

## Unibody-Design Femtosecond Lasers for Industry and Science



CARBIDE-CB3

Tunable pulse duration,  
190 fs – 20 ps

Maximum output of  
120 W, 1 mJ or 80 W, 2 mJ

Single-shot – 10 MHz  
repetition rate

NEW

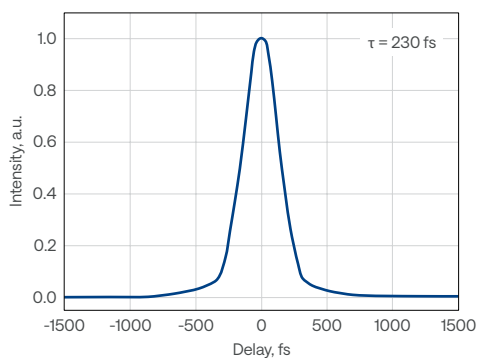
Pulse-on-demand and  
BiBurst for pulse control

Up to 5<sup>th</sup> harmonic or  
tunable extensions

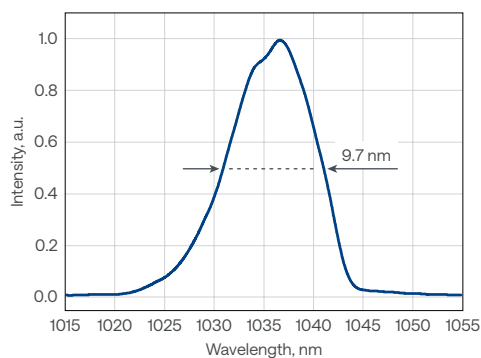
Air-cooled and  
water-cooled models

Compact industrial-grade design

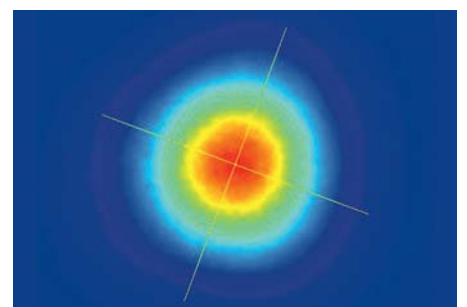
CARBIDE-CB3  
Typical pulse duration



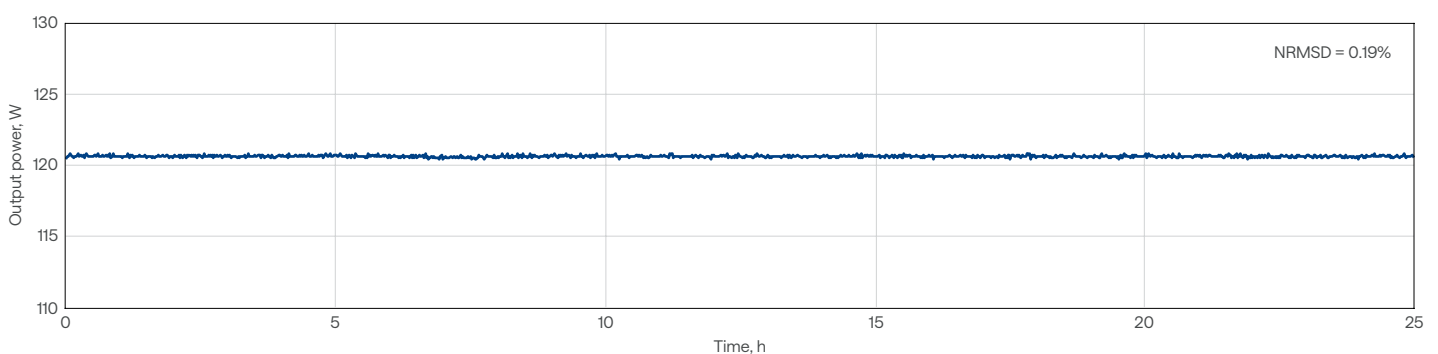
CARBIDE-CB3  
Typical spectrum



CARBIDE-CB3  
Typical beam profile



CARBIDE-CB3-120W  
Long-term power stability



# CARBIDE-CB3 specifications

NEW

Model	CB3-20W	CB3-40W	CB3-80W	CB3-120W
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## OUTPUT CHARACTERISTICS

Cooling method	Water-cooled			
Center wavelength	1030 ± 10 nm			
Maximum output power	20 W	40 W	80 W	120 W
Pulse duration <sup>1)</sup>	< 250 fs		< 350 fs <sup>2)</sup>	< 250 fs
Pulse duration tuning range	250 fs – 10 ps		350 fs – 10 ps	250 fs – 10 ps
Maximum pulse energy	0.4 mJ	0.2 mJ	0.8 mJ	2 mJ
Repetition rate	Single-shot – 1 MHz	Single-shot-1 MHz (2 MHz on request)	Single-shot – 10 MHz	Single-shot – 2 MHz
Pulse selection	Single-shot, pulse-on-demand, any fundamental repetition rate division			
Polarization	Linear, vertical; 1:1000			
Beam quality, M <sup>2</sup>	< 1.2			
Beam diameter <sup>3)</sup>	3.9 ± 0.4 mm		4.2 ± 0.4 mm	5.1 ± 0.7 mm
Beam pointing stability	< 20 μrad/°C			
Pulse energy control	FEC <sup>4)</sup>	Attenuator <sup>5)</sup>	FEC <sup>4)</sup>	
Pulse picker leakage	< 0.25%	< 0.5%	< 0.25%	
Pulse-to-pulse energy stability, 24 h <sup>6)</sup>	< 0.5%			
Long-term power stability, 100 h <sup>6)</sup>	< 0.5%			

## MAIN OPTIONS

Oscillator output	< 0.5 W, 120 – 250 fs, 1030 ± 10 nm, ≈ 65 MHz <sup>7)</sup>			
Harmonic generator <sup>8)</sup>	515 nm, 343 nm, 257 nm, or 206 nm; see page 22			
Optical parametric amplifier <sup>9)</sup>	320 – 10000 nm; see page 30			n/a
BiBurst option	Tunable GHz and MHz burst with burst-in-burst capability; see page 13			

## PHYSICAL DIMENSIONS

Laser head (L × W × H)	633 × 350 × 174 mm			
Chiller (L × W × H)	585 × 484 × 221 mm		680 × 484 × 307 mm	
24 V DC power supply (L × W × H)	280 × 144 × 49 mm <sup>10)</sup>		320 × 200 × 75 mm	376 × 449 × 88 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	100 V AC, 15 A – 240 V AC, 7 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	2000 W
	Chiller	1400 W	2000 W	
Power consumption	Laser	500 W	900 W	1500 W
	Chiller	1000 W	1300 W	1800 W

<sup>1)</sup> Assuming Gaussian pulse shape.

<sup>2)</sup> Pulse duration can be reduced to < 250 fs if pulse peak intensity of > 50 GW/cm<sup>2</sup> is tolerated by the customer setup.

<sup>3)</sup> FW 1/e<sup>2</sup>, using maximum pulse energy.

<sup>4)</sup> Fast energy control (FEC) provides fast, full-scale individual pulse energy control; an external analog control input is available.

<sup>5)</sup> Waveplate-based variable optical attenuator (VOA); an external analog control input is available.

<sup>6)</sup> Under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD)

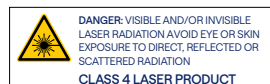
<sup>7)</sup> Available simultaneously, requires a scientific interface.

Contact sales@lightcon.com for more details or customized solutions.

<sup>8)</sup> Integrated. For external harmonic generator, refer to HIRO.

<sup>9)</sup> Integrated. For more options and OPAs, refer to www.lightcon.com.

<sup>10)</sup> Power supply can be different if optional 2 MHz version is selected.



# CARBIDE-CB5 (air-cooled) specifications

Model	CB5	CB5-SP
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## OUTPUT CHARACTERISTICS

Cooling method	Air-cooled <sup>1)</sup>		
Center wavelength	1030 ± 10 nm		
Maximum output power	6 W	5 W	
Pulse duration <sup>2)</sup>	< 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 <sup>2</sup>	< 1.2		
Beam diameter <sup>3)</sup>	2.1 ± 0.4 mm		
Beam pointing stability	< 20 µrad/°C		
Pulse energy control	Attenuator <sup>4)</sup>	AOM <sup>5)</sup>	Attenuator <sup>4)</sup>
Pulse picker leakage	< 2%	< 0.1%	< 2%
Pulse-to-pulse energy stability, 24 h <sup>6)</sup>	< 0.5%		
Long-term power stability, 100 h <sup>6)</sup>	< 0.5%		

## MAIN OPTIONS

Oscillator output	n/a		
Harmonic generator <sup>7)</sup>	515 nm, 343 nm, 257 nm, or 206 nm; see page 22		
Optical parametric amplifier <sup>8)</sup>	320 – 10000 nm; see page 30		
BiBurst option	n/a		

## PHYSICAL DIMENSIONS

Laser head (L × W × H)	633 × 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		

<sup>1)</sup> Water-cooled version available on request.

<sup>2)</sup> Assuming Gaussian pulse shape.

<sup>3)</sup>  $FW\ 1/e^2$ , using maximum pulse energy.

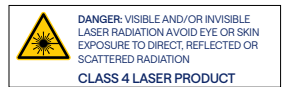
<sup>4)</sup> Waveplate-based variable optical attenuator (VOA); an external analog control input is available.

<sup>5)</sup> Enhanced contrast AOM. Provides fast amplitude control of output pulse train.

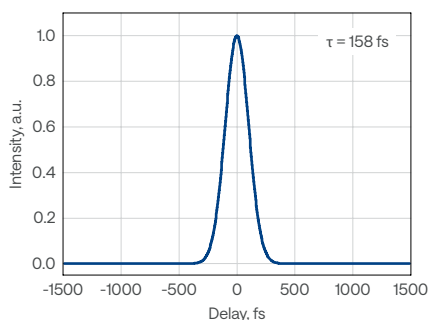
<sup>6)</sup> Under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD).

<sup>7)</sup> Integrated. For external harmonic generator, refer to HIRO.

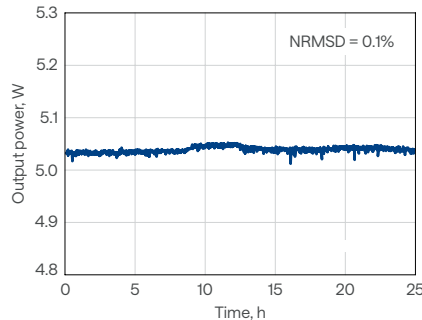
<sup>8)</sup> Integrated. For stand-alone OPAs, refer to [www.lightcon.com](http://www.lightcon.com).



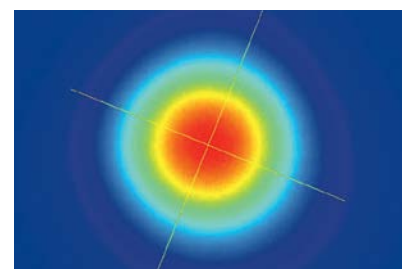
**CARBIDE-CB5-SP**  
Typical pulse duration



**CARBIDE-CB5**  
Long-term power stability

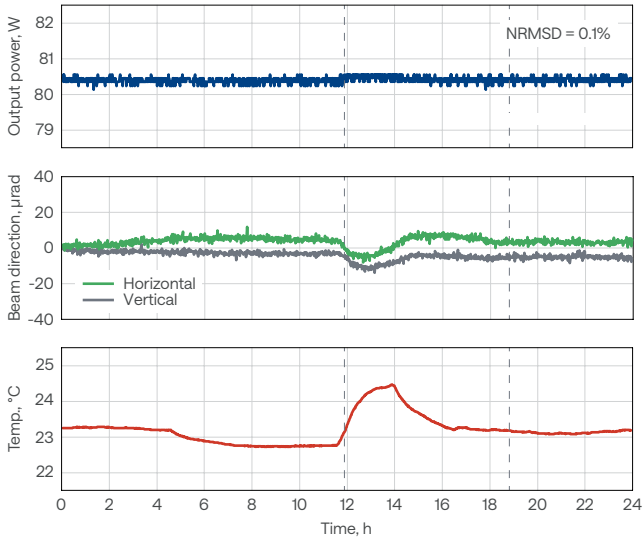


**CARBIDE-CB5**  
Typical beam profile

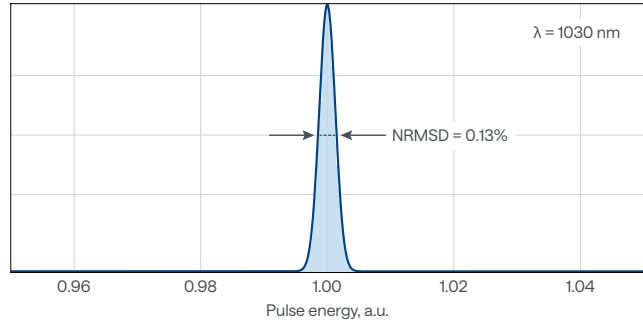


# Stability measurements

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

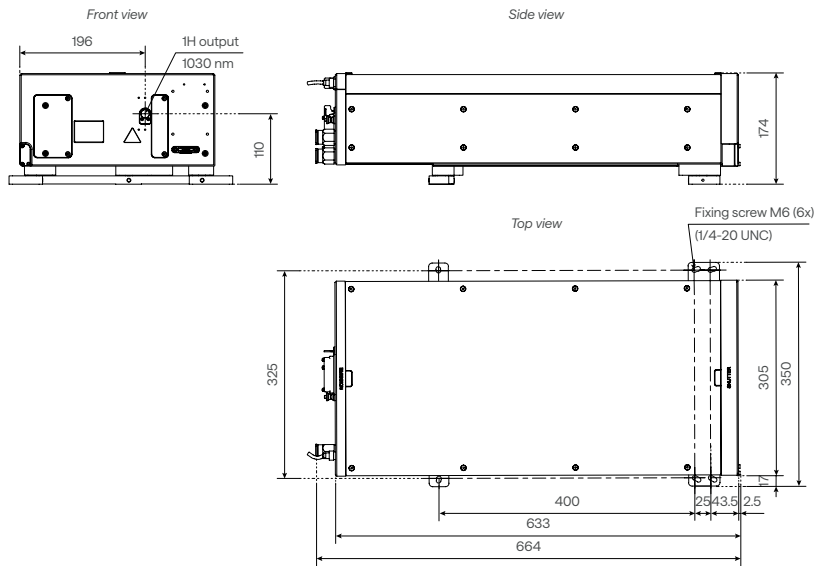


CARBIDE-CB3 Typical pulse-to-pulse energy stability



# Drawings

CARBIDE-CB3 drawing



Air-cooled CARBIDE-CB5 with attenuator drawing

