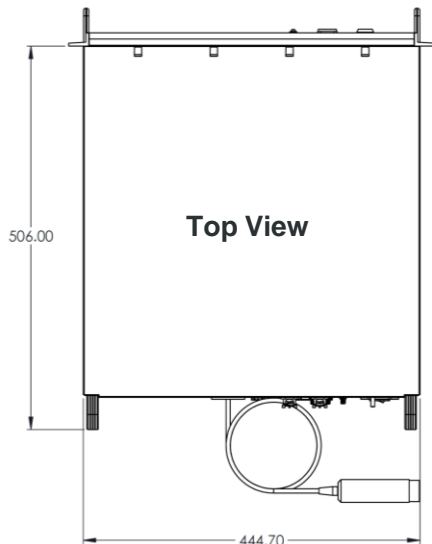


Rear View

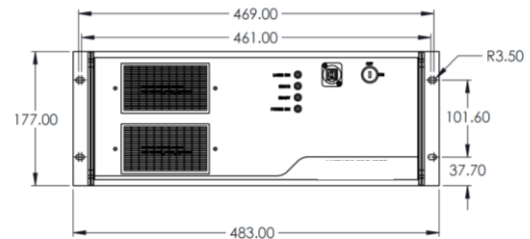


Front View

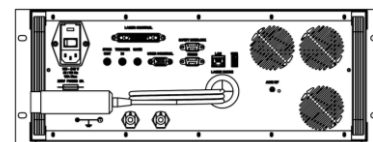
Power Supply (in mm)



Top View



Front View



Rear View

According to BLOOM continuous product improvements, specifications and drawings are subject to change without notice.