

CARBIDE



Unibody-Design Femtosecond Lasers for Industry and Science

FEATURES

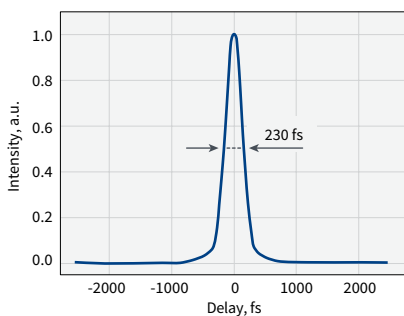
- Tunable pulse duration, 190 fs – 20 ps
- Maximum output of 80 W and 2 mJ
- Single-shot – 2 MHz repetition rate
- Pulse-on-demand and BiBurst for pulse control
- Up to 5th harmonic or tunable extensions
- Air-cooled model
- Compact industrial-grade design



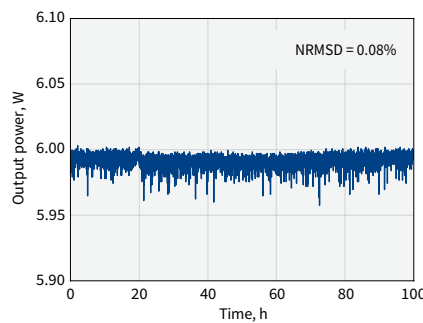
CARBIDE-CB3

CARBIDE is a series of femtosecond lasers combining high average power and excellent power stability. CARBIDE features market-leading output parameters without compromises to beam quality and stability. A compact and robust optomechanical CARBIDE design allows a variety of applications in top-class research centers, as well as display, automotive, LED, medical, and other industries. The reliability of CARBIDE has been proven by hundreds of systems operating 24/7 in the industrial environment.

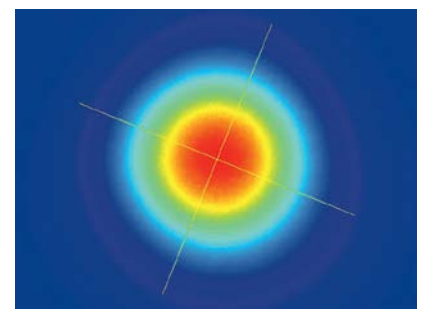
The tunability of CARBIDE lasers enables our customers to discover the most efficient manufacturing processes. Tunable parameters include pulse duration (190 fs – 20 ps), repetition rate (single-shot – 2 MHz), pulse energy (up to 2 mJ), and average power (up to 80 W). A pulse-on-demand mode is available using the built-in pulse picker. The CARBIDE lasers can be equipped with industrial-grade modules, including but not limited to high-power harmonic generators.



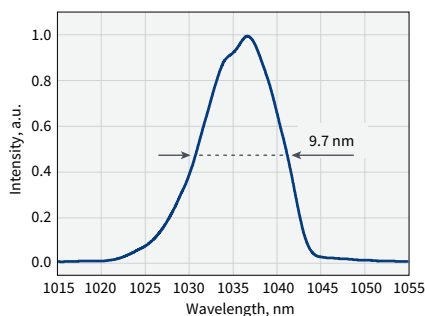
Typical pulse duration of CARBIDE laser



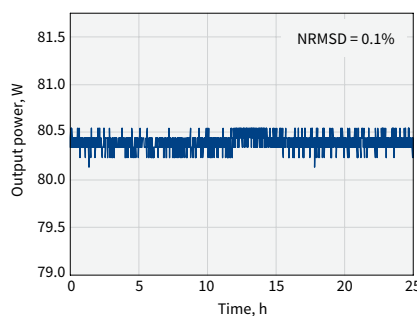
Long-term power stability of CARBIDE-CB5



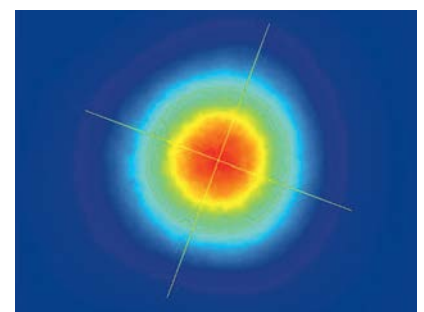
Typical beam profile of CARBIDE-CB5



Typical spectrum of CARBIDE laser



Long-term power stability of CARBIDE-CB3



Typical beam profile of CARBIDE-CB3

SPECIFICATIONS

Model	CB3-20W	CB3-40W	CB3-80W	CB5	CB5-SP
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OUTPUT CHARACTERISTICS

Cooling method	Water-cooled				Air-cooled ¹⁾		
Maximum output power	20 W	40 W	80 W		6 W	5 W	
Pulse duration ²⁾	< 250 fs			< 350 fs	< 290 fs		< 190 fs
Pulse duration tuning range	250 fs – 10 ps			350 fs – 10 ps	290 fs – 20 ps		190 fs – 20 ps
Maximum pulse energy	0.4 mJ		0.8 mJ	2 mJ	100 μJ	83 μJ	100 μJ
Repetition rate	Single-shot – 1 MHz	Single-shot – 1 MHz (2 MHz on request)	Single-shot – 2 MHz		Single-shot – 1 MHz		
Pulse selection	Single-shot, pulse-on-demand, any fundamental repetition rate division						
Center wavelength ³⁾	1030 ± 10 nm						
Polarization	Linear, vertical; 1 : 1000						
Beam quality, M ²	< 1.2						
Beam diameter ⁴⁾	3.9 ± 0.4 mm		4.2 ± 0.4 mm	5.1 ± 0.7 mm	2.1 ± 0.4 mm		
Beam pointing stability	< 20 μrad/°C						
Pulse picker	FEC ⁵⁾				included	included ⁶⁾	included
Pulse picker leakage	< 0.5%				< 2%	< 0.1%	< 2%
Pulse-to-pulse energy stability ⁷⁾	< 0.5% RMS deviation ⁸⁾ over 24 h						
Long-term power stability ⁷⁾	< 0.5% RMS deviation ⁸⁾ over 100 h						

MAIN OPTIONS

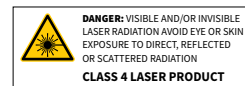
Oscillator output	< 0.5 W, 120 – 250 fs, 1030 ± 10 nm, ≈ 65 MHz ⁹⁾	n/a
Harmonic generator ¹⁰⁾	515 nm, 343 nm, 257 nm, or 206 nm; <i>see page 19</i>	
Optical parametric amplifier ^{10) 11)}	320 – 10000 nm; <i>see page 26</i>	
BiBurst option ¹⁰⁾	Tunable GHz and MHz burst with burst-in-burst capability; <i>see page 13</i>	n/a

PHYSICAL DIMENSIONS

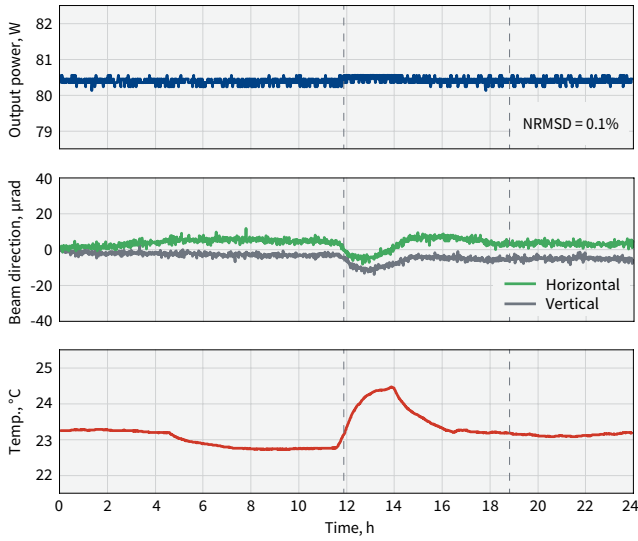
Laser head (L × W × H)	632 × 305 × 173 mm		631 × 324 × 167 mm
Chiller (L × W × H)	680 × 484 × 307 mm		Not required
24 V DC power supply (L × W × H)	280 × 144 × 49 mm	320 × 200 × 75 mm	220 × 95 × 46 mm

ENVIRONMENTAL & UTILITY REQUIREMENTS

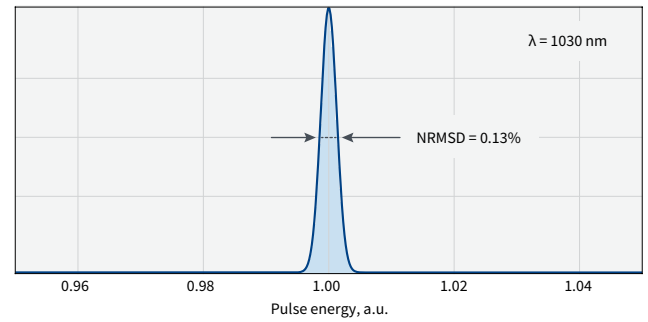
Operating temperature	15 – 30 °C (59 – 86 °F)		17 – 27 °C (62 – 80 °F)
Relative humidity	< 80% (non-condensing)		
Electrical requirements	Laser	100 V AC, 7 A – 240 V AC, 3A; 50 – 60 Hz	100 V AC, 12 A – 240 V AC, 5 A; 50 – 60 Hz
	Chiller	100 – 230 V AC; 50 – 60 Hz	200 – 230 V AC; 50 – 60 Hz
Rated power	Laser	600 W	1000 W
	Chiller	1400 W	2000 W

¹⁾ Water-cooled version available on request.²⁾ Assuming Gaussian pulse shape.³⁾ Precise center wavelength for specific models available upon request.⁴⁾ FW 1/e², using maximum pulse energy.⁵⁾ Provides fast energy control; external analog control input available. Response time – next available RA pulse.⁶⁾ Enhanced contrast AOM. Provides fast amplitude control of output pulse train.⁷⁾ Under stable environmental conditions.⁸⁾ Normalized to average pulse energy, NRMSD.⁹⁾ Available simultaneously, requires scientific interface. Contact sales@lightcon.com for details or customized solutions.¹⁰⁾ Integrated. For external harmonic generator, refer to HIRO.¹¹⁾ Integrated. For external OPA refer to ORPHEUS OPAs.

STABILITY MEASUREMENTS

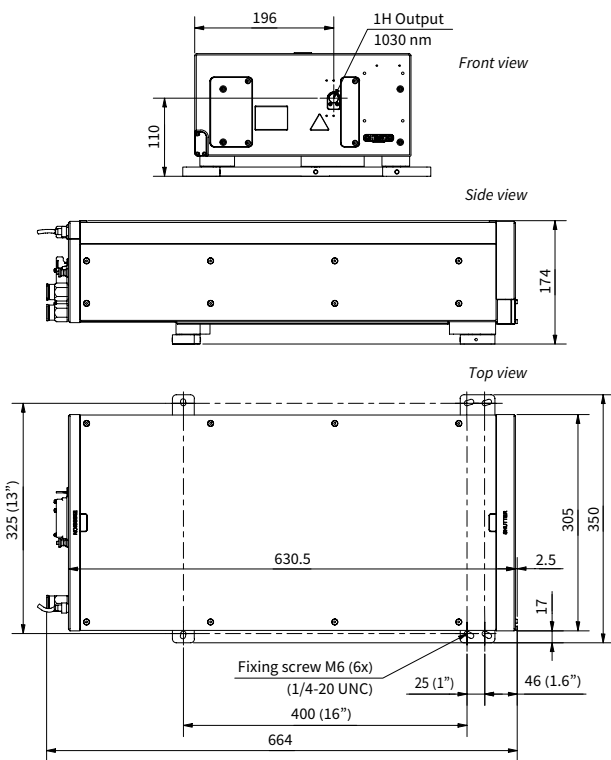


CARBIDE-CB3 output power and beam direction with power lock enabled, under varying environmental conditions

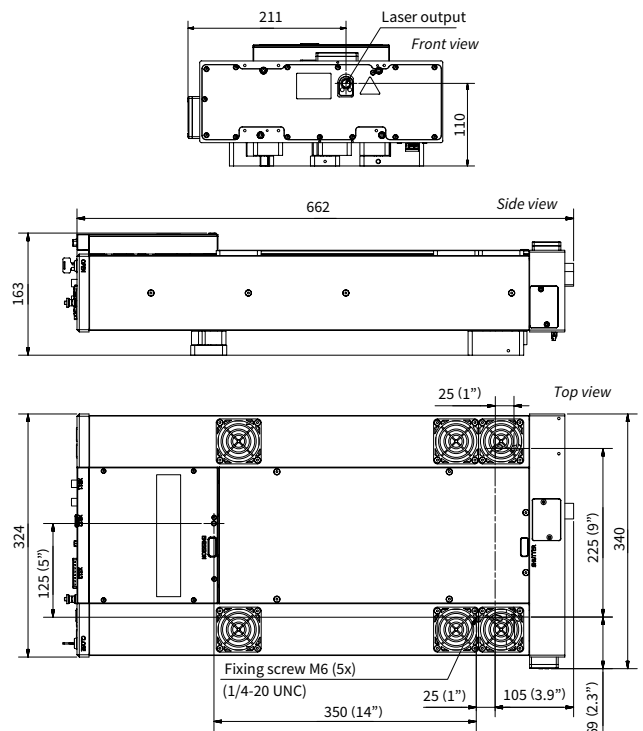


Typical pulse-to-pulse energy stability

DRAWINGS



Drawing of CARBIDE-CB3



Drawing of air-cooled CARBIDE-CB5 with attenuator

CARBIDE | 120W IR

NEW

High-Power IR Femtosecond Laser



CARBIDE-CB3-120W

FEATURES

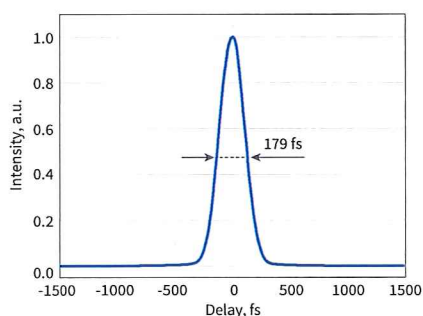
- Maximum output of 120 W and 1 mJ
- Tunable pulse duration, 190 fs – 20 ps
- Pulse-on-demand and BiBurst for pulse control
- Up to 5th harmonic or tunable extensions
- Compact industrial-grade design

SPECIFICATIONS

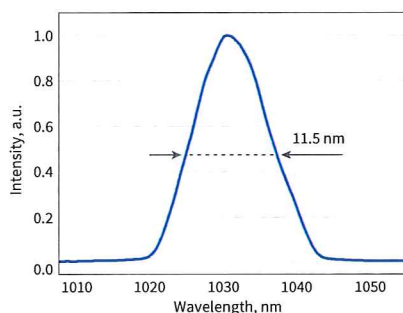
Model	CB3-120W
OUTPUT CHARACTERISTICS	
Cooling method	Water-cooled
Maximum output power	120 W
Pulse duration ¹⁾	< 250 fs
Pulse duration tuning range	250 fs – 10 ps
Maximum pulse energy	1 mJ
Repetition rate	120 – 2000 kHz
Pulse selection	Single-shot, pulse-on-demand, any fundamental repetition rate division
Center wavelength ²⁾	1030 ± 10 nm
Polarization	Linear, vertical; 1 : 1000
Beam quality, M ²	< 1.2
Beam diameter ³⁾	4.5 ± 0.5 mm
Beam pointing stability	< 20 μrad/°C
Pulse picker	FEC ⁴⁾
Pulse picker leakage	< 0.25 %
Pulse-to-pulse energy stability ⁵⁾	< 0.5% RMS deviation ⁶⁾ over 24 h
Long-term power stability ⁵⁾	< 0.5% RMS deviation ⁶⁾ over 100 h

MAIN OPTIONS

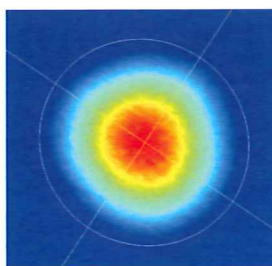
Oscillator output	< 0.5 W, 120 – 250 fs, 1030 ± 10 nm, ≈ 65 MHz ⁷⁾
Automated harmonic generator ⁸⁾	515 nm, 343 nm, 257 nm, or 206 nm
BiBurst option ⁸⁾	Tunable GHz and MHz burst with burst-in-burst capability



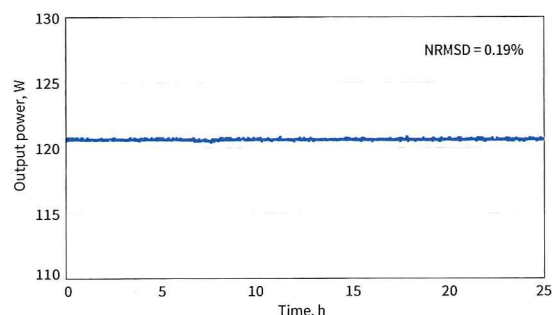
Typical pulse duration of CARBIDE-CB3-120W



Typical spectrum of CARBIDE-CB3-120W



Beam profile of CARBIDE-CB3-120W



Long-term power stability of CARBIDE-CB3-120W

¹⁾ Assuming Gaussian pulse shape.

²⁾ Precise center wavelength for specific models available upon request.

³⁾ FW 1/e², using maximum pulse energy.

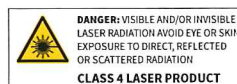
⁴⁾ Provides fast energy control; external analog control input available. Response time – next available RA pulse.

⁵⁾ Under stable environmental conditions.

⁶⁾ Expressed as NRMSD (normalized root mean squared deviation).

⁷⁾ Available simultaneously, requires scientific interface. Contact sales@lightcon.com for details or customized solutions

⁸⁾ See respective datasheets for more details, incl. 30 W UV model. For stand-alone harmonic generator, refer to HIRO.



CARBIDE | 50W UV

NEW

High-Power UV Femtosecond Laser

FEATURES

- 343 nm output
- Industrial-grade design
- High beam quality and stability
- Compact footprint

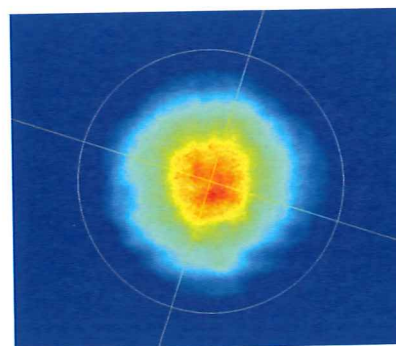
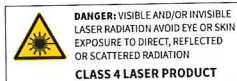


CARBIDE-CB3-50W-UV

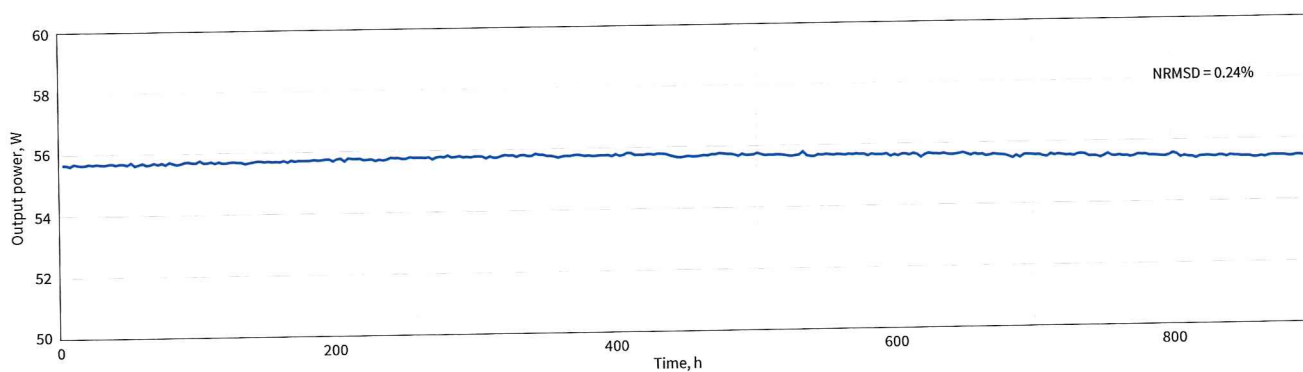
SPECIFICATIONS

Model	CB3-50W-UV
OUTPUT CHARACTERISTICS	
Output wavelength	343 nm
Maximum output power	50 W
Pulse energy	40 – 160 μ J
Pulse duration ¹⁾	\approx 500 fs
Repetition rate	120 – 1000 kHz
Beam quality, M^2	< 1.3

¹⁾ Assuming Gaussian pulse shape.



Beam profile of
CARBIDE-CB3-50W-UV



Long-term power stability of CARBIDE-CB3-50W-UV