CARBIDE

NEW

Unibody-Design Femtosecond Lasers for Industry and Science

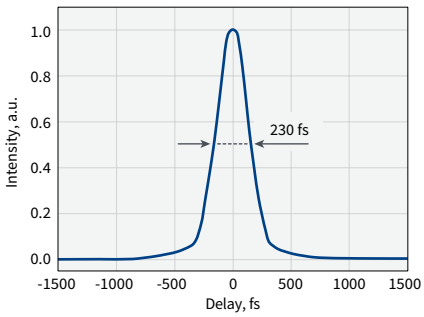
FEATURES

- Tunable pulse duration, 190 fs – 20 ps
- Maximum output of 120 W, 1 mJ or 80 W, 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

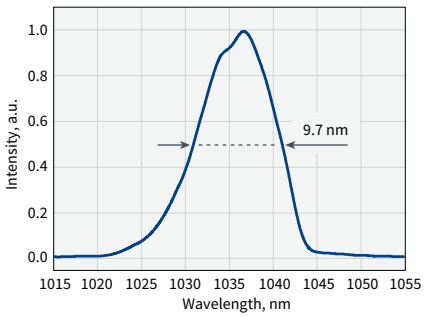
CARBIDE-CB3

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.

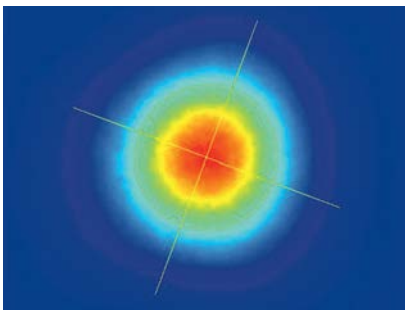
CARBIDE features high-power water-cooled (CB3) and air-cooled (CB5) models. The tunability of CARBIDE lasers enables our customers to discover the most efficient manufacturing processes. Tunable parameters include pulse duration (190 fs – 20 ps), repetition rate (single-shot – 2 MHz), pulse energy (up to 2 mJ), and average power (up to 120 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 harmonic generators and optical parametric amplifiers.



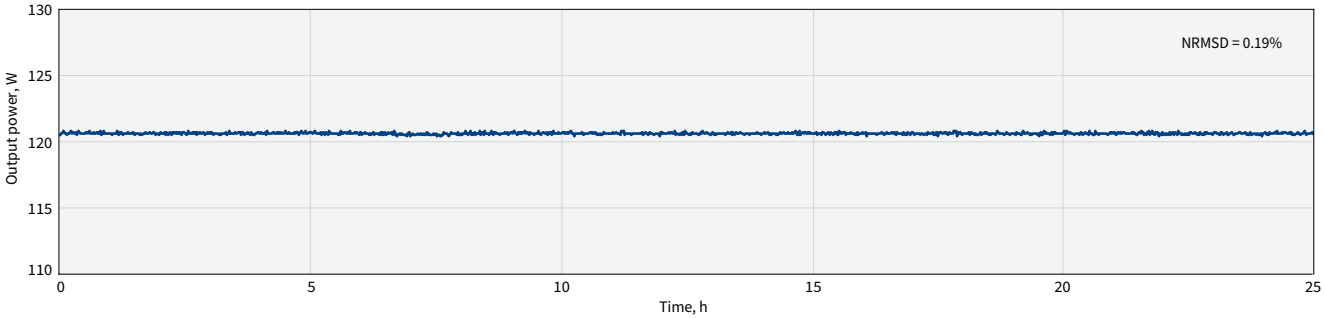
Typical pulse duration of CARBIDE-CB3



Typical spectrum of CARBIDE-CB3



Typical beam profile of CARBIDE-CB3



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

CARBIDE-CB3 SPECIFICATIONS

NEW

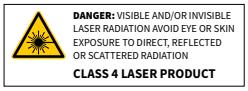
Model	CB3-20W	CB3-40W	CB3-80W	CB3-120W
OUTPUT CHARACTERISTICS				
Cooling method	Water-cooled			
Center wavelength [1]	1030 ± 10 nm			
Maximum output power	20 W	40 W	80 W	120 W
Pulse duration [2]	< 250 fs		< 350 fs [3]	< 250 fs
Pulse duration tuning range	250 fs – 10 ps		350 fs – 10 ps	250 fs – 10 ps
Maximum pulse energy	0.4 mJ		0.8 mJ	2 mJ	1 mJ
Repetition rate	Single-shot – 1 MHz	Single-shot – 1 MHz (2 MHz on request)	Single-shot – 2 MHz	Single-shot – 1 MHz (2 MHz on request)
Pulse selection	Single-shot, pulse-on-demand, any fundamental repetition rate division			
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	4.5 ± 0.5 mm
Beam pointing stability	< 20 µrad/°C			
Pulse picker	FEC [5]			
Pulse picker leakage	< 0.25%			
Pulse-to-pulse energy stability, 24 h [6]	< 0.5%			
Long-term power stability, 100 h [6]	< 0.5%			
MAIN OPTIONS				
Oscillator output [7]	< 0.5 W, 120 – 250 fs, 1030 ± 10 nm, ≈ 65 MHz			
Harmonic generator [8]	515 nm, 343 nm, 257 nm, or 206 nm; *see page 23*			
Optical parametric amplifier [9]	320 – 10000 nm; *see page 30*			–
BiBurst option	Tunable GHz and MHz burst with burst-in-burst capability; *see page 17*			
PHYSICAL DIMENSIONS				
Laser head (L × W × H)	632 × 305 × 174 mm			
Chiller (L × W × H)	585 × 484 × 221 mm		680 × 484 × 307 mm	
24 V DC power supply (L × W × H) [10]	280 × 144 × 49 mm		320 × 200 × 75 mm	
ENVIRONMENTAL AND UTILITY REQUIREMENTS				
Operating temperature	15 – 30 °C			
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	
Electrical requirements – Chiller	100 – 230 V AC; 50 – 60 Hz		200 – 230 V AC; 50 – 60 Hz	
Rated power – Laser	600 W		1000 W	2000 W
Rated power – Chiller	1400 W		2000 W	
Power consumption – Laser	500 W		900 W	1400 W
Power consumption – Chiller	1000 W		1300 W	1700 W

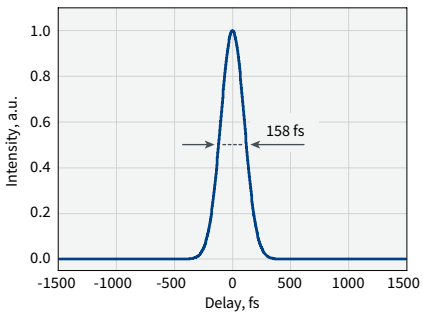
[1] *Precise center wavelength for specific models available upon request.*
[2] *Assuming Gaussian pulse shape.*
[3] *Pulse duration can be reduced to < 250 fs if pulse peak intensity of > 50 GW/cm² is tolerated by the customer setup.*
[4] *FW 1/e², using maximum pulse energy.*
[5] *Provides fast energy control; external analog control input available. Response time – next available RA pulse.*
[6] *Under stable environmental conditions. Expressed as NRMSD (normalized root mean squared deviation).*
[7] *Available simultaneously, requires scientific interface. Contact sales@lightcon.com for details or customized solutions.*
[8] *Integrated. For external harmonic generator, refer to HIRO.*
[9] *Integrated. For more options and OPAs for -4mJ and -UP models, refer to ORPHEUS series of OPAs.*
[10] *Power supply can be different if optional 2 MHz version is selected.*

CARBIDE-CB5 (AIR-COOLED) SPECIFICATIONS

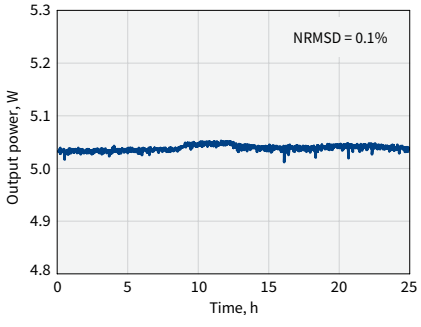
Model	CB5		CB5-SP
OUTPUT CHARACTERISTICS			
Cooling method	Air-cooled [1]		
Center wavelength [2]	1030 ± 10 nm		
Maximum output power	6 W	5 W	
Pulse duration [3]	< 290 fs		< 190 fs
Pulse duration tuning range	290 fs – 20 ps		190 fs – 20 ps
Maximum pulse energy	100 µJ	83 µJ	100 µJ
Repetition rate	Single-shot – 1 MHz		
Pulse selection	Single-shot, pulse-on-demand, any fundamental repetition rate division		
Polarization	Linear, vertical; 1 : 1000		
Beam quality, M^2	< 1.2		
Beam diameter [4]	2.1 ± 0.4 mm		
Beam pointing stability	< 20 µrad/°C		
Pulse picker	Included	Included [5]	Included
Pulse picker leakage	< 2 %	< 0.1 %	< 2 %
Pulse-to-pulse energy stability, 24 h [6]	< 0.5%		
Long-term power stability, 100 h [6]	< 0.5%		
MAIN OPTIONS			
Oscillator output	n/a		
Harmonic generator [7]	515 nm, 343 nm, 257 nm, or 206 nm; *see page 23*		
Optical parametric amplifier [8]	320 – 10000 nm; *see page 30*		
BiBurst option	n/a		
PHYSICAL DIMENSIONS			
Laser head (L × W × H)	631 × 324 × 162 mm		
Chiller	Not required		
24 V DC power supply (L × W × H)	220 × 95 × 46 mm		
ENVIRONMENTAL AND UTILITY REQUIREMENTS			
Operating temperature	17 – 27 °C		
Relative humidity	< 80% (non-condensing)		
Electrical requirements	100 V AC, 3 A – 240 V AC, 1.3 A; 50 – 60 Hz		
Rated power	300 W		
Power consumption	150 W		

1) *Water-cooled version available on request.*
2) *Precise center wavelength for specific models available upon request.*
3) *Assuming Gaussian pulse shape.*
4) *FW 1/e², using maximum pulse energy.*
5) *Enhanced contrast AOM. Provides fast amplitude control of output pulse train.*
6) *Under stable environmental conditions. Expressed as NRMSD (normalized root mean squared deviation).*
7) *Integrated. For external harmonic generator, refer to HIRO.*
8) *Integrated. For stand-alone OPAs, refer to ORPHEUS series of OPAs.*

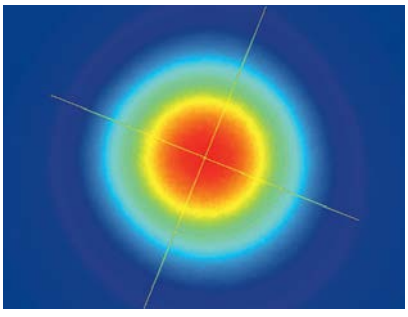




Typical pulse duration of CARBIDE-CB5

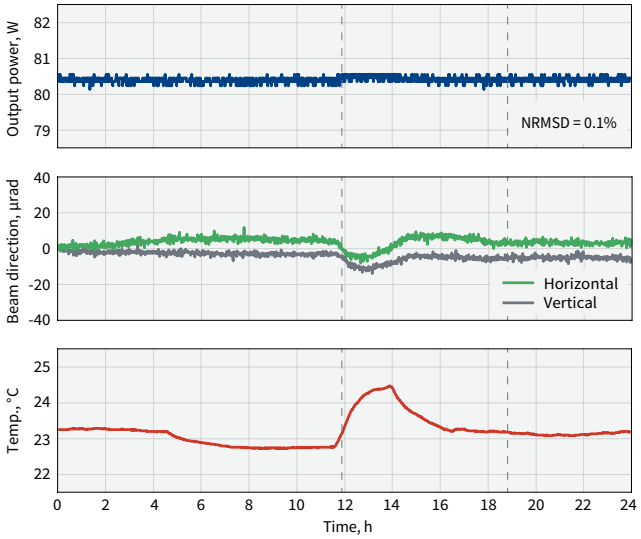


Long-term power stability of CARBIDE-CB5

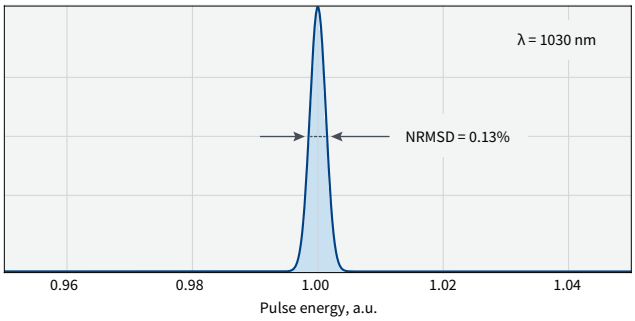


Typical beam profile of CARBIDE-CB5

STABILITY MEASUREMENTS

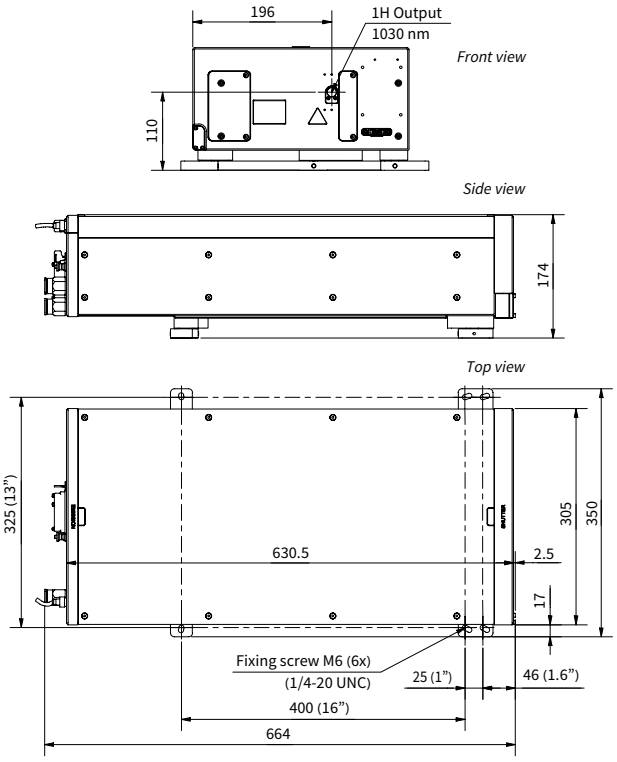


CARBIDE-CB3 output power and beam direction with power lock enabled, under varying environmental conditions

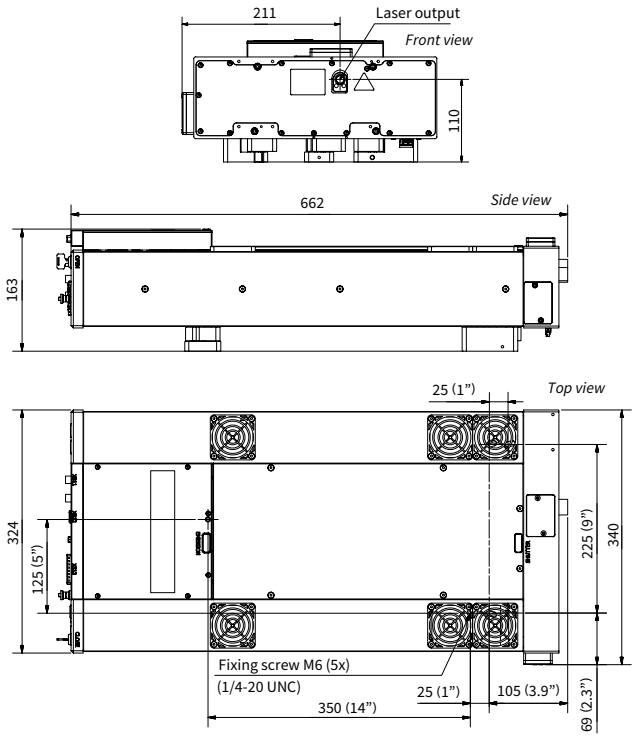


Typical pulse-to-pulse energy stability

DRAWINGS



Drawing of CARBIDE-CB3



Drawing of air-cooled CARBIDE-CB5 with attenuator

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