LIGHT CONVERSION

Product Catalog

Femtosecond Lasers for Industry

lightcon.com

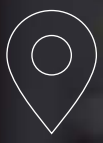
2026

LIGHT CONVERSION is a global leader in ultrafast technology, designing and manufacturing femtosecond lasers, wavelength-tunable sources, optical parametric chirped-pulse amplifiers, spectroscopy systems, and microscopy sources.

The comprehensive portfolio represents the best-in-class lasers tailored for industry, science, and medicine.

10 000

Femtosecond laser systems installed worldwide



17 500

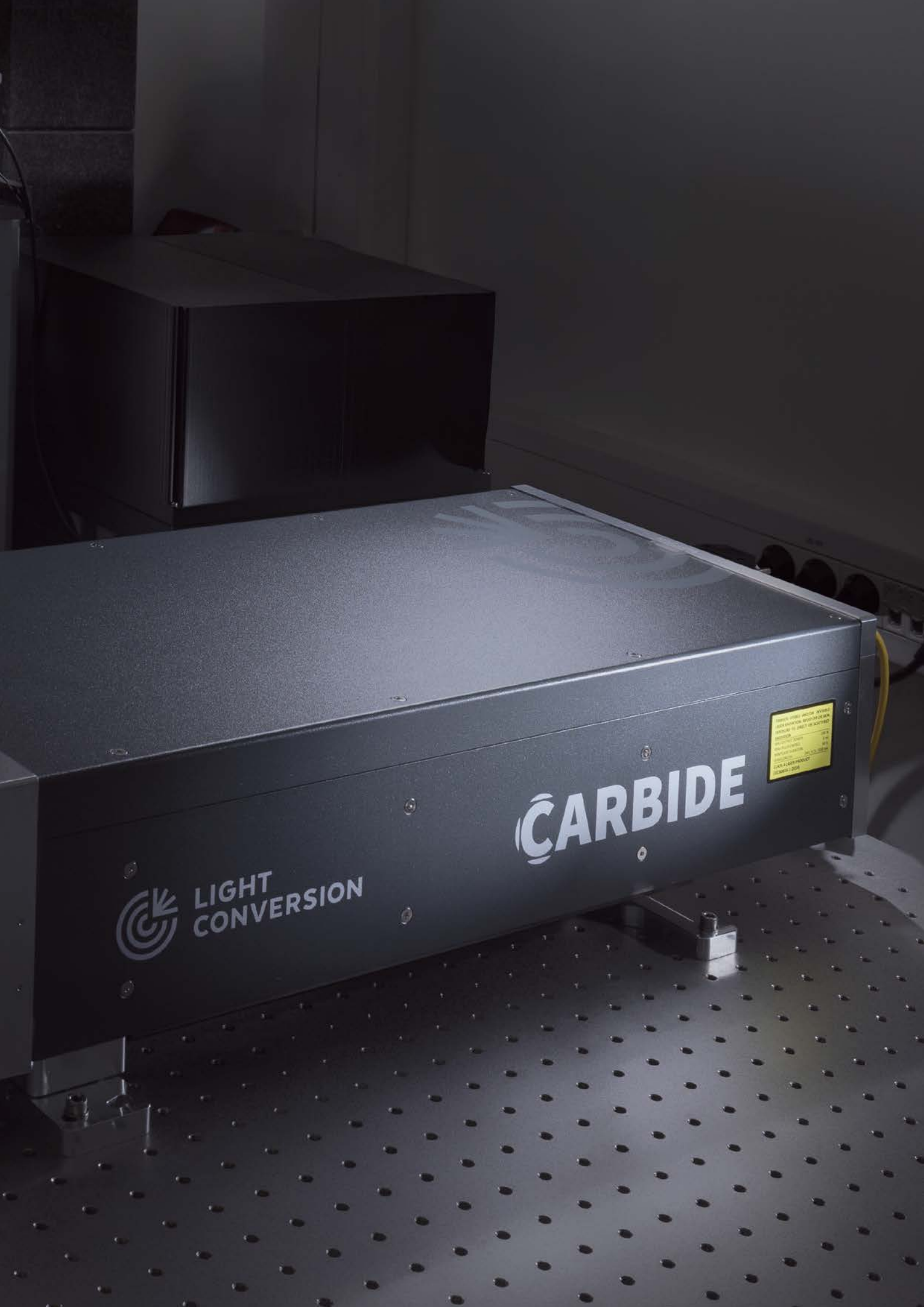
Square meters designated for manufacture and R&D

750

Employees, of whom 15% focus on R&D

About Us

Founded in 1994, LIGHT CONVERSION has evolved into a leading company in ultrafast laser technology with over 10 000 systems installed worldwide and 750 employees, 15% of whom focus on R&D. The company's lasers are used by all of the world's top 50 universities, highlighting its commitment to state-of-the-art research, while also ensuring the reliability and performance in 24/7 industrial applications. With international offices in the US, China, and Korea, along with a global representative network, the company ensures worldwide sales and service.


CARBIDE
LIGHT
CONVERSION

Femtosecond Lasers

LIGHT CONVERSION is world-renowned for its industrial-grade Yb-based femtosecond lasers, covering a wide range of industrial, scientific, and medical applications.

High average power and pulse energy at high repetition rates

Market-proven industrial-grade stability and reliability

Automated harmonics and wavelength-tunable extensions

CARBIDE

Compact industrial design in air- or water-cooled models, providing up to 120 W, 1 mJ or 80 W, 2 mJ with excellent output stability.

PHAROS

Scientific flexibility with process-tailored output parameters, offering up to 1 mJ pulse energy at < 100 fs or up to 5 mJ at < 250 fs.

FLINT

Expanding the parameter range with repetition rates from 10 to 90 MHz, output power up to 20 W, and pulse durations down to 50 fs.

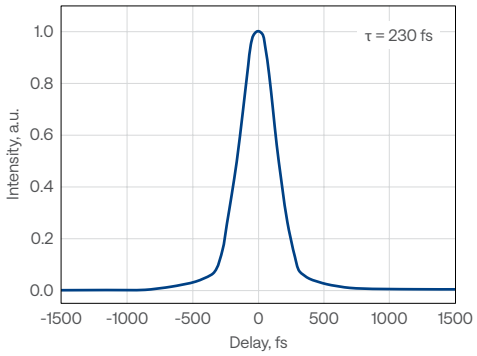
CARBIDE

Industrial Femtosecond Lasers

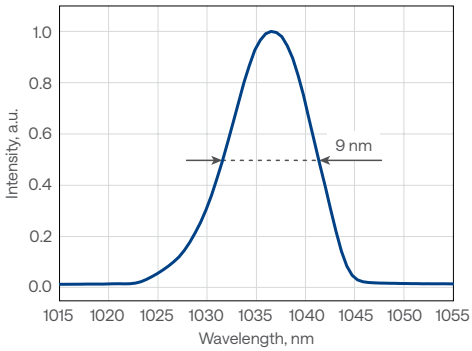
- Maximum output of 120 W (IR) or 50 W (UV)
- NEW — Single-shot – 10 MHz repetition rate
- Pulse-on-demand and BiBurst for pulse control
- Automated harmonics up to the 5th and wavelength-tunable extensions
- Air-cooled or water-cooled models

CARBIDE-CB3

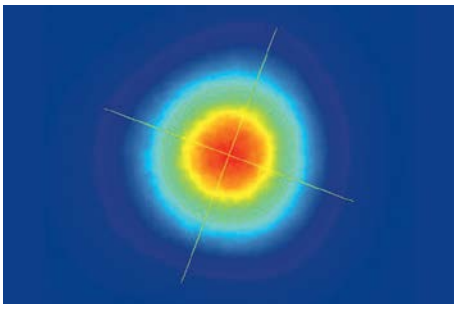
CARBIDE-CB3
Typical pulse duration



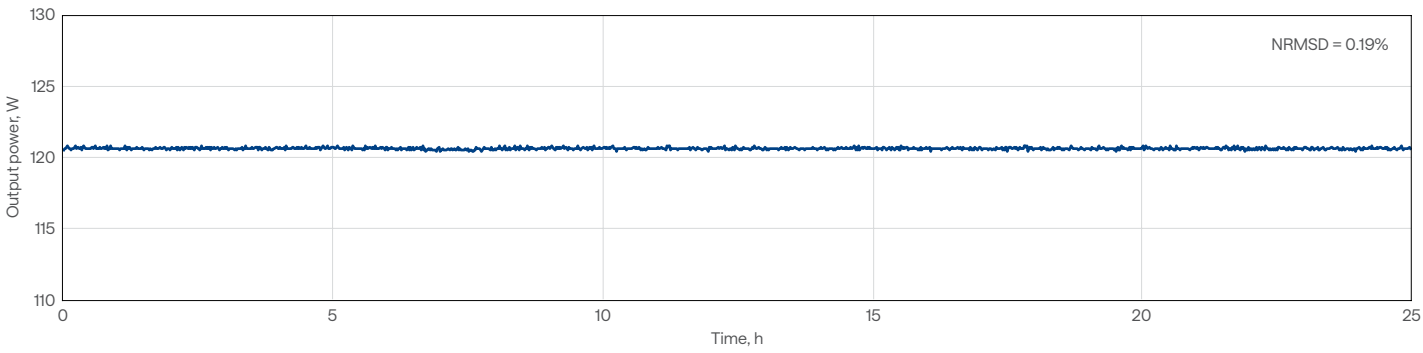
CARBIDE-CB3
Typical spectrum



CARBIDE-CB3
Typical beam profile



CARBIDE-CB3-120W
Long-term power stability



CARBIDE-CB3 specifications

NEW

Model	CB3-20W	CB3-40W	CB3-40W-10MHz	CB3-80W	CB3-120W
OUTPUT CHARACTERISTICS					
Cooling method	Water-cooled				
Center wavelength	1030 ± 10 nm				
Maximum output power	20 W	40 W		80 W	120 W
Pulse duration [1]	< 250 fs			< 350 fs [2]	< 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 / 1 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^2	< 1.2				
Beam diameter [3]	3.9 ± 0.4 mm			4.2 ± 0.4 mm	5.1 ± 0.7 mm / 5 ± 0.5 mm
Beam pointing stability	< 20 µrad/°C				
Pulse energy control	FEC [4]		Attenuator [5]	FEC [4]	
Pulse picker leakage	< 0.25%		< 0.5%	< 0.25%	
Pulse-to-pulse energy stability, 12 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; refer to CARBIDE HG				
Optical parametric amplifier [9]	UV – MIR; refer to I-OPA or ORPHEUS				
BiBurst option	Tunable GHz and MHz burst with burst-in-burst capability; refer to BiBurst				
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)	352 × 195 × 75 mm				376 x 449 x 88 mm
ENVIRONMENTAL & 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
Electrical requirements – Chiller	100 – 230 V AC; 50 – 60 Hz		200 – 230 V AC; 50 – 60 Hz		
Rated power – Laser	1000 W		1000 W		2000 W
Rated power – Chiller	1400 W		2000 W		
Power consumption – Laser	500 W		900 W		1500 W
Power consumption – Chiller	1000 W		1300 W		1800 W

[1] *Assuming a Gaussian pulse shape.*

[2] *Pulse duration can be reduced to < 250 fs if a pulse peak intensity of > 50 GW/cm² is tolerated by the customer setup.*

[3] *FW 1/e², using maximum pulse energy.*

[4] *Fast energy control (FEC) provides fast, full-scale individual pulse energy control; an external analog control input is available. An optional integrated waveplate-based variable optical attenuator is available.*

[5] *Waveplate-based variable optical attenuator (VOA); an external analog control input is available. FEC is available for repetition rates up to 2 MHz.*

[6] *Under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD).*

[7] *Available simultaneously, requires a scientific interface. Contact sales@lightcon.com for more details or customized solutions.*

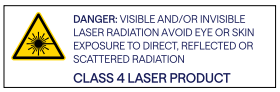
[8] *Integrated. For an external harmonic generator, refer to HIRO.*

[9] *Integrated. For more details and stand-alone OPAs, refer to wavelength-tunable sources.*

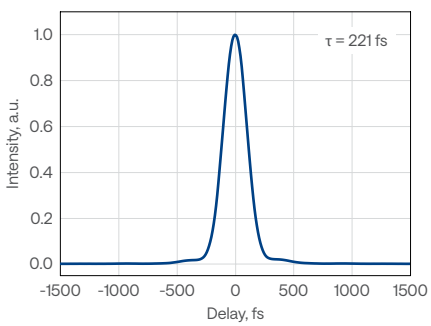
CARBIDE-CB5 specifications

Model	CB5-6W	CB5-5W	CB5-SP
OUTPUT CHARACTERISTICS			
Cooling method	Air-cooled [1]		
Center wavelength	1030 ± 10 nm		
Maximum output power	6 W	5 W	
Pulse duration [2]	< 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 [3]	2.1 ± 0.4 mm		
Beam pointing stability	< 20 µrad/°C		
Pulse energy control	Attenuator [4]	AOM [5]	Attenuator [4]
Pulse picker leakage	< 2%	< 0.1 %	< 2%
Pulse-to-pulse energy stability, 12 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; refer to CARBIDE HG		
Optical parametric amplifier [8]	UV – MIR; refer to I-OPA or ORPHEUS		
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 & 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	280 W		
Power consumption	250 W		

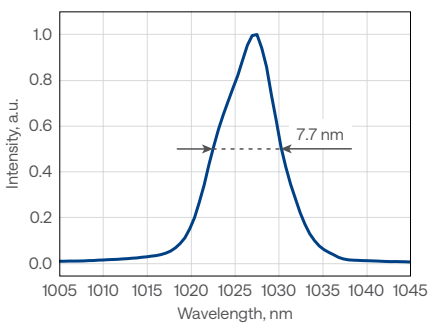
[1] *Water-cooled version available on request.*
[2] *Assuming a Gaussian pulse shape.*
[3] *FW 1/e^2, using maximum pulse energy.*
[4] *Waveplate-based variable optical attenuator (VOA); an external analog control input is available.*
[5] *Enhanced contrast AOM. Provides fast, full-scale individual pulse energy control; an external analog control input is available.*
[6] *Under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD).*
[7] *Integrated. For an external harmonic generator, refer to HIRO.*
[8] *Integrated. For more details and stand-alone OPAs, refer to wavelength-tunable sources.*



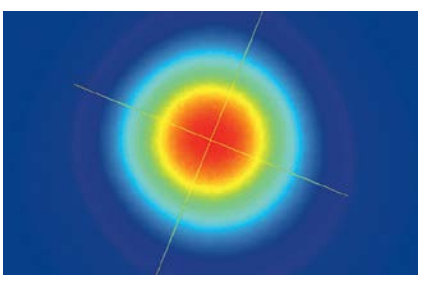
CARBIDE-CB5
Typical pulse duration



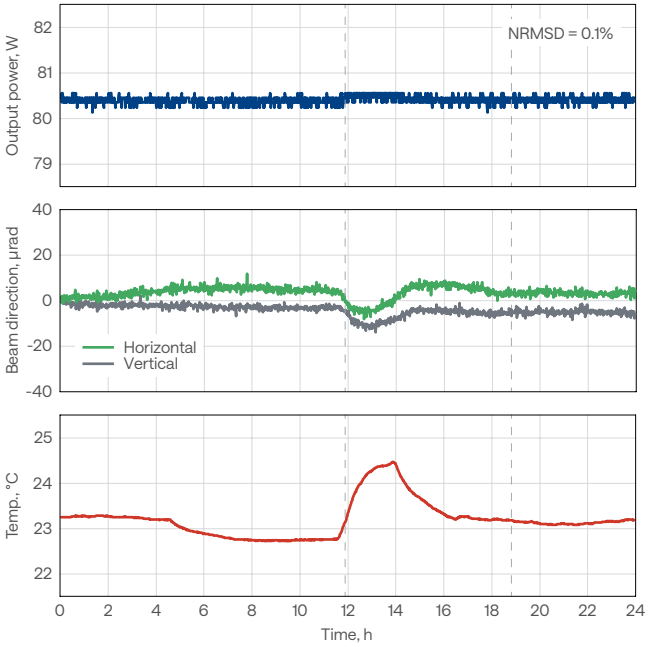
CARBIDE-CB5
Typical spectrum



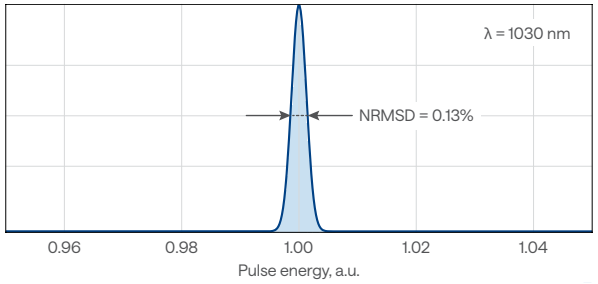
CARBIDE-CB5
Typical beam profile



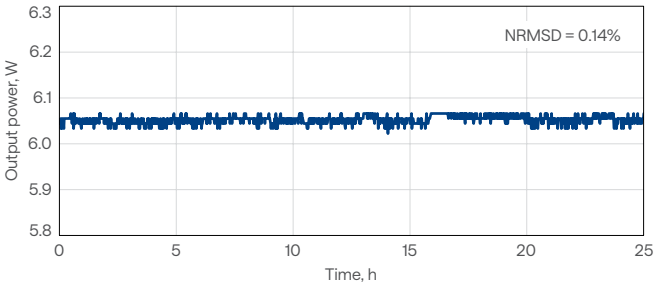
CARBIDE-CB3 output power and beam direction stability with power lock enabled, across varying environmental conditions



CARBIDE-CB3
Typical pulse-to-pulse energy stability

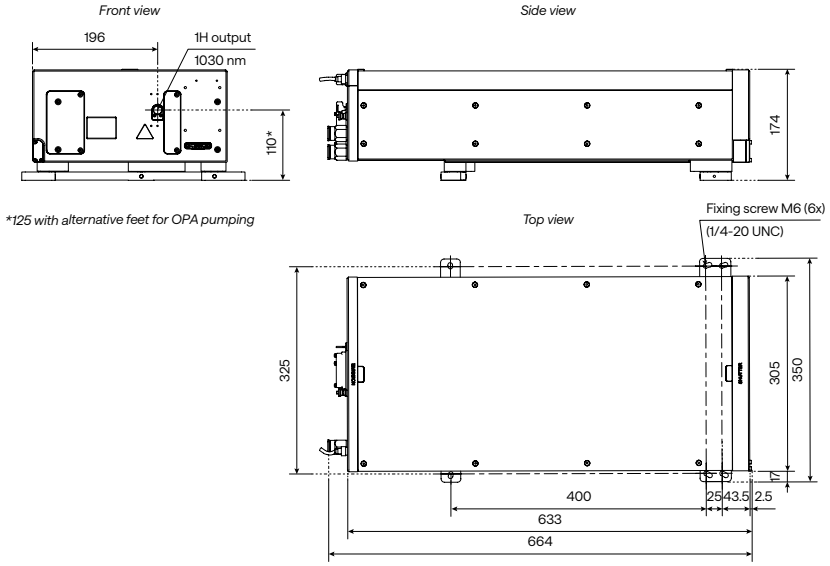


CARBIDE-CB5-6W
Long-term power stability

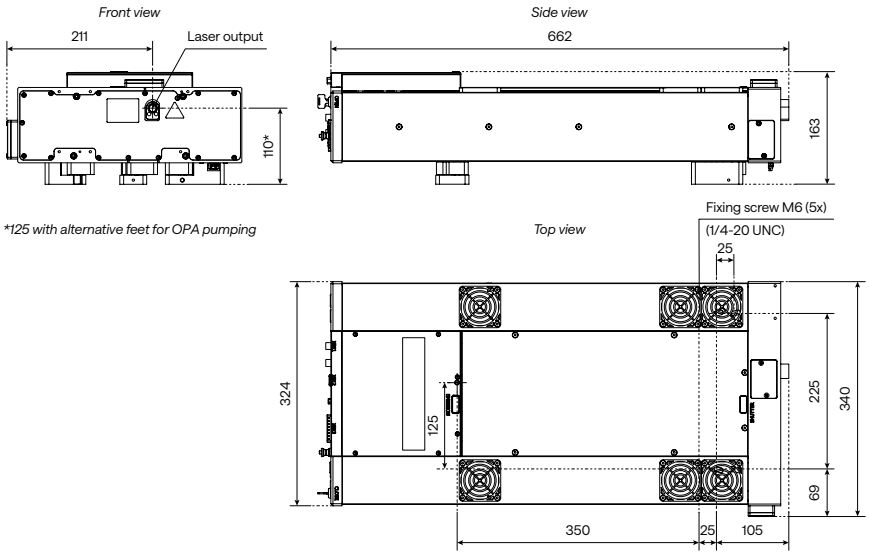


Drawings

CARBIDE-CB3



Air-cooled **CARBIDE-CB5** with an attenuator



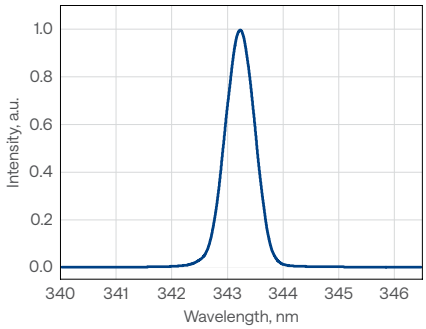
The drawings depend on the exact configuration. If crucial for integration, please contact sales@lightcon.com.

CARBIDE | CB3-UV

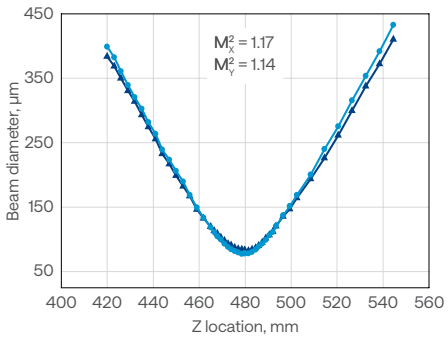
High-Power UV Femtosecond Lasers

- NEW Maximum output of 50 W
- 500 fs pulse duration
- Up to MHz repetition rate
- High beam quality and stability
- Compact industrial-grade design

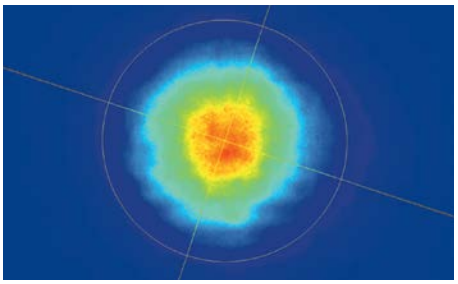
CARBIDE-CB3-UV
Typical spectrum



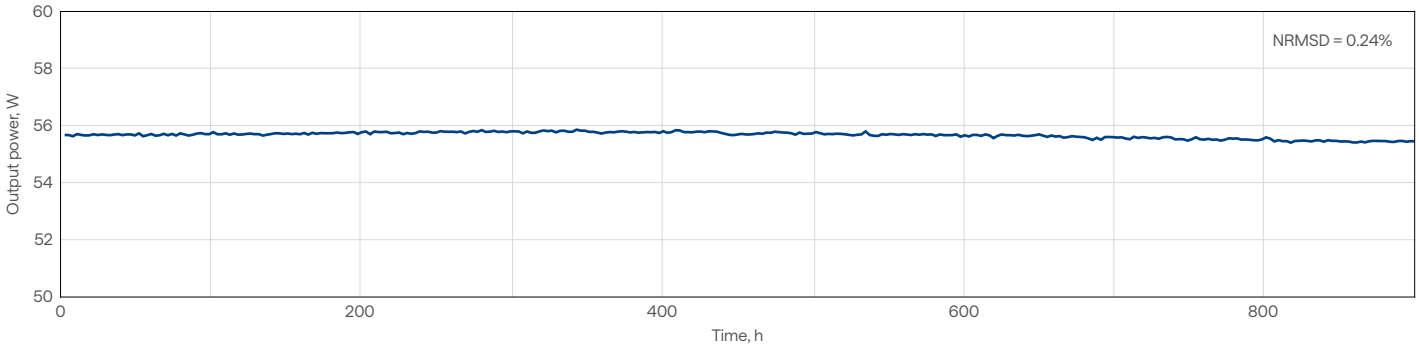
CARBIDE-CB3-UV
Typical M^2 measurement data



CARBIDE-CB3-UV
Beam profile



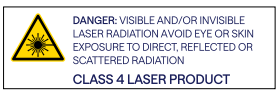
CARBIDE-CB3-UV-50W
Long-term power stability



Specifications

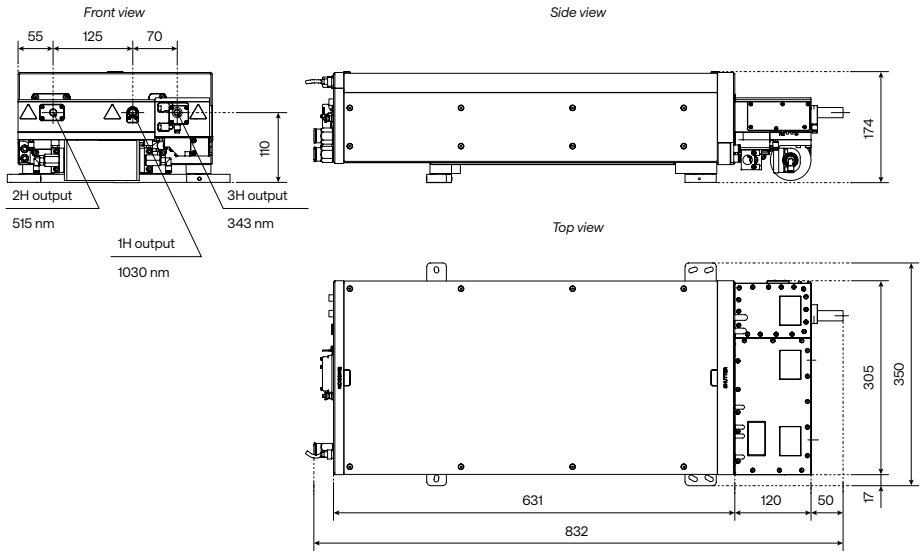
Model		CB3-UV-30W	CB3-UV-50W
OUTPUT CHARACTERISTICS			
Cooling method		Water-cooled	
Center wavelength		343 ± 3 nm	
Output power		> 30 W	> 50 W
Pulse duration [1]		≈ 500 fs	
Maximum output pulse energy [2]		150 µJ	
Repetition rate [3]		200 – 1000 kHz	300 – 1000 kHz
Polarization		Linear, vertical; 1 : 200	
Beam quality, M^2, typical values		< 1.3	
Beam diameter [4]		2 – 5 mm	
Long-term power stability, 12 h [5]		< 0.5%	
Lifetime		10 000 h	
MAIN OPTIONS			
Optional amplifier outputs		1030 nm, 515 nm	
PHYSICAL DIMENSIONS			
Laser head (L × W × H)		801 × 350 × 174 mm	
Chiller (L × W × H)		680 × 484 × 307 mm	
24 V DC power supply (L × W × H)		352 × 195 × 75 mm	376 × 449 × 88 mm
ENVIRONMENTAL & UTILITY REQUIREMENTS			
Operating temperature		15 – 30 °C	
Relative humidity		< 80% (non-condensing)	
Electrical requirements	Laser	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	200 – 230 V AC; 50 – 60 Hz	
Rated power	Laser	1000 W	2000 W
	Chiller	2000 W	
Power consumption	Laser	900 W	1500 W
	Chiller	1300 W	1800 W

[1] *Assuming a Gaussian pulse shape.*
[2] *Depends on the pump energy.*
[3] *Repetition rate available up to 2 MHz at lower power.*
[4] *FW 1/e²; depends on the pump energy.*
[5] *Under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD).*



Drawings

CARBIDE-CB3-UV



HG | CARBIDE

Integrated Harmonic Generators

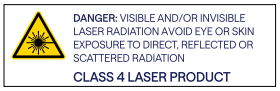
- 515 nm, 343 nm, 257 nm, or 206 nm output
- Automated harmonic selection
- Mounted directly on the laser head

CARBIDE-CB3 with a 2H-3H module

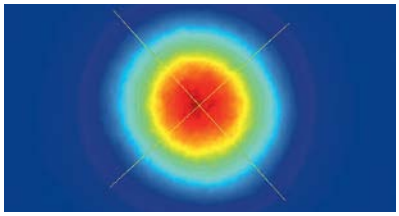
Specifications

Model		2H	2H-3H	2H-4H	2H-5H	30W UV [1]	50W UV [1]
Output wavelength [2] (automated selection)		1030 nm 515 nm	1030 nm 515 nm 343 nm	1030 nm 515 nm 257 nm	1030 nm 515 nm 206 nm	1030 nm 515 nm 343 nm	1030 nm 515 nm 343 nm
Pump pulse energy		20 – 2000 µJ	50 – 2000 µJ	20 – 2000 µJ	100 – 1500 µJ	80 – 400 µJ	120 – 400 µJ
Pump pulse duration		< 300 fs				≈ 500 fs	
Conversion efficiency / Output power		> 50% (2H)	> 50% (2H) > 25% (3H)	> 50% (2H) > 10% (4H) [3]	> 50% (2H) > 5% (5H) [4]	30 W (3H)	50 W (3H)
Beam quality, M^2	≤ 400 µJ pump	< 1.3 (2H)	< 1.3 (2H) < 1.4 (3H)	< 1.3 (2H) n/a (4H)	n/a	< 1.3 (3H)	< 1.3 (3H)
	> 400 µJ pump	< 1.4 (2H)	< 1.4 (2H) < 1.5 (3H)	< 1.4 (2H) n/a (4H)	n/a		

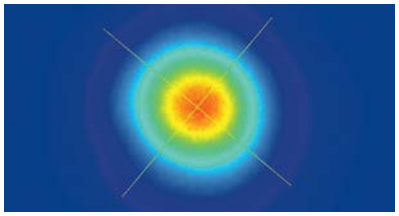
[1] *Refer to CARBIDE-CB3-UV for more details.*
[2] *Depends on the pump laser model. Up to the 5th harmonic available; contact sales@lightcon.com for more details.*
[3] *Maximum output power of 5 W.*
[4] *Maximum output power of 0.2 W.*



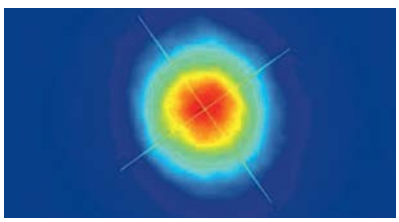
CARBIDE-CB5 (100 kHz, 6 W)
Typical 1H beam profile



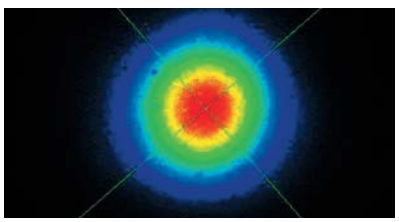
CARBIDE-CB5 (100 kHz, 3.4 W)
Typical 2H beam profile



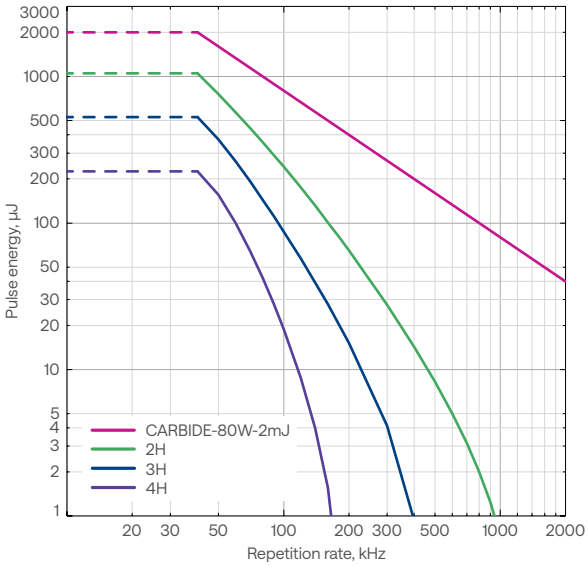
CARBIDE-CB5 (100 kHz, 2.2 W)
Typical 3H beam profile



CARBIDE-CB5 (100 kHz, 100 mW)
Typical 4H beam profile



CARBIDE-CB3-80W with a harmonic generator
Pulse energy vs repetition rate



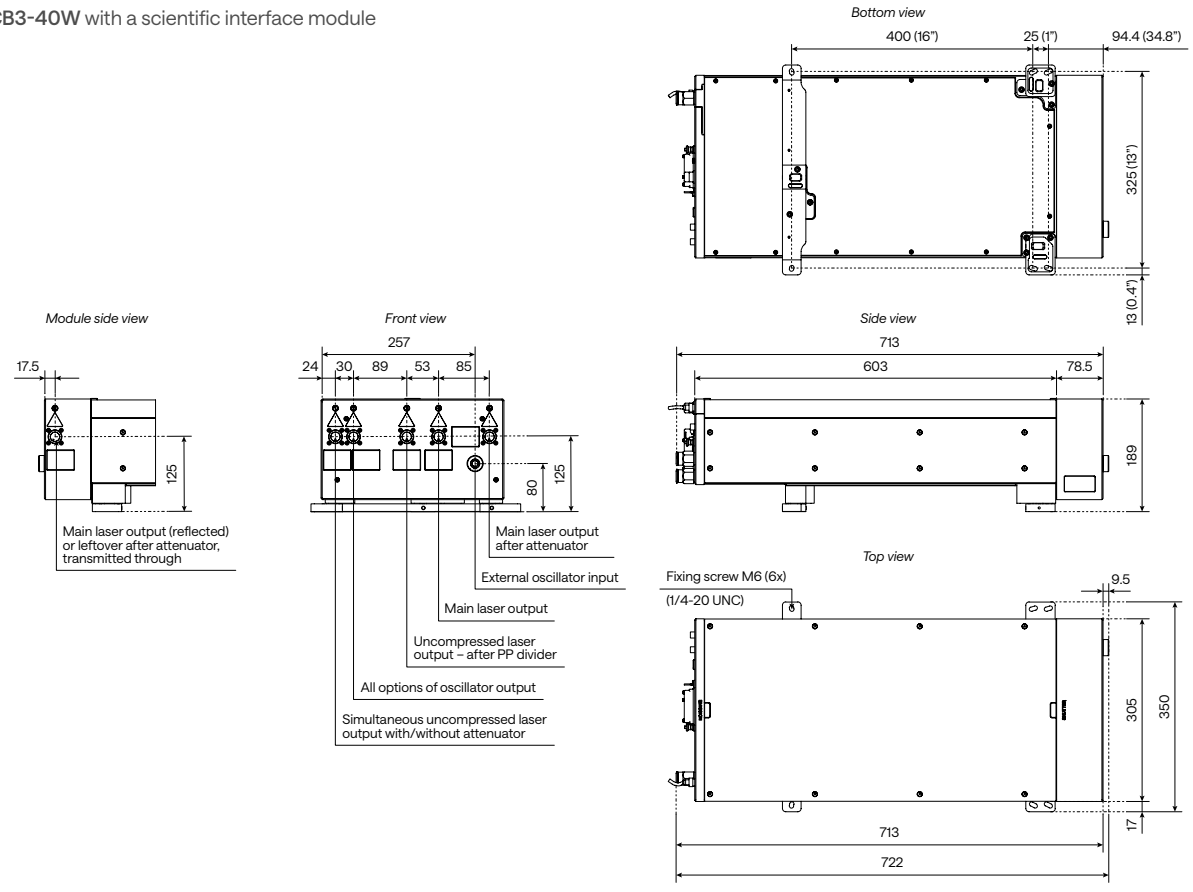
SCI-M | CARBIDE

Scientific Interface Module for CARBIDE

- Simultaneous or separate oscillator output
- Uncompressed laser output
- Seeding by an external oscillator
- Beam-splitting for multiple outputs

Drawings

CARBIDE-CB3-40W with a scientific interface module



BiBurst

Tunable GHz and MHz Burst with Burst-in-Burst Capability

Water-cooled **CARBIDE** and **PHAROS** lasers feature the tunable GHz and MHz burst option with burst-in-burst capability, known as BiBurst.

In standard mode, the laser emits a single pulse at a fixed frequency. In burst mode, the output consists of pulse packets instead of single pulses. Each packet consists of a specific number of equally separated pulses. MHz-Burst contains N pulses with a nanosecond period, while GHz-Burst contains P pulses with a picosecond period. When both burst modes are combined, the equally separated pulse packets contain sub-packets of pulses, forming the burst-in-burst or BiBurst.

CARBIDE and **PHAROS** lasers, equipped with tunable GHz and MHz bursts and BiBurst options, bring new capabilities to high-tech manufacturing industries, such as consumer electronics, integrated photonic chip production, advanced display manufacturing, and quantum technologies.

Applications:

- Brittle material drilling and cutting
- Deep engraving
- Selective ablation
- Volume modification of transparent materials
- Hidden marking
- Surface polishing
- Functional surface structuring

Specifications

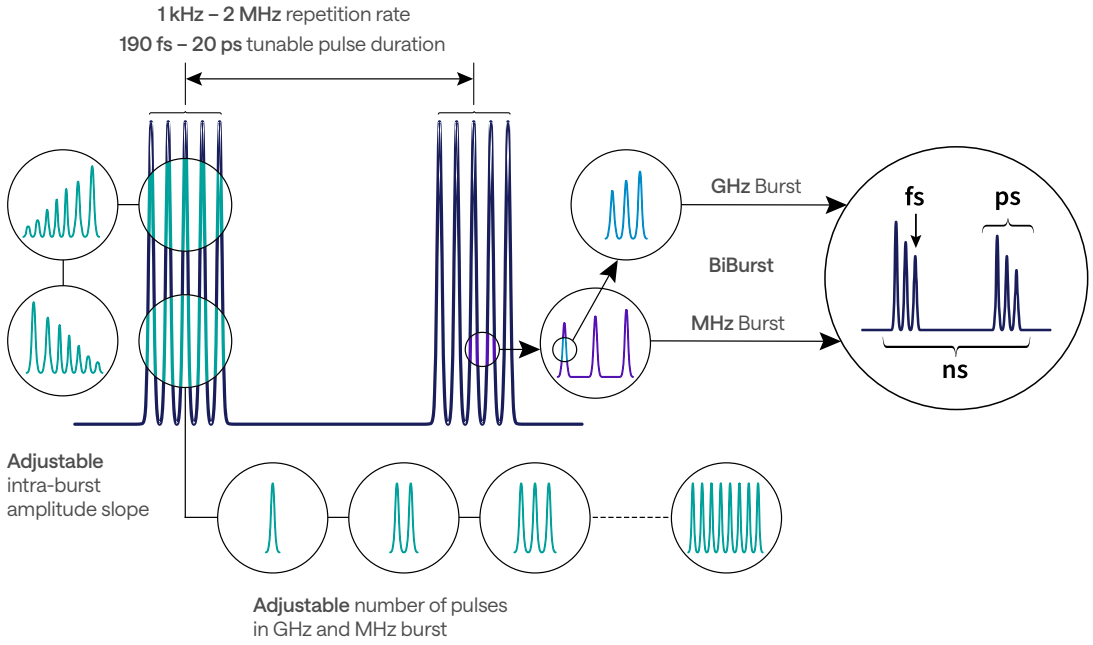
Model		CARBIDE-CB3	PHAROS
GHz Burst	Intra burst pulse period [1]	440 ± 40 ps	200 ± 40 ps
	Number of pulses, P [2]	1 – 10 (up to 400) [3]	1 – 25
MHz Burst	Intra burst pulse period	≈ 15 ns	
	Number of pulses, N [2]	1 – 10	1 – 9 (7 with FEC) [4]

[1] *Custom spacing is available on request. For CARBIDE-CB3-10MHz model standard pulse period is 1500 ps.*

[2] *The maximum number of pulses in a burst depends on the laser repetition rate and energy. CARBIDE-CB3-10MHz model is limited up to 5 pulses.*

[3] *The maximum number of P pulses can be increased to 350 – 400 with optional long GHz burst mode.*

[4] *Fast energy control option. Enables formation of any pulse envelope at laser pulse repetition rate.*



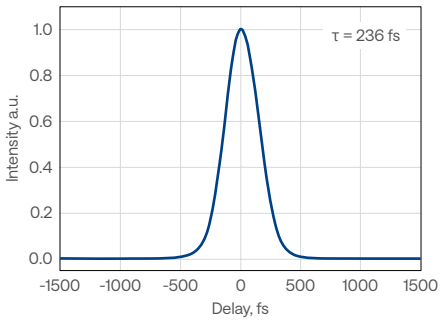
PHAROS

High-Energy Femtosecond Lasers

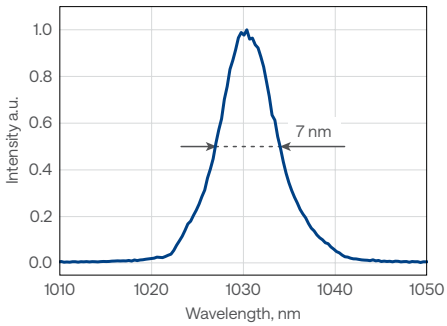
NEW

- Maximum pulse energy of up to 5 mJ
- Down to < 100 fs right at the output
- Tunable pulse duration, 100 fs – 20 ps
- Pulse-on-demand and BiBurst for pulse control
- Automated harmonics up to the 5th and wavelength-tunable extensions

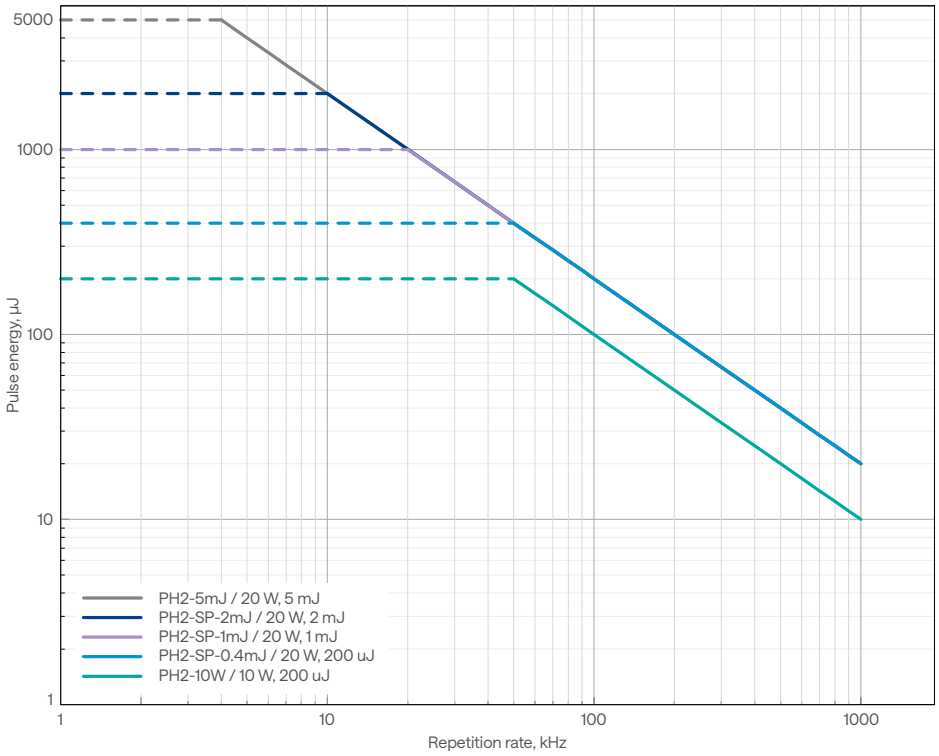
PHAROS-PH2-5mJ
Typical pulse duration



PHAROS-PH2-5mJ
Typical spectrum



PHAROS
Pulse energy vs fundamental repetition rate



Specifications

NEW

Model	PH2-10W	PH2-SP			PH2-5mJ	PH2-UP	
OUTPUT CHARACTERISTICS							
Center wavelength [1]	1030 ± 10 nm						
Maximum output power	10 W	20 W					
Pulse duration [2]	< 290 fs	< 190 fs			< 250 fs	< 100 fs	
Pulse duration tuning range	290 fs – 10 ps (20 ps on request)	190 fs – 10 ps (20 ps on request)			n/a	100 fs – 10 ps	
Maximum pulse energy	0.2 mJ	0.4 mJ	1 mJ	2 mJ	5 mJ	0.4 mJ	1 mJ
Repetition rate	Single-shot – 1 MHz						
Pulse selection	Single-shot, pulse-on-demand, any fundamental repetition rate division						
Polarization	Linear, horizontal						
Beam quality, M^2	< 1.2		< 1.3			< 1.2	
Beam diameter [3]	3.3 ± 0.5 mm	4.0 ± 0.5 mm	4.5 ± 0.5 mm	6.8 ± 0.7 mm	11 ± 0.5 mm	4.5 ± 0.5 mm	6 ± 0.5 mm
Beam pointing stability	< 20 µrad/°C						
Pre-pulse contrast	< 1 : 1000						
Post-pulse contrast	< 1 : 200						
Pulse-to-pulse energy stability, 12 h [4]	< 0.5%						
Long-term power stability, 100 h [4]	< 0.5%						
MAIN OPTIONS							
Oscillator output [5]	1 – 7 W, 50 – 250 fs, ≈ 1035 nm, ≈ 76 MHz						
Harmonic generator [6]	515 nm, 343 nm, 257 nm, or 206 nm; refer to PHAROS HG or HIRO						
Optical parametric amplifier [7]	UV – MIR; refer to I-OPA or ORPHEUS						
BiBurst option	Tunable GHz and MHz burst with burst-in-burst capability; refer to BiBurst						
CEP stabilization	Refer to CEP & RRL Option						
Repetition rate locking							
PHYSICAL DIMENSIONS							
Laser head (L × W × H) [8]	730 × 419 × 230 mm				827 × 492 × 250 mm	770 × 419 × 230 mm	
Chiller (L × W × H)	590 × 484 × 267 mm						
24 V DC power supply (L × W × H) [8]	280 × 144 × 49 mm						
ENVIRONMENTAL & UTILITY REQUIREMENTS							
Operating temperature	15 – 30 °C (air conditioning recommended)						
Relative humidity	< 80% (non-condensing)						
Electrical requirements – Laser	100 V AC, 12 A – 240 V AC; 5 A, 50 – 60 Hz						
Electrical requirements – Chiller	100 – 230 V AC; 50 – 60 Hz						
Rated power – Laser	1000 W						
Rated power – Chiller	1400 W						
Power consumption – Laser	600 W						
Power consumption – Chiller	1000 W						

[1] *Precise wavelengths for specific models are available upon request.*

[2] *Assuming a Gaussian pulse shape.*

[3] *FW 1/e^2, measured at laser output, using maximum pulse energy.*

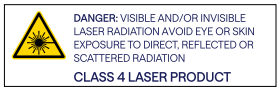
[4] *Under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD).*

[5] *Available simultaneously. Contact sales@lightcon.com for more details or customized solutions.*

[6] *Integrated except for PH2-5mJ. For an external harmonic generator, refer to HIRO.*

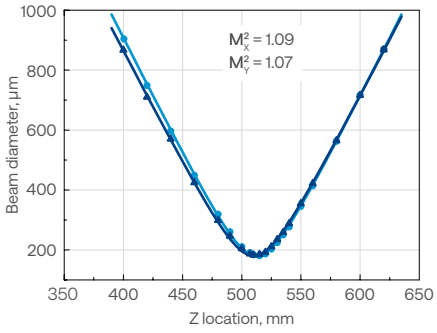
[7] *Integrated except for PH2-5mJ. For more options and OPAs for -5mJ and -UP models, refer to the ORPHEUS series of OPAs.*

[8] *Dimensions depend on the laser configuration and integrated options.*

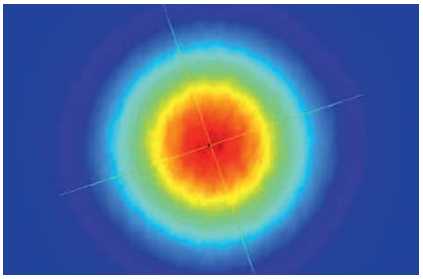


Beam properties

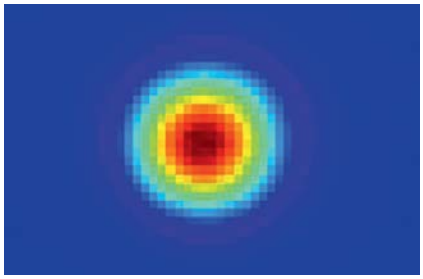
PHAROS
Typical M^2 measurement data



PHAROS
Typical near-field beam profile

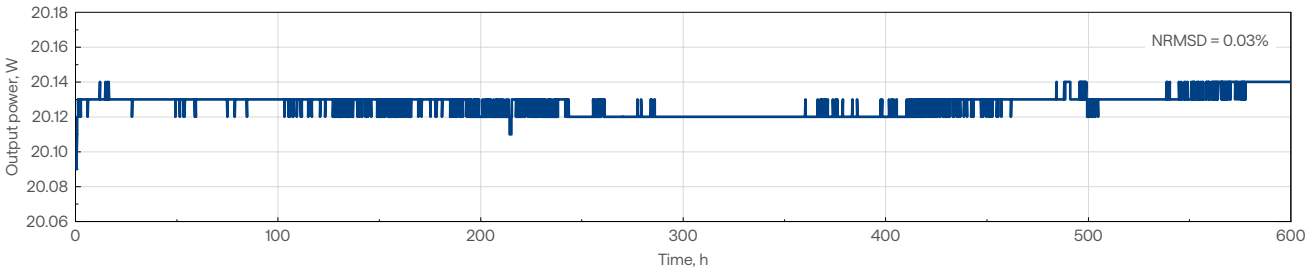


PHAROS
Typical far-field beam profile

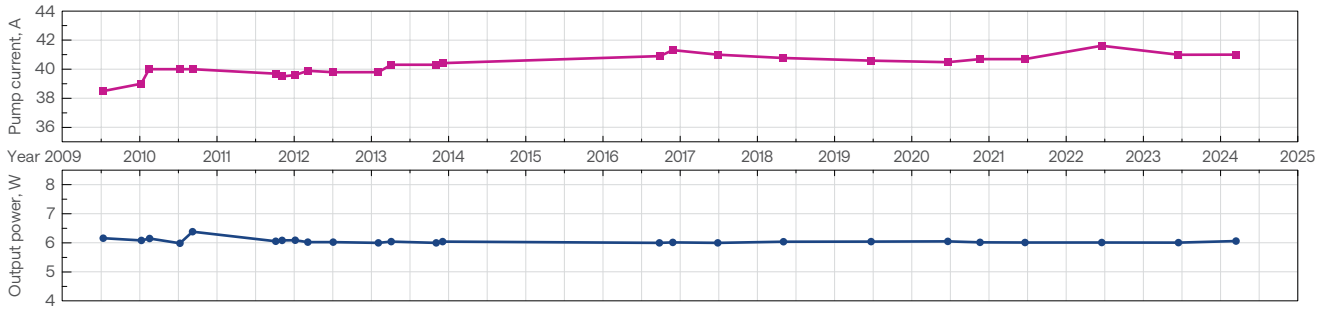


Stability measurements

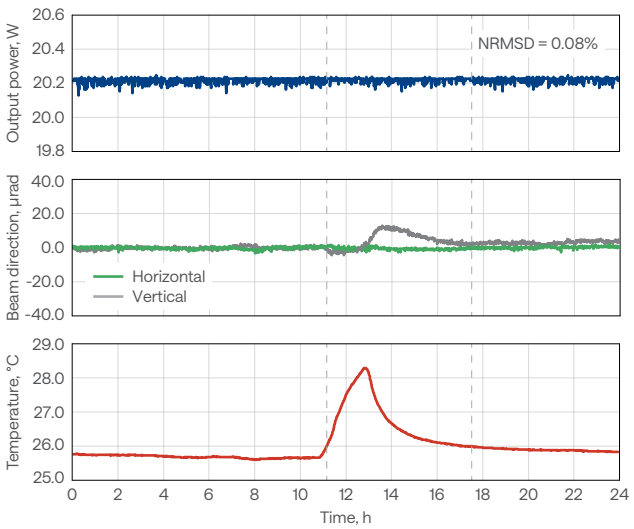
PHAROS
Long-term power stability



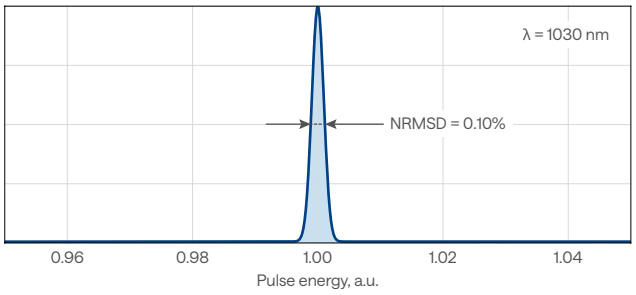
Output power of industrial-grade **PHAROS** lasers operating 24/7 and the current of the pump diodes over the years



PHAROS output power and beam pointing stability with power lock enabled, across varying environmental conditions



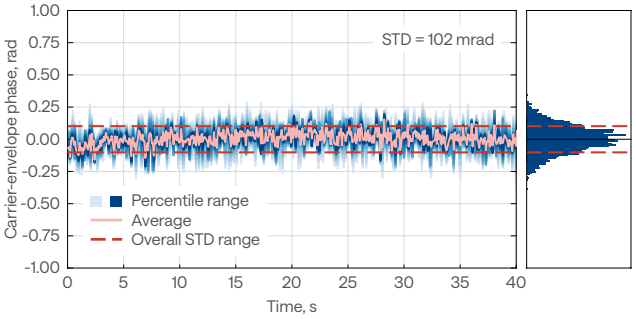
PHAROS
Typical pulse-to-pulse energy stability



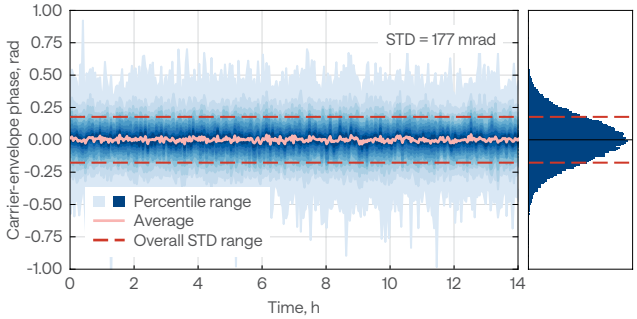
CEP stabilization

PHAROS lasers can be equipped with feedback electronics for carrier-envelope phase (CEP) stabilization of the output pulses. The carrier-envelope offset (CEO) of the **PHAROS** oscillator is actively locked to 1/4th of the repetition rate with a < 100 mrad standard deviation. The CEP stable pulses from the synchronized amplifier have a < 350 mrad standard deviation. The CEP drift occurring inside the amplifier and the user's setup can be compensated with an out of loop f-2f interferometer, which is a part of the complete **PHAROS** active CEP stabilization package.

PHAROS
Short-term CEP stability operating at 200 kHz repetition rate



PHAROS
Long-term CEP stability operating at 200 kHz repetition rate

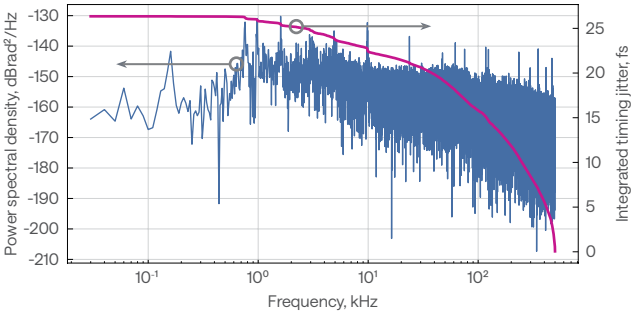


Repetition rate locking

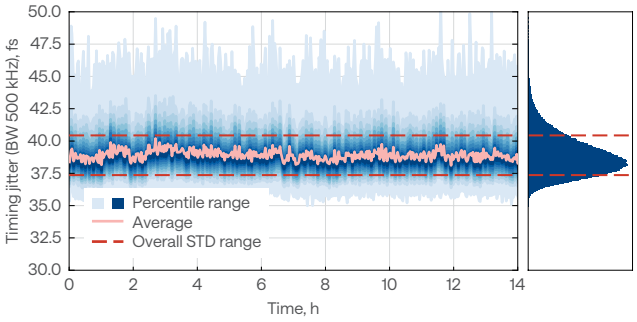
The oscillators in **PHAROS** lasers can be customized for repetition rate locking applications. Coupled with the necessary feedback electronics, the oscillator's repetition rate can be synchronized to an external RF source using the two piezo stages installed within the cavity.

The repetition rate locking system ensures an integrated timing jitter of less than 200 fs for RF reference frequencies above 500 MHz. Additionally, continuous phase shifting is available upon request.

Phase noise data of **PHAROS** oscillator
locked to a 2.8 GHz RF source

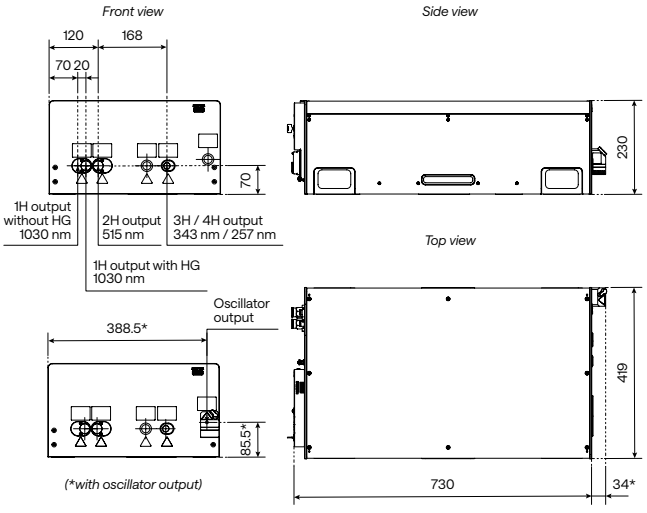


Timing jitter stability over 14 h
PHAROS oscillator locked to a 2.8 GHz RF source

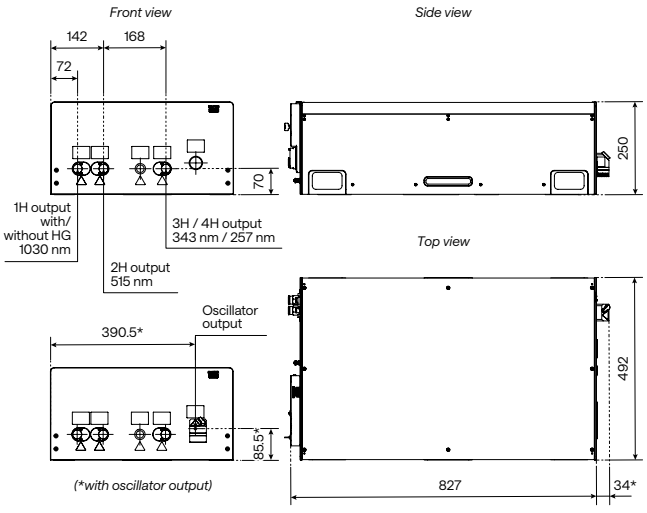


Drawings

PHAROS-PH2-730
-10W or -20W-SP with a FEC or BiBurst option, or a harmonic generator



PHAROS-PH2-827
-10W with an -HE harmonic generator option, or -5mJ

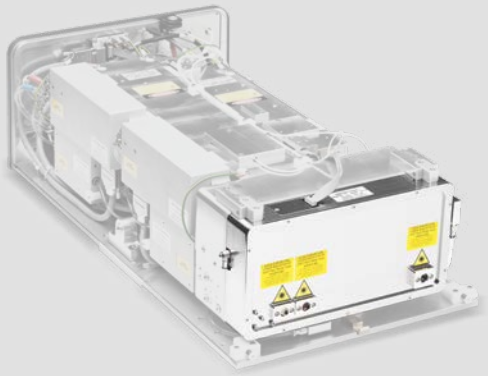


The drawings depend on the exact configuration. If crucial for integration, please contact sales@lightcon.com.

HG | PHAROS

Integrated Harmonic Generators

- 515 nm, 343 nm, 257 nm, or 206 nm output
- Automated harmonic selection
- Industrial-grade design

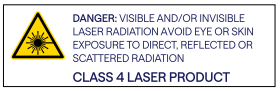


PHAROS with a harmonic generator

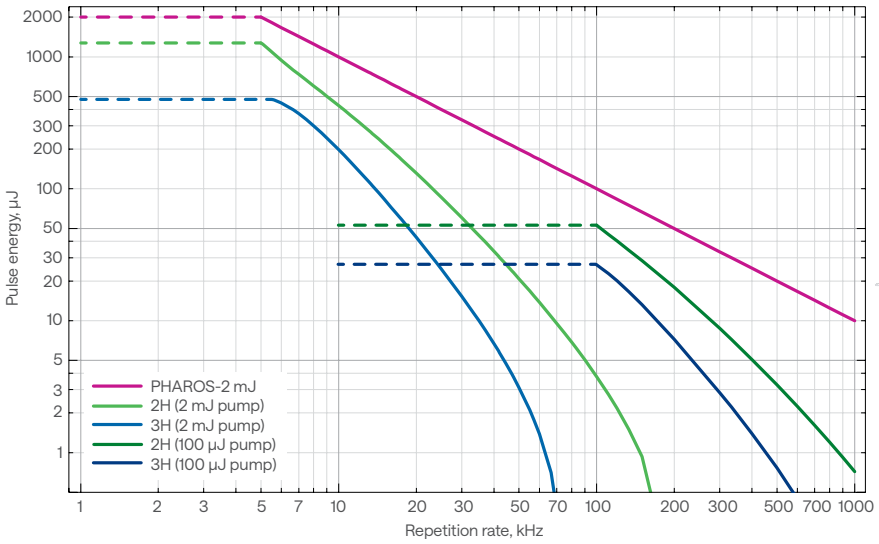
Specifications

Model		2H (-HE)	2H-3H (-HE)	2H-4H (-HE)	4H-5H
Output wavelength [1] (automated selection)		1030 nm 515 nm	1030 nm 515 nm 343 nm	1030 nm 515 nm 257 nm	1030 nm 257 nm 206 nm
Pump pulse energy [2]		20 – 2000 µJ	20 – 2000 µJ	20 – 2000 µJ	200 – 2000 µJ
Pump pulse duration		100 – 500 fs			
Conversion efficiency		> 50% (2H)	> 50% (2H) > 25% (3H)	> 50% (2H) > 10% (4H) [3]	> 10% (4H) [4] > 5% (5H) [5]
Beam quality, M^2	≤ 400 µJ pump	<1.3 (2H)	<1.3 (2H) <1.4 (3H)	<1.3 (2H) n/a (4H)	n/a
	> 400 µJ pump	<1.4 (2H)	<1.4 (2H) <1.5 (3H)	<1.4 (2H) n/a (4H)	

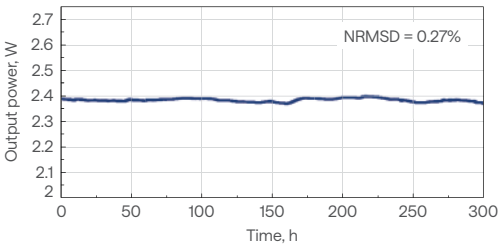
[1] *Depends on the pump laser model.*
[2] *For more pump energy options contact sales@lightcon.com*
[3] *Maximum output power: 2 W at 20 – 1000 µJ pump energy, or 1 W at 1000 – 2000 µJ pump energy.*
[4] *Maximum output power of 1 W.*
[5] *Maximum output power of 150 mW.*



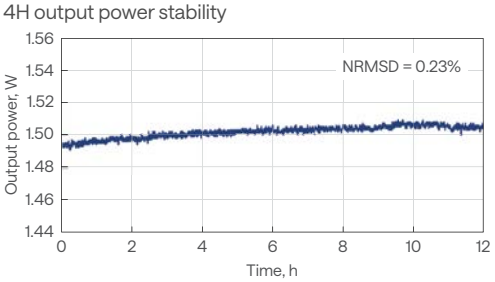
PHAROS with a harmonic generator
Pulse energy vs repetition rate



3H output power stability



4H output power stability



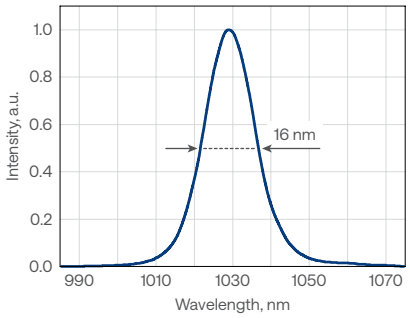
FLINT

High-Repetition-Rate Femtosecond Lasers

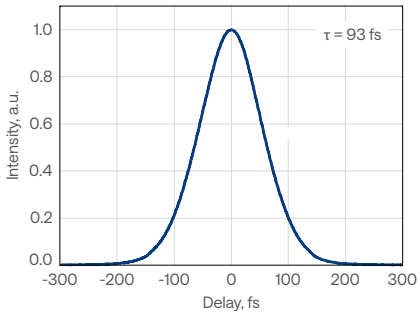
- High-power models, up to 20 W
- High-energy models, up to 0.5 µJ
- 10 – 90 MHz repetition rate
- Down to 50 fs pulse duration
- CEP stabilization or repetition rate locking

FLINT-FL1

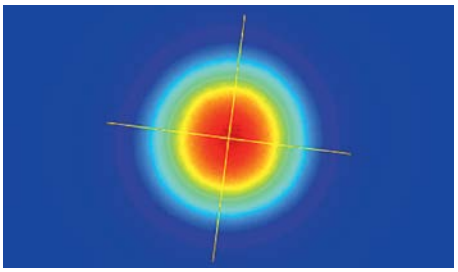
FLINT-FL1
Typical spectrum



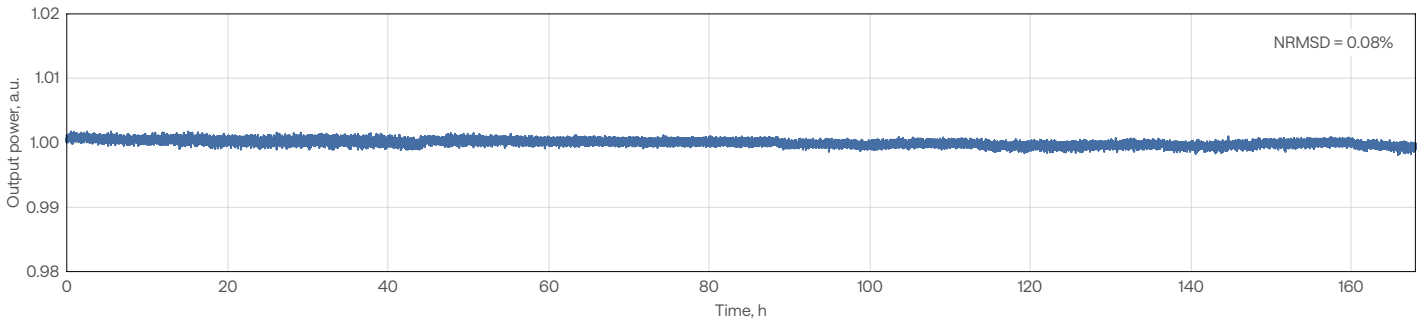
FLINT-FL1
Typical pulse duration



FLINT-FL1
Typical beam profile



FLINT-FL2 (20 W) output power stability under harsh environmental conditions over 7 days



Specifications

Model	FL1			FL2-SP	FL2		
Key feature	CEP	RRL	Compact	Short pulse	High power and high energy		
Pulse duration	< 100 fs		< 120 fs	< 50 fs	< 120 fs	< 170 fs [1]	
Repetition rate	60 – 90 MHz [2]			10 MHz	10 MHz	40 MHz	80 MHz
Maximum output power	0.5 W	1 W	8 W	4 W	5 W	20 W	
Maximum pulse energy	6 nJ [3]	12.5 nJ [3]	100 nJ [3]	0.4 µJ	0.5 µJ		0.25 µJ
Center wavelength	1035 ± 10 nm			1030 ± 10 nm	1030 ± 10 nm		
Polarization	Linear, horizontal						
Beam quality, M^2	< 1.2			< 1.3	< 1.2		
Beam pointing stability	< 10 µrad/°C						
Long-term power stability, 100 h [4]	< 0.5%						
Integrated 2H generator [5]	n/a				Optional; conversion efficiency > 30% [6] refer to FLINT HG		
External 2H, 3H, or 4H generator	Optional; refer to HIRO						
Integrated attenuator	n/a			Included			

PHYSICAL DIMENSIONS

Laser head (L × W × H)	448 × 206 × 115 mm	543 × 322 × 146 mm
Power supply and chiller rack (L × W × H)	642 × 553 × 540 mm	642 × 553 × 673 mm
Chiller	Different options available. Contact sales@lightcon.com	

ENVIRONMENTAL & UTILITY REQUIREMENTS

Operating temperature		15 – 30 °C (air conditioning recommended)	
Relative humidity		< 80% (non-condensing)	
Electrical requirements		100 V AC, 7 A – 240 V AC, 3 A; 50 – 60 Hz	100 V AC, 12 A – 240 V AC, 5 A; 50 – 60 Hz
Rated power		200 W	
Power consumption	Laser	100 W	150 W
	Chiller	600 W	1000 W

[1] *For 20 W output power. Lower power models: 8 W and 12 W, are available upon request.*

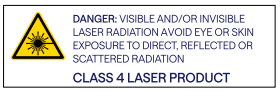
[2] *Standard repetition rate is 80 MHz; custom repetition rate can be factory preset from the given range.*

[3] *Depends on the repetition rate. Values are given for 80 MHz.*

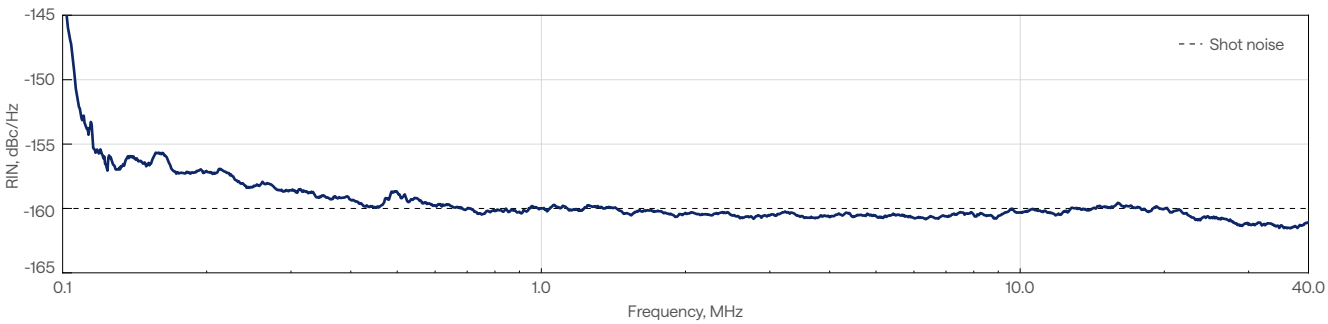
[4] *With enabled power-lock, under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD).*

[5] *For external 2H, or even 3H and 4H generation, refer to HIRO for FLINT.*

[6] *Conversion efficiency specified at maximum power.*



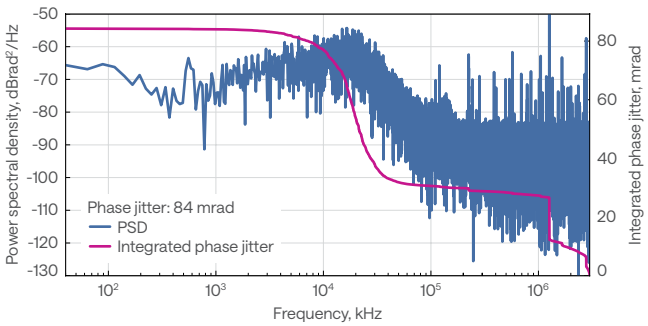
FLINT oscillator relative intensity noise (RIN), shot-noise limited at -160 dBc/Hz above 1 MHz



CEP stabilization

FLINT oscillators can be equipped with feedback electronics for carrier-envelope phase (CEP) stabilization of the output pulses. The carrier-envelope offset (CEO) of the oscillator is actively locked to 1/4th of the repetition rate with a < 100 mrad standard deviation.

CEP-locked **FLINT** oscillator phase noise data

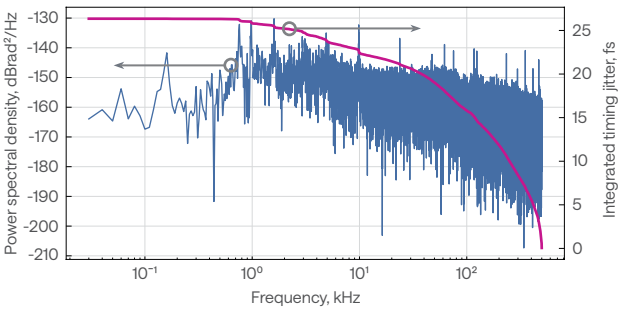


Repetition rate locking

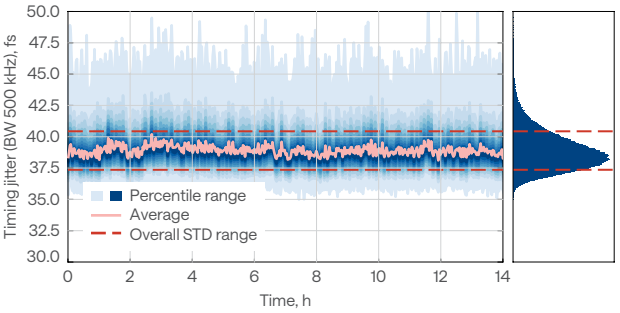
FLINT oscillators can be customized for repetition rate locking applications. Coupled with the necessary feedback electronics, the oscillator's repetition rate can be synchronized to an external RF source using the two piezo stages installed within the cavity.

The repetition rate locking system ensures an integrated timing jitter of less than 200 fs for RF reference frequencies above 500 MHz. Additionally, continuous phase shifting is available upon request.

FLINT oscillator phase noise data
locked to a 2.8 GHz RF source

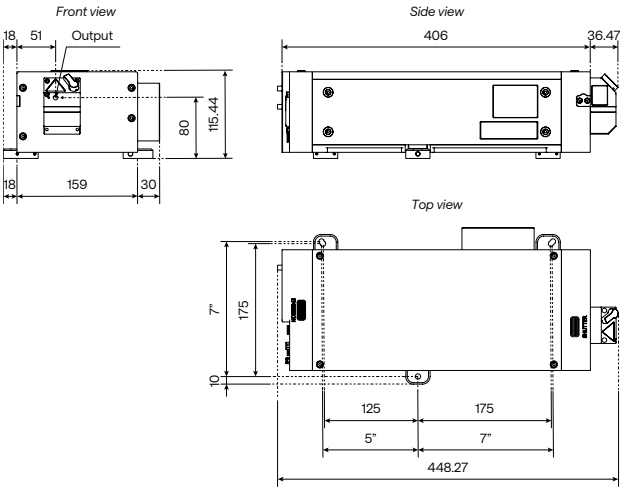


Timing jitter stability over 14 h
FLINT oscillator locked to a 2.8 GHz RF source

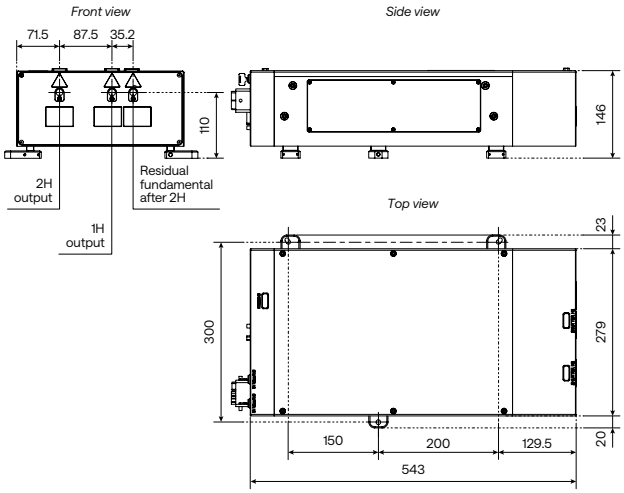


Drawings

FLINT-FL1



FLINT-FL2



HG | FLINT

Integrated Second Harmonic Generator

- 515 nm output
- Automated harmonic selection
- Integrated into the housing
- Industrial-grade design

FLINT-FL2 with an integrated harmonic generator

Specifications

Model	FL1	FL2-SP	FL2		
Available harmonic	Refer to HIRO		2H [1]		
Pump repetition rate			10 MHz	40 MHz	80 MHz
Maximum pump power			5 W	20 W	
Center wavelength			515 ± 10 nm		
Conversion efficiency [2]			> 30%		
Polarization			Linear, horizontal		

[1] *For external 2H or even 3H and 4H generation, refer to HIRO for FLINT.*

[2] *Conversion efficiency specified at maximum power.*

HIRO

External Harmonic Generator

- 515 nm, 343 nm, 257 nm, and 206 nm outputs
- Simple selection of the active harmonic
- Simultaneous or switchable outputs
- Standalone harmonics module for CARBIDE, PHAROS and FLINT

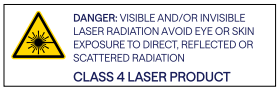
HIRO for CARBIDE or PHAROS

Model	HIRO	HIRO-HP	HIRO-HE
Maximum pump power	20 W	80 W	
Pump pulse energy	8 – 400 µJ	200 – 1000 µJ	1000 – 4000 µJ
Available outputs [1) 2)]	Up to 4H [3)]	Up to 5H	
Conversion efficiency [1) 4)]	> 50% (2H) > 25% (3H) > 10% (4H) [5)] > 5% (5H) [6) 7)]		
Polarization [8)]	Linear, horizontal (2H, 5H) Linear, vertical (3H, 4H)		

PHYSICAL DIMENSIONS

Dimensions (L × W × H)	487 × 176 × 180 mm	552 × 320 × 170 mm

1) *For harmonic combinations and simultaneous outputs, contact sales@lightcon.com.*
2) *Residual fundamental output available upon request.*
3) *White light continuum output available upon request.*
4) *Percentage of pump power, for repetition rate of up to 1 MHz.*
5) *Maximum output power of 1 W.*
6) *Maximum ouput power of 150 mW. Only for HIRO-HP/HE.*
7) *> 1 % when pumped with PHAROS-UP.*
8) *Different polarization is available upon request.*



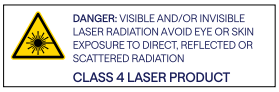
HIRO for FLINT

Available harmonic	Up to 4H
Maximum pump power [1]	4 W
Conversion efficiency [2]	> 35% (2H) > 5% (3H) > 1% (4H)

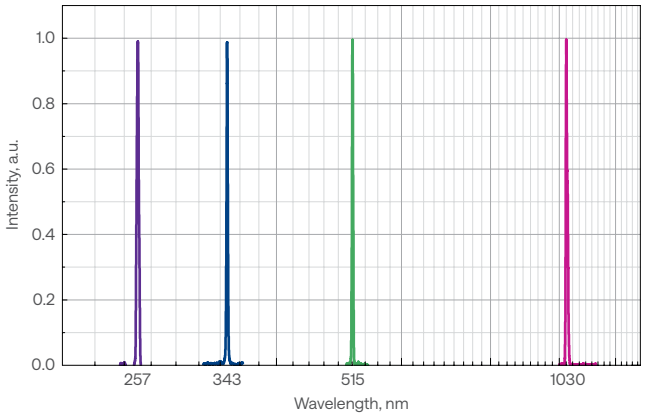
PHYSICAL DIMENSIONS

Dimensions (L × W × H)	487 × 176 × 180 mm

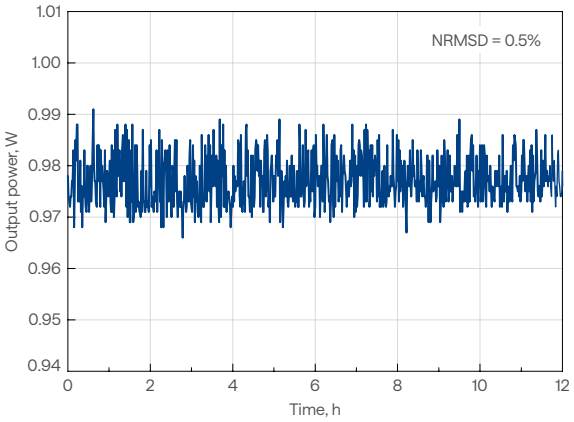
[1] *For high power 2H, refer to HG for FLINT.*
[2] *For pump power of > 500 mW.*



HIRO outputs

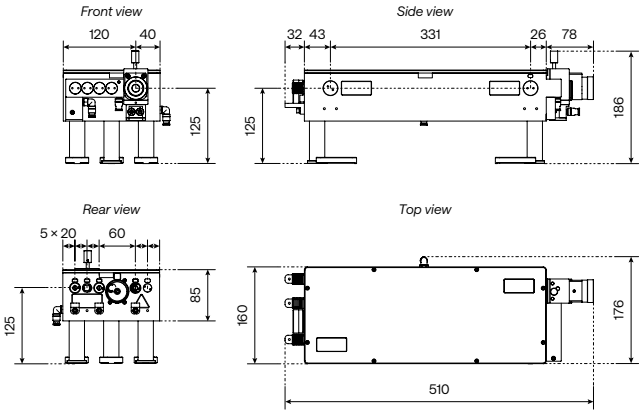


4H output power stability

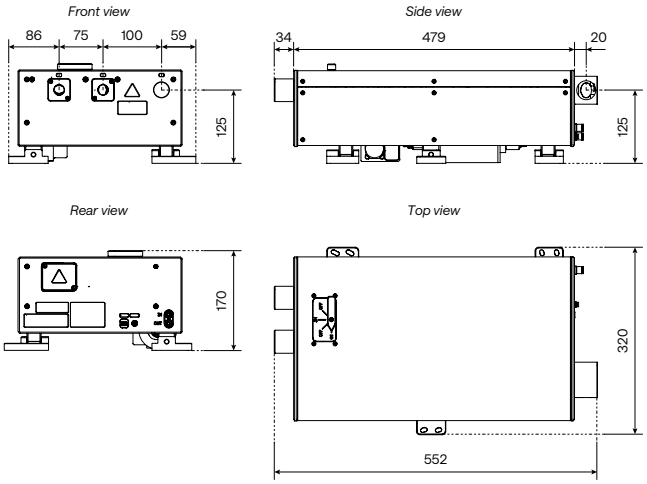


Drawings

HIRO



HIRO-HP/HE



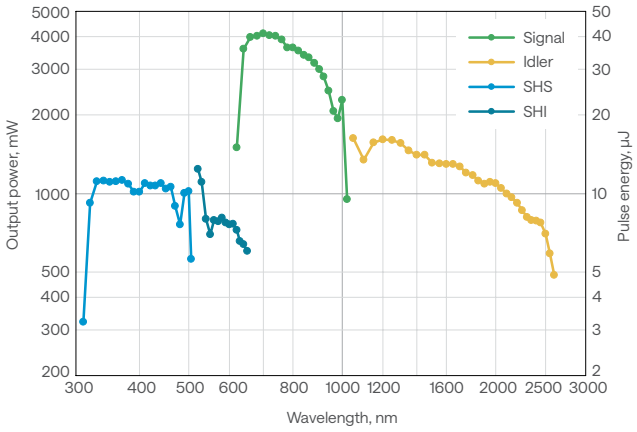
I-OPA

Industrial-Grade Optical Parametric Amplifier

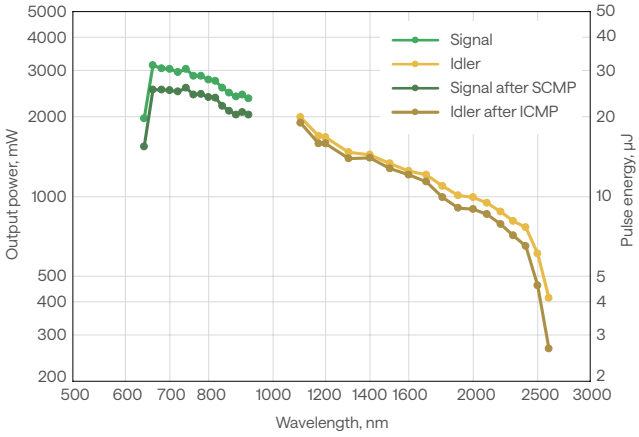
- Wavelength tunability in an industrial design
- Single-box solution
- Tunable or fixed-wavelength models
- Plug-and-play installation and robust performance
- The most compact OPA in the market

CARBIDE-CB3 with I-OPA-HP

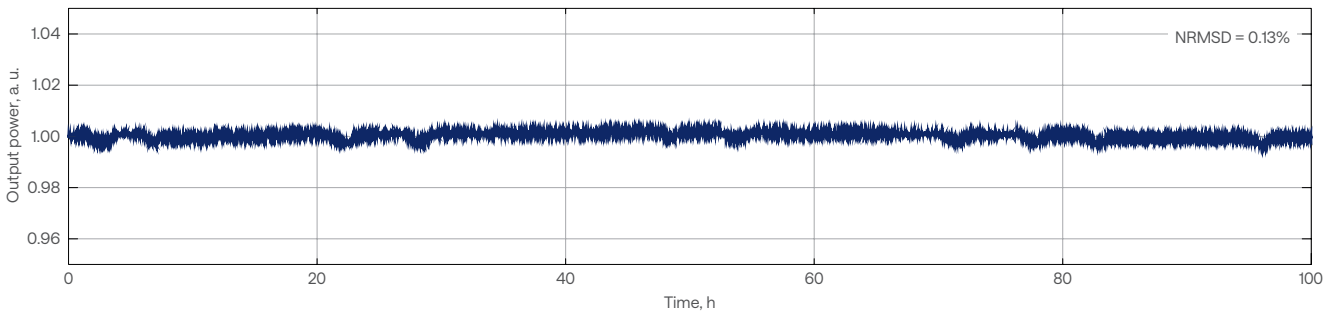
I-OPA-HP typical tuning curves
Pump: 40 W, 400 µJ, 100 kHz



I-OPA-F typical tuning curves
Pump: 40 W, 400 µJ, 100 kHz



I-OPA-HP
Typical power stability at 1300 nm



Specifications

Model	I-OPA-HP	I-OPA-F	I-OPA-ONE
Configuration	ORPHEUS	ORPHEUS-F	ORPHEUS-ONE
Pump power	Up to 40 W		
Pump pulse energy	20 – 400 µJ		
Repetition rate	Up to 2 MHz		
Tuning range [1]	640 – 1010 nm (signal) 1050 – 2600 nm (idler)	650 – 920 nm (signal) 1200 – 2500 nm (idler)	1350 – 2000 nm (signal) 2100 – 4500 nm (idler)
Conversion efficiency	> 7% @ 700 nm (40 – 400 µJ pump; up to 1 MHz)		> 9% @ 1550 nm (40 – 400 µJ pump; up to 1 MHz)
	> 3.5% @ 700 nm (20 – 40 µJ pump; up to 2 MHz)		> 6% @ 1550 nm (20 – 40 µJ pump; up to 2 MHz)
Spectral bandwidth [2]	80 – 220 cm^{-1} @ 700 – 960 nm	200 – 1000 cm^{-1} @ 650 – 920 nm 150 – 1000 cm^{-1} @ 1200 – 2000 nm	60 – 150 cm^{-1} @ 1450 – 2000 nm
Pulse duration [2] [3]	120 – 250 fs	< 55 fs @ 800 – 920 nm < 70 fs @ 650 – 800 nm < 100 fs @ 1200 – 2000 nm	100 – 300 fs
Long-term power stability, 8 h [4]	< 1% @ 800 nm		< 1% @ 1550 nm
Pulse-to-pulse energy stability, 1 min [4]	< 1% @ 800 nm		< 1% @ 1550 nm
Wavelength extension options	320 – 505 nm (SHS) [5] 525 – 640 nm (SHI) [5]	Contact sales@lightcon.com	4500 – 10 000 nm (DFG)
Pulse compression options [2]	n/a	SCMP (signal pulse compressor) ICMP (idler pulse compressor)	n/a

PUMP LASER REQUIREMENTS

Pump laser	CARBIDE or PHAROS
Center wavelength	1030 ± 10 nm
Maximum pump power	40 W
Maximum repetition rate	Up to 2 MHz
Pump pulse energy	20 – 400 µJ
Pulse duration	180 – 300 fs

ENVIRONMENTAL & UTILITY REQUIREMENTS

Refer to lightcon.com

[1] *In the case of a fixed wavelength (FW), a single wavelength can be selected from the signal or idler range. The signal may have an accessible idler pair, and vice versa.*

[2] *I-OPA-F broad-bandwidth pulses are compressed externally. Typical pulse duration before compression: 120 – 250 fs, after compression: 25 – 70 fs @ 650 – 920 nm, 40 – 100 fs @ 1200 – 2000 nm.*

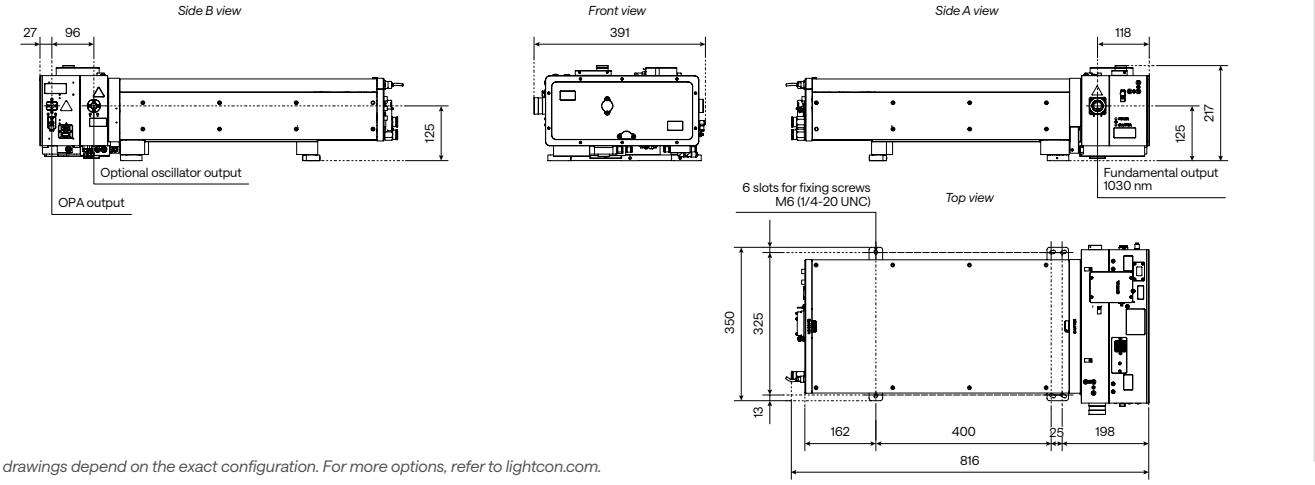
[3] *Output pulse duration depends on the selected wavelength and the pump laser pulse duration.*

[4] *Expressed as normalized root mean squared deviation (NRMSD).*

[5] *Conversion efficiency is 1.2% at peak; specified as a percentage of pump power.*

Drawings

CARBIDE-CB3 with I-OPA-HP



The drawings depend on the exact configuration. For more options, refer to lightcon.com.

Micromachining Applications

LIGHT CONVERSION delivers best-in-class lasers and laser systems for today's most demanding applications.

Cutting & drilling

Silicon dicing

High-contrast marking

Micromachining Applications

Transparent Materials

Selective laser etching

3D selective laser etching in fused silica.

Source: Femtika.

Color marking in glass

Source: Workshop of Photonics.

Glass cutting

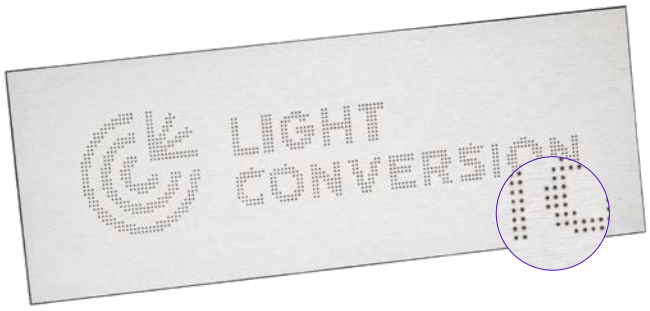
Structure fabricated in fused silica.

Glass cutting

Bottom-up glass cutting with GHz bursts: a map of Lithuania cut from 4,8 mm-thick glass.

Source: M. Mackevičiūtė et al., Fast and efficient bottom-up cutting of soda-lime glass using GHz bursts of short laser pulses, Opt. Lasers Eng. 183 (2024).

Metals



Conical drilling

A hole array produced in a 100 µm-thick stainless steel sheet at a rate of 1 ms per hole.

Nozzle drilling

Precision drilling of the nozzle holes.

Source: Posalux SA.

Selective ablation

Selective ablation of tungsten carbide.

Cutting and welding

Cut and welded parts from brass using a single laser system.

Surface texturing

Moon-like surface texturing on a watch bezel.

Source: LASEA.

Micromachining

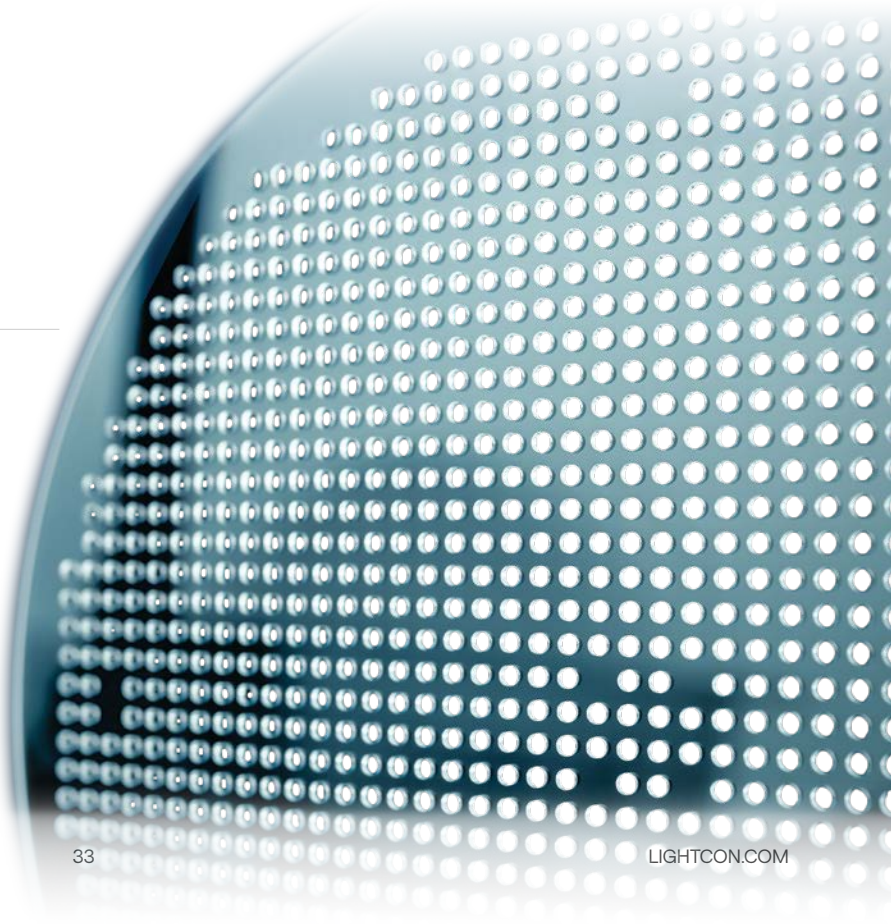
Semicon Industry

Silicon carbide dicing

Single-pass (300 mm/s) dicing
of a 500 µm-thick 4H-SiC wafer.

Silicon dicing

Precise dicing of a silicon wafer.



Through Glass Via drilling

Example of glass drilling with densely packed holes.

Source: Workshop of Photonics.

Medical Industry

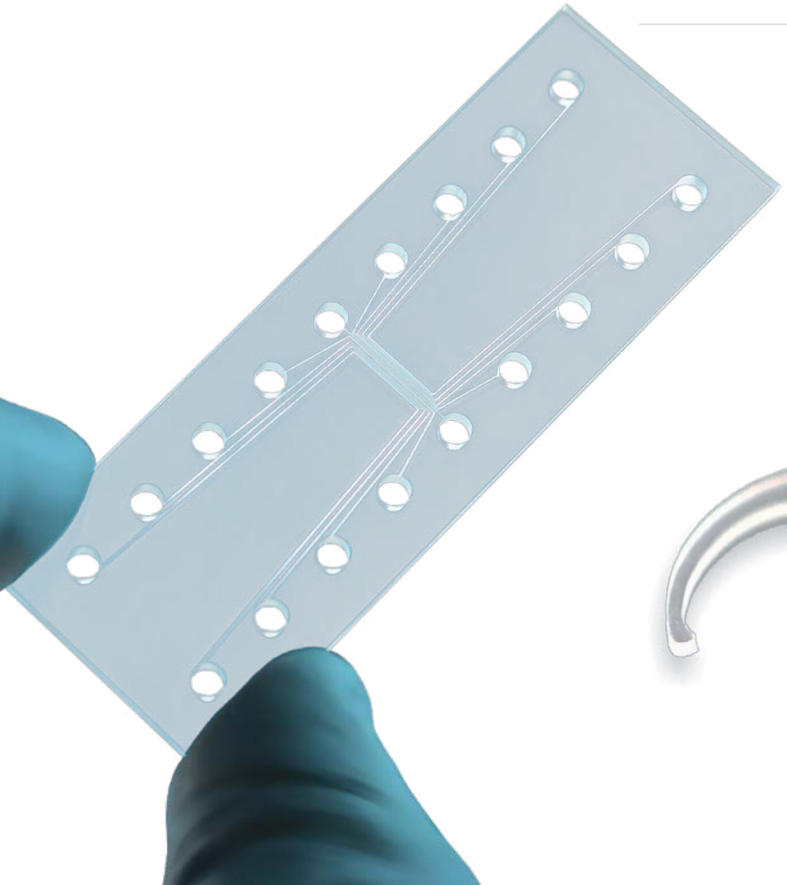
Nitinol stent cutting

Source: Lighteum.

High-contrast marking

Corrosion-free black-and-white marking on a stainless steel hemostatic clamp using the BiBurst option.

Stainless steel stent cutting



Glass ablation and welding

Microfluidic chip manufacturing with channel sealing.

Source: Workshop of Photonics.

Intraocular lens cutting

Source: Lasea.

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