Spectroscopy Systems

LIGHT CONVERSION

Product Catalog

lightcon.com

LIGHT CONVERSION is a global leader in ultrafast technology, designing and manufacturing:

- Femtosecond Lasers,
- Wavelength-Tunable Sources,
- OPCPA Systems,
- Microscopy Sources,
- Spectroscopy Systems.

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

About Us

Founded in 1994, LIGHT CONVERSION has evolved into a leading company in ultrafast laser technology with over 9000 systems installed worldwide and 600 employees, 15% of whom focus on R&D. The company's lasers are used in all of the top 50 universities worldwide, 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.

Contents


HARPIA

Spectroscopy Systems

The HARPIA ultrafast spectrometer conducts a variety of sophisticated time-resolved measurements within a compact footprint. With its intuitive user experience and easy day-to-day operation, it meets the demands of modern scientific applications.

HARPIA | TA	The system, centered around the transient absorption spectrometer, offers expandability through additional modules such as time-correlated single-photon counting, Kerr gate, and fluorescence upconversion, third beam delivery, or microscopy.
HARPIA | LIGHT NEW	The transient absorption spectroscopy system combines accessibility, versatility, and unparalleled performance in a single-box design, allowing transient event measurement and analysis on a femto-to-nanosecond time scale.
HARPIA | TG	The transient grating spectrometer is designed for measuring carrier diffusion and lifetime using the laser-induced transient grating technique, enabling the characterization of electrically non-conductive or non-fluorescent samples.

Complete single-supplier solutions for sophisticated measurements

Compact and robust systems, powered by industrial-grade lasers

High-level automation and software control

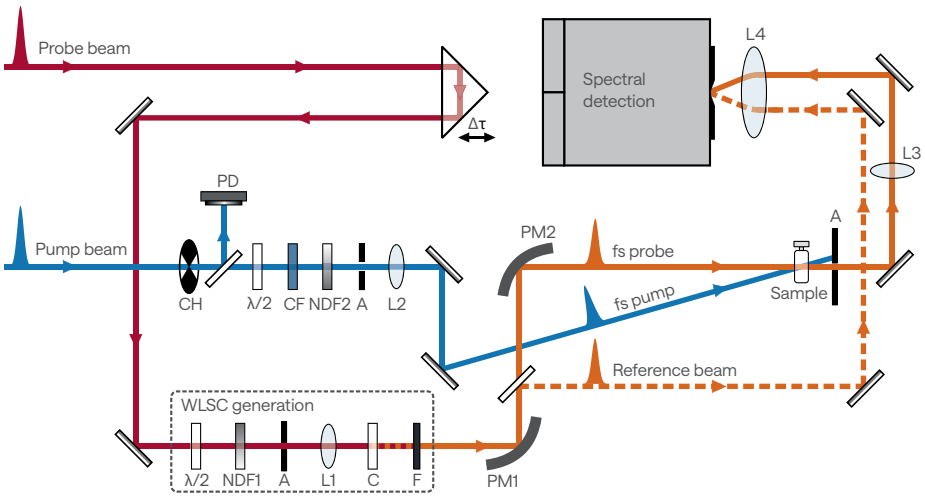
HARPIA | TA

Ultrafast Transient Absorption Spectrometer

Layout example

- Excellent performance at a high repetition rate
- Measurement range from UV to MIR
- Market-leading sensitivity
- Modules for time-resolved, and multi-pulse experiments
- High-level automation in a compact footprint

HARPIA-TA optical layout for pump-probe experiments

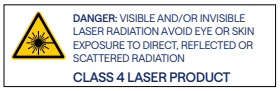


A – aperture
C – crystal
CF – spectral filter
CH – chopper
F – filter
L – lens
PD – photodiode
PM – parabolic mirror
NDF – neutral density filter
WLSC – white light supercontinuum
Δτ – delay
λ/2 – half-wave plate

Specifications

Configuration	UV-VIS	UV-VIS-NIR	MIR
Probe spectral range	350 – 1100 nm	350 – 1600 nm	2000 – 13000 nm
Pump range	240 – 2200 nm		450 – 2200 nm [1]
Delay range (resolution)	8 ns (8.3 fs)		4 ns (4.2 fs)
Temporal resolution	≤ laser pulse duration or better		
Laser repetition rate	1 – 100 kHz		
Maximum data acquisition rate	3850 Hz		Laser repetition rate
Modes	Reflection and transmission		

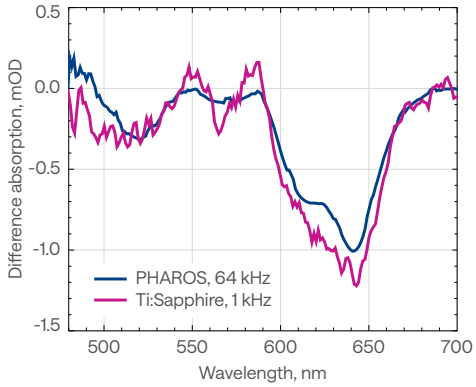
[1] *Wavelength range is configurable to 240 – 700 nm. Contact sales@lightcon.com for more details.*



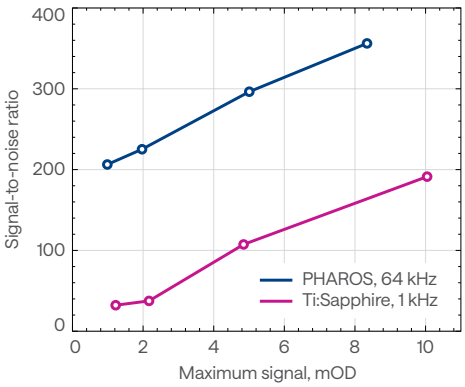
Performance at high repetition rates

The **HARPIA** spectroscopy system achieves an excellent signal-to-noise ratio at a high repetition rate and low energy excitation conditions. The graphs below compare the signal-to-noise ratio (SNR) of difference absorption spectra obtained with a Ti:Sapphire laser operating at 1 kHz and a **PHAROS** laser operating at 64 kHz with the same acquisition time.

Measured difference absorption spectra of CdSe/ZnS quantum dots using low- and high-repetition rate lasers with 5 s acquisition time



Best-effort SNRs, achieved with **HARPIA-TA** spectrometer driven by a Ti:Sapphire laser at 1 kHz (magenta) and a **PHAROS** laser at 64 kHz (blue)



Software

HARPIA Service App

Control and data acquisition software

A single software solution for all measurement modes, featuring:

- User-friendly interface
- Measurement presets
- Measurement noise suppression
- Diagnostics and data export
- Continuous support and updates
- API for remote experiment control using third-party software (LabVIEW, Python, MATLAB)

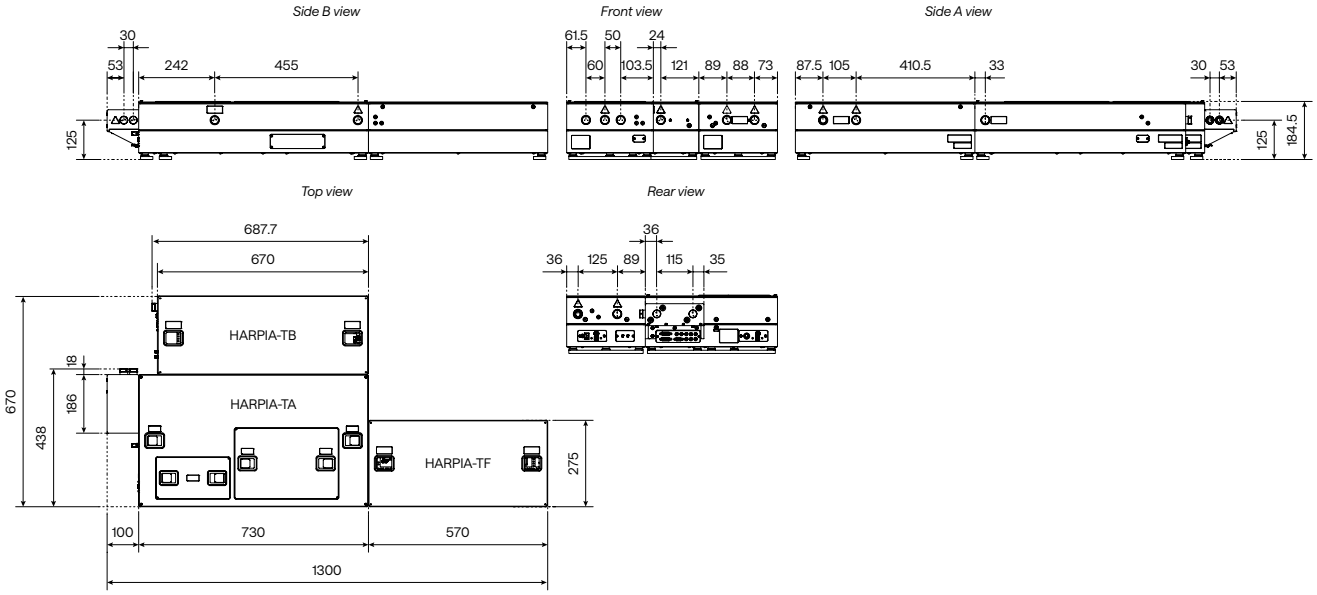
Data analysis software

An ultrafast spectroscopy data analysis software, featuring:

- Advanced data wrangling: slicing, merging, cropping, smoothing, fitting, etc.
- Advanced global and target analysis
- Probe spectral chirp correction, calibration and deconvolution
- Support for 3D data sets (2D electronic spectroscopy, fluorescence lifetime imaging)
- Publication-ready figure preparation and data export

Drawings

Drawings of **HARPIA** system with **HARPIA-TB** and **HARPIA-TF** modules



Modules and accessories

HARPIA | TF Time-Resolved Fluorescence Module

Time-resolved fluorescence spectroscopy carries information on the molecular processes in the excited states. **HARPIA-TF** combines different measurement modes, thus allowing the observation of fluorescence dynamics at different time scales.

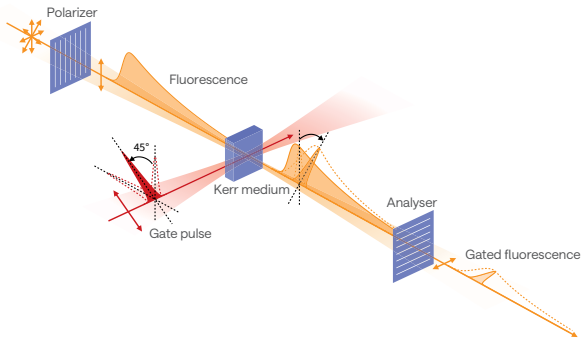
Using a high-repetition-rate **PHAROS** or **CARBIDE** laser, the fluorescence dynamics can be measured while exciting the samples with pulse energies down to several nanojoules.

Kerr gate
Easy to use. Simpler alignment and maintenance. The entire spectrum is measured at once.

Fluorescence upconversion (FU)
Better temporal resolution for measuring fast fluorescence events.

Time-correlated single-photon counting (TCSPC)
Fluorescence lifetime measurements are extendible to measure phosphorescence signals.

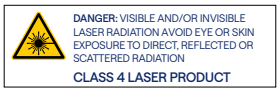
Principle of Kerr gate spectroscopy



Specifications

Module	HARPIA-TF		
Measurement technique	Kerr gate	Fluorescence upconversion	TCSPC
Spectral range	250 – 1100 nm	330 – 820 nm	220 – 820 nm [1]
Pump range	240 – 2200 nm		
Temporal resolution	400 – 500 fs	≤ laser pulse duration or better	< 180 ps or < 50 ps
Max measurement range	8 ns		5 µs
Delay resolution	8.3 fs		n/a
Gate (probe) beam requirements	25 – 30 µJ		n/a
Compatible with	TCSPC		Kerr gate or fluorescence upconversion
Modes	Transmission		

[1] *Spectral range is extendable with an additional NIR detector (measurement range 1000 - 1700 nm); contact sales@lightcon.com for more details.*



HARPIA | TA-FP Flash Photolysis – Nanosecond TA Module

The flash photolysis experiment is designed to measure the long-lived states of molecular systems.

The principle of flash photolysis is analogous to the femtosecond transient absorption (TA) experiment but with a delay in a nanosecond–millisecond range.

Specifications

Module	HARPIA-TA-FP		HARPIA-TA-FP-UV	
HARPIA-TA configuration	UV-VIS	UV-VIS-NIR	UV-VIS	UV-VIS-NIR
Probe spectral range	450 – 1100 nm	450 – 1600 nm	350 – 1100 nm	350 – 1600 nm
Pump range	240 – 2200 nm			
Delay range	up to 8 ms		up to 500 µs	
Delay resolution	100 ps			
Temporal resolution	2 ns		1 ns	
Probe laser repetition rate	1850 Hz			
Maximum data acquisition rate	3850 Hz			
Modes	Reflection and transmission			

HARPIA | TB Third Beam Delivery Module

When standard spectroscopy tools are not enough to unravel the intricate ultrafast dynamics of photoactive systems, multi-pulse time-resolved spectroscopic techniques can be utilized to yield additional insight.

Femtosecond stimulated Raman scattering (FSRS)
Delivering frequency-narrowed picosecond pulses allows to perform FSRS measurements. It is a time-resolved spectroscopy technique for observing changes in the vibrational structure of optically excited molecular systems.

Multi-pulse time-resolved transient absorption
Multi-pulse time-resolved spectroscopic techniques are a way to manipulate the reactions and access new regions of the higher excited states.

Specifications

Module	HARPIA-TB	
Configuration	Pump for multi-pulse experiments	NIR probe
Acceptable wavelength range	450 – 2200 nm [1]	1600 – 2600 nm
Delay range (resolution)	4 ns (4.2 fs)	
Modes	Transmission	

[1] *Wavelength range is configurable to 240 – 700 nm. Contact sales@lightcon.com for more details.*

Options

Cryostat Mounting

HARPIA-TA supports cryostats that can be mounted externally or internally.

Sample Stirrer

Liquid samples are mixed up to avoid overexposure and ensure fresh samples.

Motorized Pump Mirror

Used to automatically optimize pump and probe overlap.

External Beam Steering

To lock the optical beam paths for OPA wavelenghts (350 – 1100 nm).

Beam Profiler

For checking beam shape/size at any position before/after measurement inside **HARPIA**.

HARPIA | LIGHT

NEW

Tabletop Transient Absorption Spectroscopy System

- Maintenance-free single-box solution
- Plug-and-play installation
- Intuitive measurement and data analysis
- Femto-to-nanosecond temporal resolution

Specifications

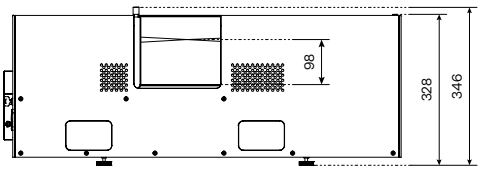
Modes	Transmission and reflection
Probe spectral range	460 – 910 nm
Probe polarization control	Linear (0 – 180°)
Pump wavelengths	515 nm, 343 nm
Delay range (resolution)	7.5 ns (10 fs)
Temporal resolution	≤ 290 fs
Laser repetition rate	60 kHz, any fundamental repetition rate division
Maximum data acquisition rate	3850 Hz
Dimensions	870.5 x 388 x 346 mm

CLASS 1
LASER PRODUCT

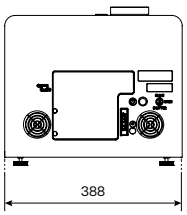
Drawings

HARPIA-LIGHT drawing

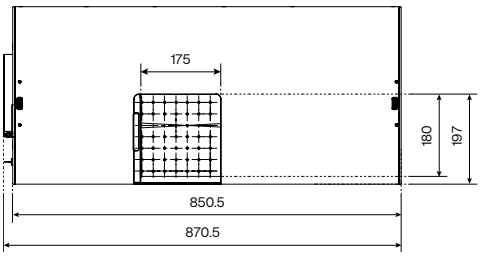
Side B view



Front view



Top view

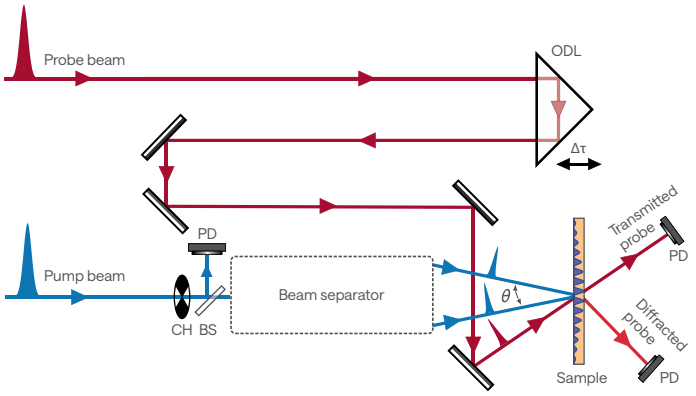


HARPIA | TG

Transient Grating Spectrometer

- Carrier diffusion coefficient in a matter of minutes
- Non-invasive measurement technique
- Fully automated and computer controlled
- Continuous setting of grating period
- Sensitivity down to μJ/cm² excitation level
- Advanced measurement and analysis software
- Photoluminescence (PL) measurement option

HARPIA-TG principal scheme



BS – beam splitter
CH – chopper
PD – photodiode
ODL – optical delay line
PM – parabolic mirror
θ – intersection angle
Δτ – delay

Specifications

Measurement mode	Transmission	Reflection
Grating recording wavelength [1]	340 – 560 nm	
Probe wavelength [2]	1030 nm	
Grating period [3]	1.05 – 12.5 μm	1.5 – 4.5 μm
Pulse duration	< 290 fs	
Delay range	Up to 8 ns	

MEASUREMENT RANGES

Diffusion coefficient	≥ 0.1 cm²/s
Carrier lifetime	3 ps – 8 ns

DIMENSIONS

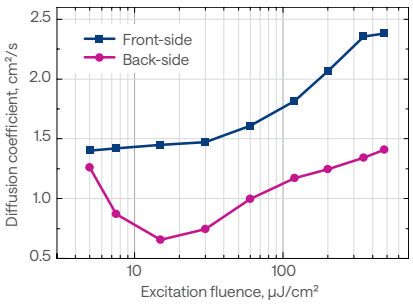
Physical dimensions (L × W × H)	730 × 420 × 188 mm

[1] *Extendable to 750 nm by applying different physical gratings. Contact sales@lightcon.com for more details.*
[2] *OPA-based probe is available upon request. Contact sales@lightcon.com for more details.*
[3] *Depends on the pump wavelength.*

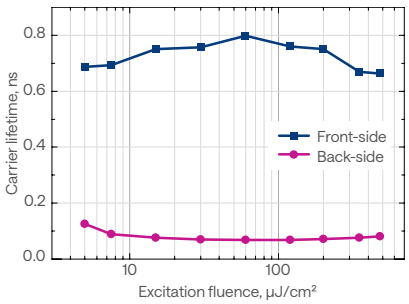
DANGER: VISIBLE AND/OR INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT, REFLECTED OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT

Performance

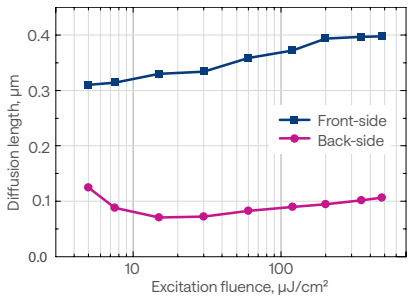
Diffusion coefficient of GaN as a function of fluence



Carrier lifetime of GaN as a function of fluence



Diffusion length of GaN as a function of fluence




PHAROS
LIGHT CONVERSION
CARBIDE
LIGHT CONVERSION
FLINT

Femtosecond Lasers

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

CARBIDE	Compact industrial design in air-cooled and water-cooled models, providing up to 120 W, 1 mJ or 80 W, 2 mJ with excellent output stability.
PHAROS	Scientific flexibility and process-tailored output parameters, providing pulse duration down to 100 fs and pulse energy of up to 4 mJ.
FLINT	Expanding the parameter range with repetition rates ranging from 10 to 100 MHz, with power up to 20 W and pulse duration down to 50 fs.

High average power and high pulse energy at a high repetition rate

Market-proven industrial-grade stability and reliability

Tailored to the needs of industry and science

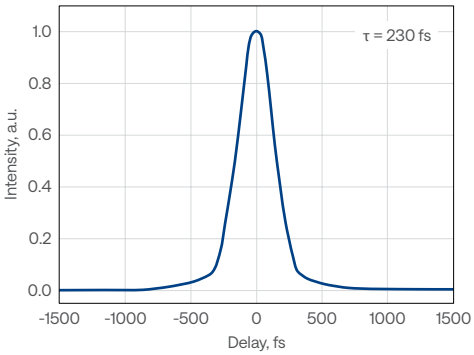
CARBIDE

Unibody-Design Femtosecond Lasers for Industry and Science

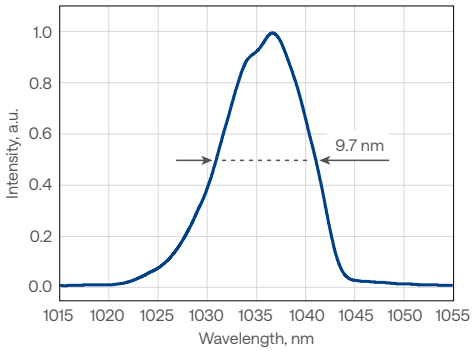
CARBIDE-CB3

- 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 5th harmonic or tunable extensions
- Air-cooled and water-cooled models
- Compact industrial-grade design

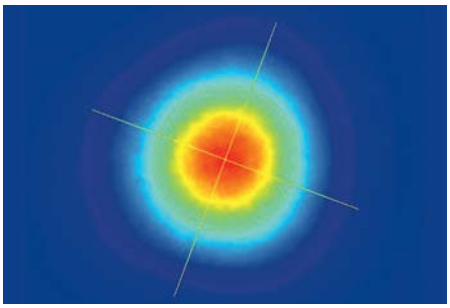
CARBIDE-CB3
Typical pulse duration



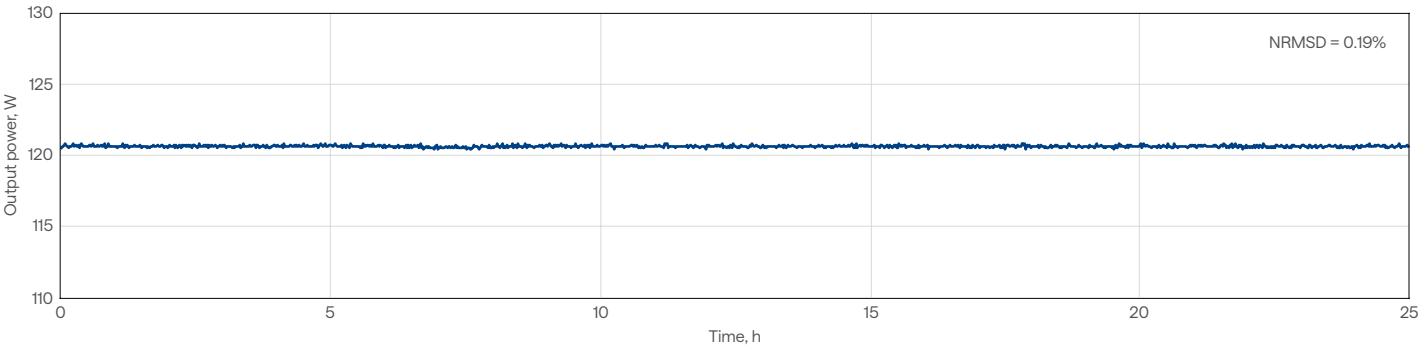
CARBIDE-CB3
Typical spectrum



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

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, 24 h [6]	< 0.5%				
Long-term power stability, 100 h [6]	< 0.5%				

MAIN OPTIONS

Oscillator output	< 0.5 W, 120 – 250 fs, 1030 ± 10 nm, ≈ 65 MHz [7]		
Harmonic generator [8]	515 nm, 343 nm, 257 nm, or 206 nm; *see page 22*		
Optical parametric amplifier [9]	320 – 10000 nm; *see page 28*		n/a
BiBurst option	Tunable GHz and MHz burst with burst-in-burst capability		

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 [10]	320 × 200 × 75 mm	376 x 449 x 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

[1] *Assuming Gaussian pulse shape.*

[2] *Pulse duration can be reduced to < 250 fs if 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.*

[5] *Waveplate-based variable optical attenuator (VOA); an external analog control input is available.*

[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 external harmonic generator, refer to HIRO.*

[9] *Integrated. For more options and OPAs, refer to www.lightcon.com.*

[10] *Power supply can be different if optional 2 MHz version is selected.*

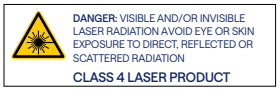
DANGER: VISIBLE AND/OR INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT, REFLECTED OR SCATTERED RADIATION

CLASS 4 LASER PRODUCT

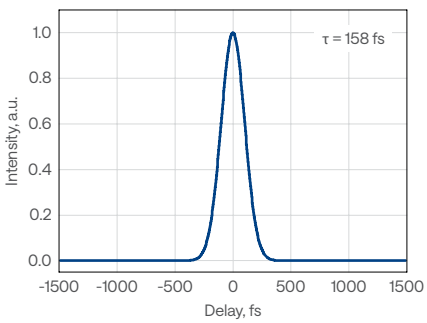
CARBIDE-CB5 (air-cooled) specifications

Model	CB5		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, 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 22*		
Optical parametric amplifier [8]	320 – 10000 nm; *see page 28*		
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		

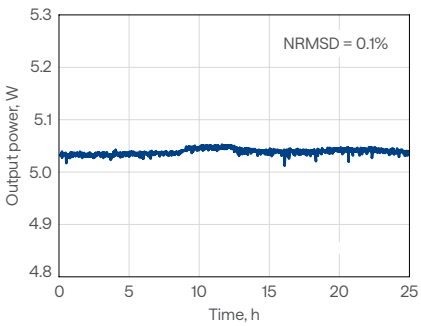
1) *Water-cooled version available on request.*
2) *Assuming Gaussian pulse shape.*
3) *FW 1/e², using maximum pulse energy.*
4) *Waveplate-based variable optical attenuator (VOA); an external analog control input is available.*
5) *Enhanced contrast AOM. Provides fast amplitude control of output pulse train.*
6) *Under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD).*
7) *Integrated. For external harmonic generator, refer to HIRO.*
8) *Integrated. For stand-alone OPAs, refer to www.lightcon.com.*



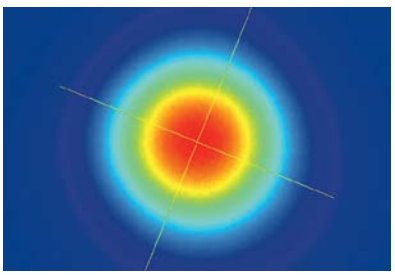
CARBIDE-CB5-SP
Typical pulse duration



CARBIDE-CB5
Long-term power stability

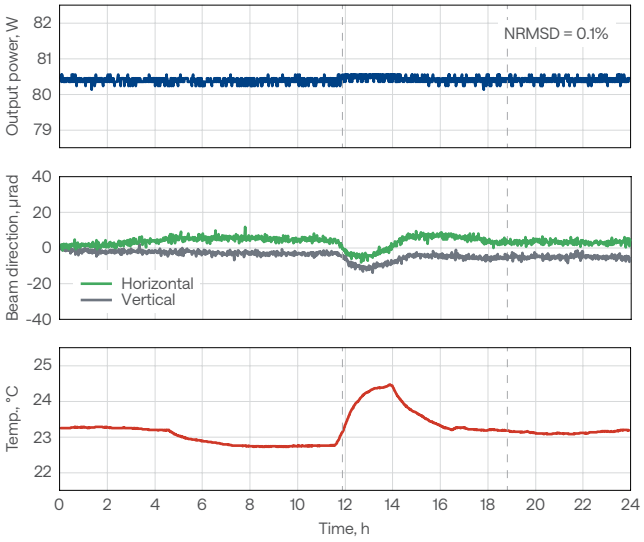


CARBIDE-CB5
Typical beam profile

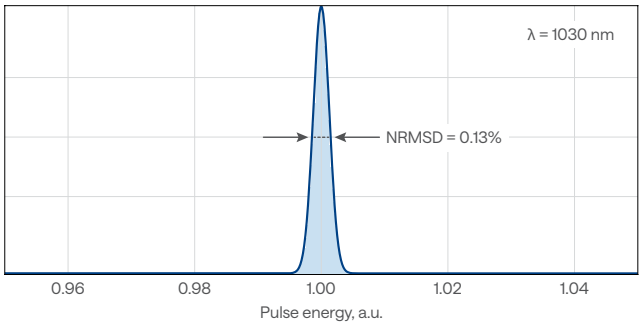


Stability measurements

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

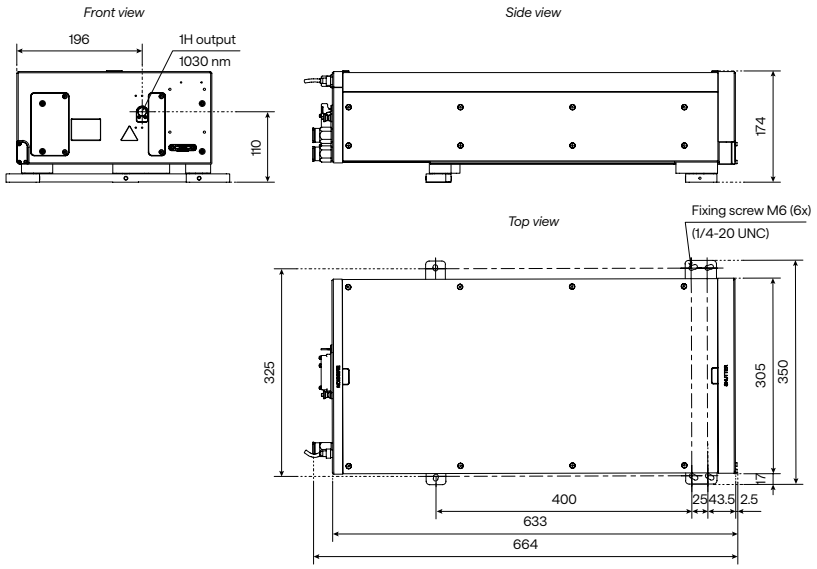


CARBIDE-CB3
Typical pulse-to-pulse energy stability

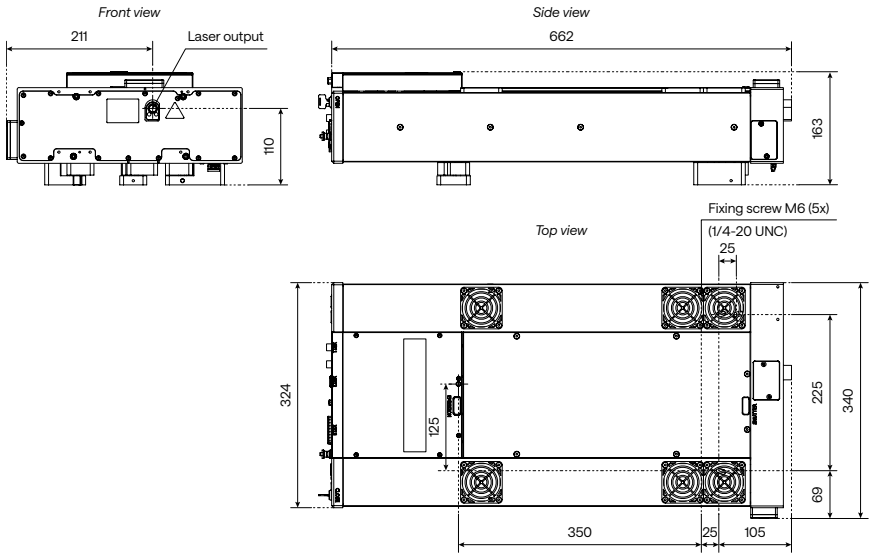


Drawings

CARBIDE-CB3 drawing



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

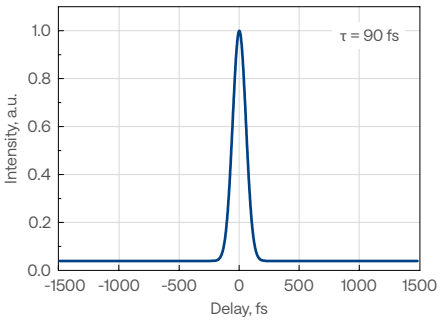


PHAROS

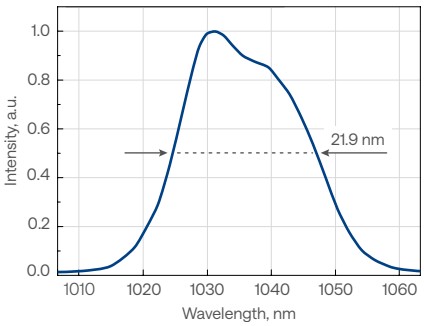
Modular-Design Femtosecond Lasers for Industry and Science

- Tunable pulse duration, 100 fs – 20 ps
- Maximum pulse energy of up to 4 mJ
- Down to < 100 fs right at the output
- Pulse-on-demand and BiBurst for pulse control
- Up to 5th harmonic or tunable extensions
- CEP stabilization or repetition rate locking
- Thermally-stabilized and sealed design

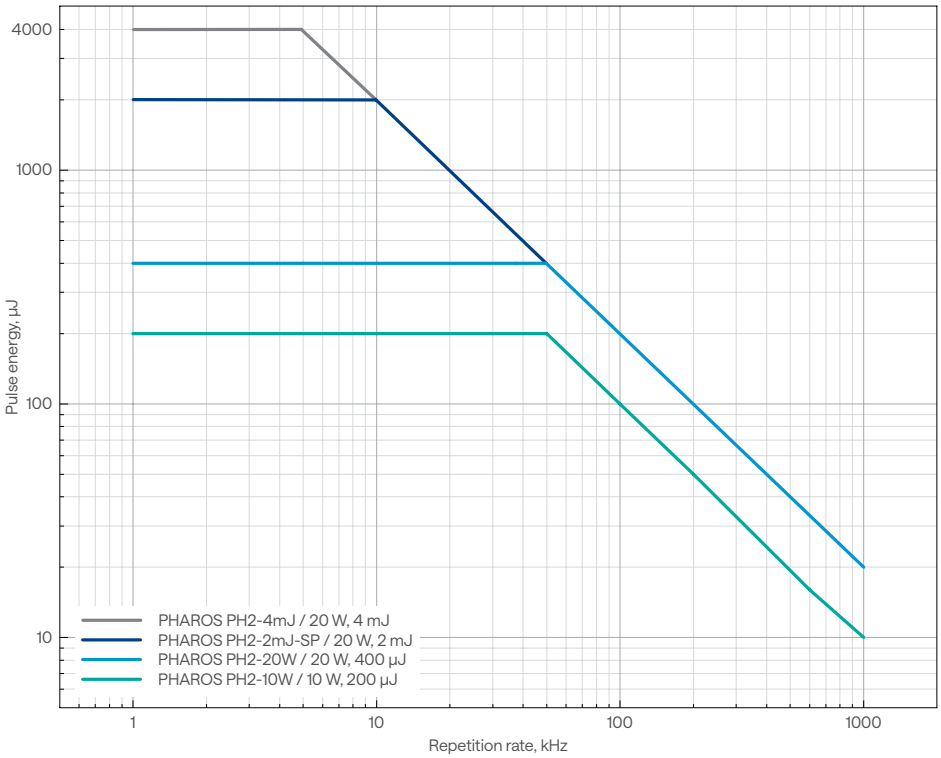
PHAROS-PH2-UP
Typical pulse duration



PHAROS-PH2-UP
Typical spectrum



PHAROS
Pulse energy vs fundamental repetition rate



Specifications

Model	PH2-10W	PH2-20W-SP			PH2-4mJ	PH2-UP	
OUTPUT CHARACTERISTICS							
Center wavelength [1]	1030 ± 10 nm						
Maximum output power	10 W	20 W					
Pulse duration [2]	< 290 fs	< 190 fs			< 450 fs [3]	< 100 fs	
Pulse duration tuning range	290 fs – 10 ps (20 ps on request)	190 fs – 10 ps (20 ps on request)			450 fs – 10 ps	100 fs – 10 ps	
Maximum pulse energy	0.2 mJ	0.4 mJ	1 mJ	2 mJ	4 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 [4]	3.3 ± 0.5 mm	4.0 ± 0.5 mm	4.5 ± 0.5 mm	6.8 ± 0.7 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, 24 h [5]	< 0.5%						
Long-term power stability, 100 h [5]	< 0.5%						
MAIN OPTIONS							
Oscillator output [6]	1 – 7 W, 50 – 250 fs, ≈ 1035 nm, ≈ 76 MHz						
Harmonic generator [7]	515 nm, 343 nm, 257 nm, or 206 nm; *see page 23*						
Optical parametric amplifier [8]	320 – 10000 nm; *see page 28*						
BiBurst option	Tunable GHz and MHz burst with burst-in-burst capability						
CEP stabilization	Optional						
Repetition rate locking							
PHYSICAL DIMENSIONS							
Laser head (L × W × H) [9]	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) [9]	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 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, measured at laser output, using maximum pulse energy.*

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

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

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

[8] *Integrated. For more options and OPAs for -4mJ and -UP models, refer to www.lightcon.com.*

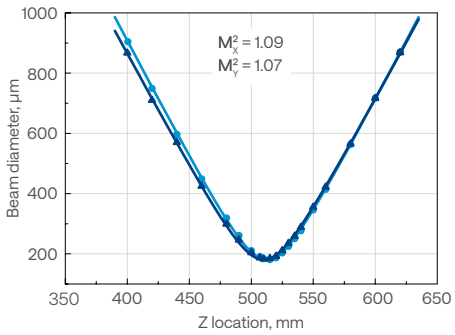
[9] *Dimensions depend on laser configuration and integrated options.*

DANGER: VISIBLE AND/OR INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT, REFLECTED OR SCATTERED RADIATION

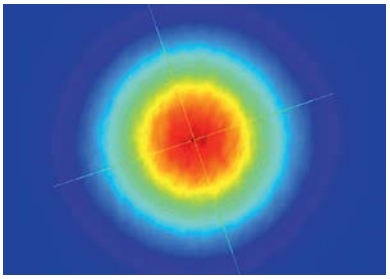
CLASS 4 LASER PRODUCT

Beam properties

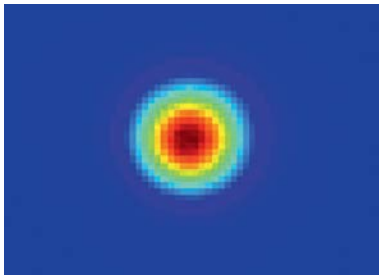
PHAROS
Typical M^2 measurement data



PHAROS
Typical near-field beam profile

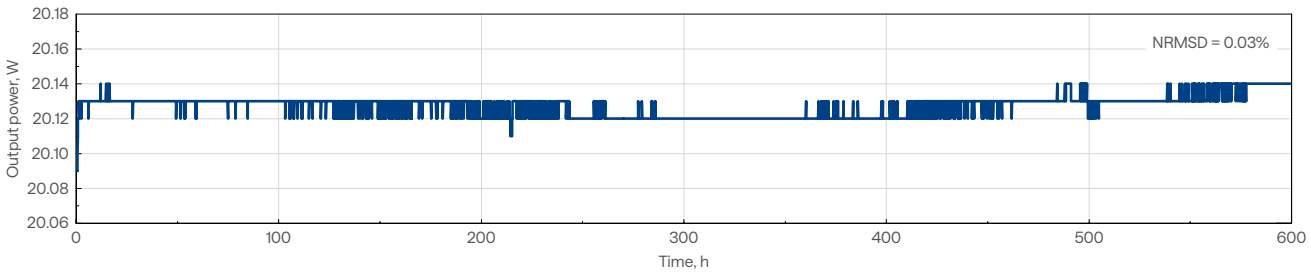


PHAROS
Typical far-field beam profile

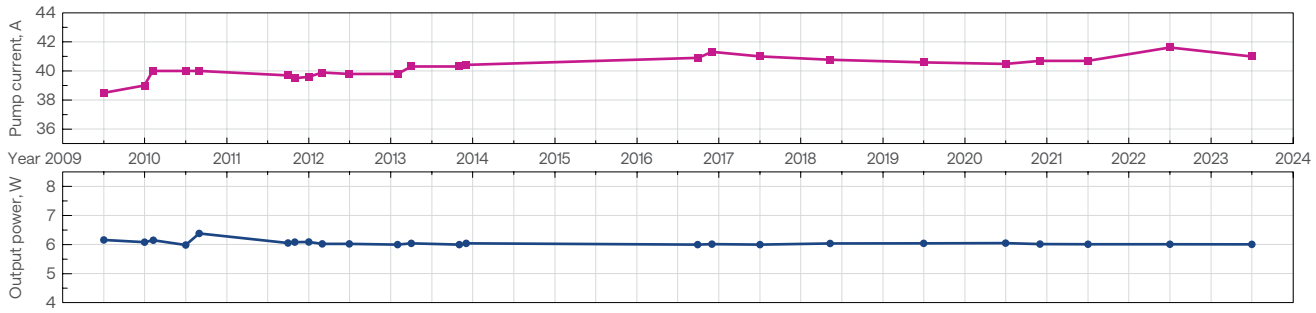


Stability measurements

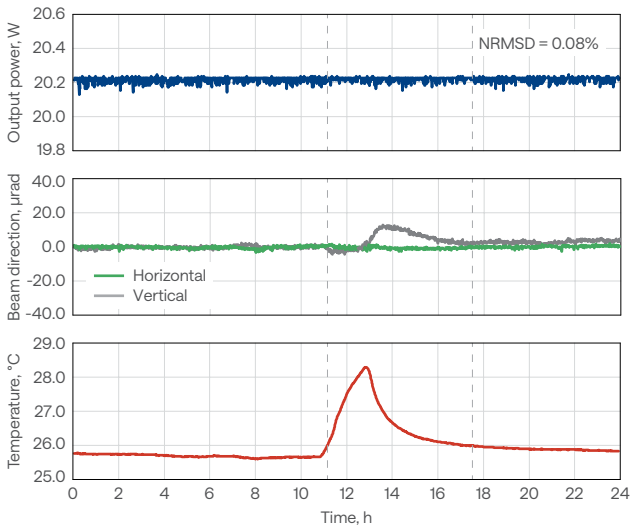
PHAROS
Long-term power stability



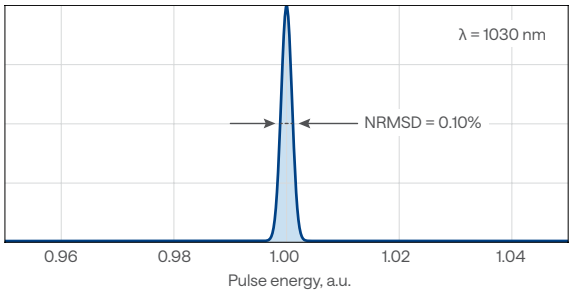
Output power of industrial-grade **PHAROS** lasers operating 24/7 and the current of the pump diodes over the years



PHAROS output power and the stability of beam direction with power lock enabled, across varying environmental conditions



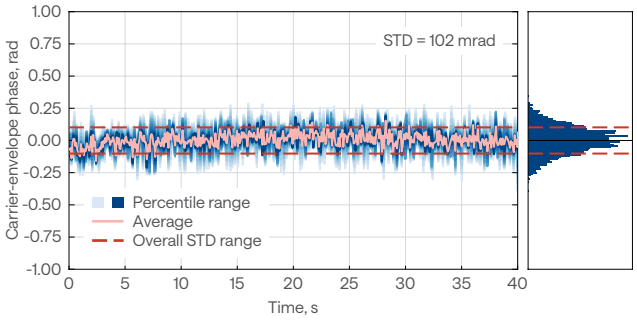
PHAROS
Typical pulse-to-pulse energy stability



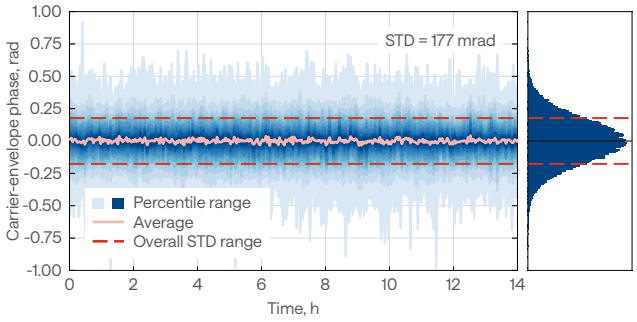
CEP stabilization

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

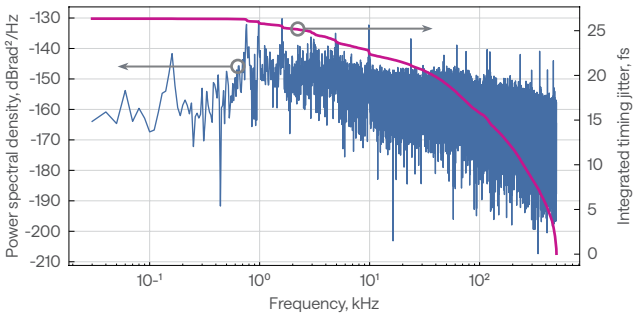


Repetition rate locking

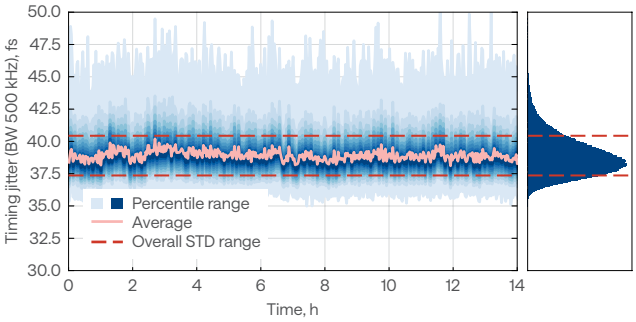
The oscillator of **PHAROS** laser can be customized for repetition rate locking applications. Coupled with the necessary feedback electronics, the repetition rate is synchronized to an external RF source using the two piezo stages installed inside the cavity.

The repetition rate locking system can assure an integrated timing jitter of less than 200 fs for RF reference frequencies larger than 500 MHz. Continuous phase shifting is available on request.

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

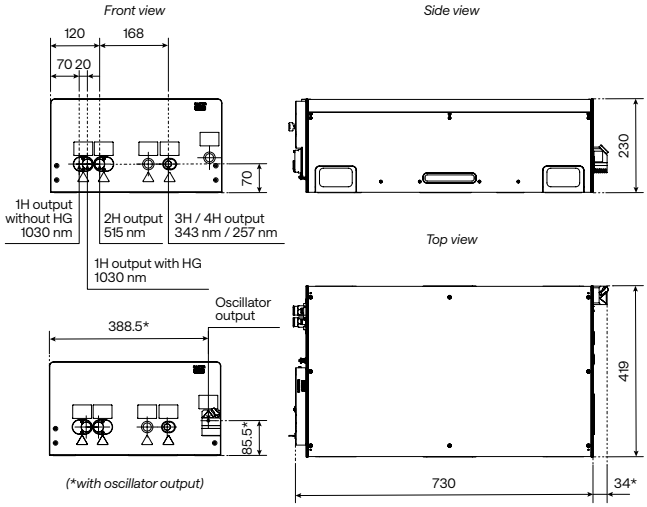


Timing jitter stability over 14 h
PHAROS oscillator locked to a 2.8 GHz RF source

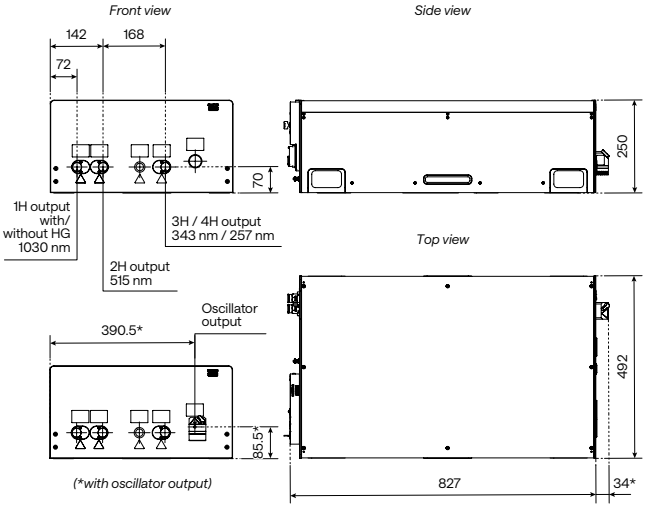


Drawings

PHAROS-PH2-730 drawing.
PH2 or PH2-SP with FEC, BiBurst, or harmonics



PHAROS-PH2-827 drawing
PH2 with -HE harmonics, PH2-4mJ, or PH2-UP with harmonics



HG | CARBIDE

Automated Harmonic Generators

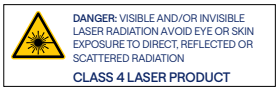
CARBIDE-CB3 with 2H-3H

- 515 nm, 343 nm, 257 nm, or 206 nm output
- Automated harmonic selection
- Mounted directly on the laser head
- Industrial-grade design
- 50 W UV model

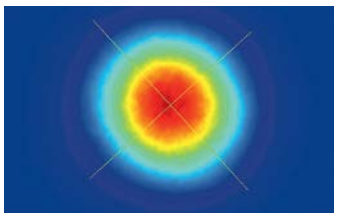
Specifications

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, typical values	≤ 400 µJ pump	< 1.15 (2H)	< 1.15 (2H) < 1.2 (3H)	< 1.15 (2H) n/a (4H)	n/a	< 1.3 (3H)	< 1.3 (3H)
	> 400 µJ pump	< 1.2 (2H)	< 1.2 (2H) < 1.3 (3H)	< 1.2 (2H) n/a (4H)	n/a		

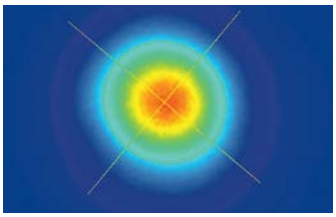
[1] *Refer to CARBIDE-CB3-UV for more details.*
[2] *Depends on pump laser model. Up to 5th harmonic available; contact sales@lightcon.com for more details.*
[3] *Maximum output power of 5 W. More than 4 W is available at 50 – 400 µJ pump energies and ≈ 500 fs pump pulse duration.*
[4] *Maximum output power of 0.2 W.*



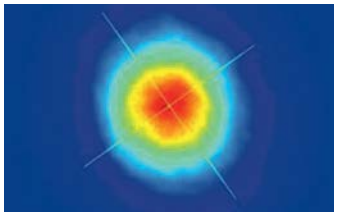
CARBIDE-CB5 (100 kHz, 6 W)
Typical 1H beam profile



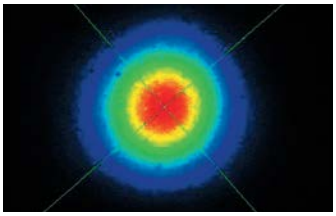
CARBIDE-CB5 (100 kHz, 3.4 W)
Typical 2H beam profile



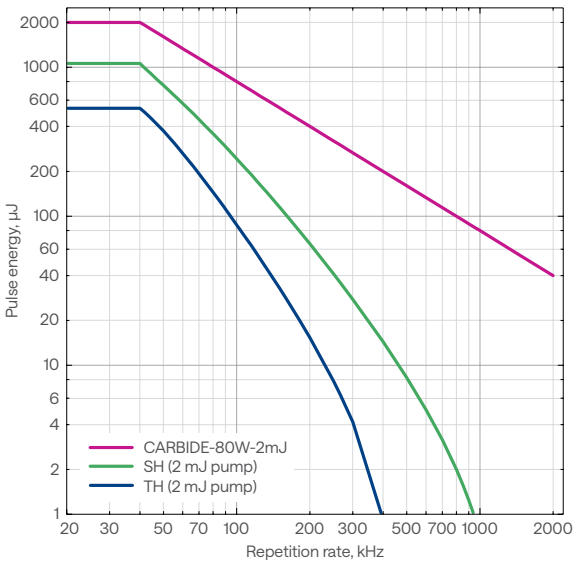
CARBIDE-CB5 (100 kHz, 2.2 W)
Typical 3H beam profile



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

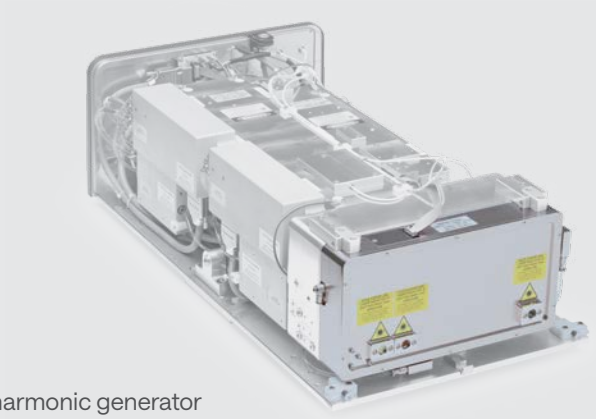


CARBIDE-CB3-80W with HG
Pulse energy vs repetition rate



HG | PHAROS

Automated Harmonic Generators



PHAROS with a harmonic generator

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

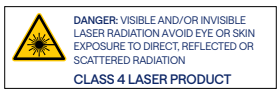
Specifications

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		20 – 4000 µJ	50 – 4000 µJ	20 – 4000 µJ	200 – 1000 µJ
Pump pulse duration		100 – 500 fs			
Conversion efficiency		> 50% (2H)	> 50% (2H) > 25% (3H)	> 50% (2H) > 10% (4H) [2]	> 10% (4H) [2] > 5% (5H) [3]
Beam quality, M^2, typical values	≤ 400 µJ pump	<1.15 (2H)	<1.15 (2H) <1.2 (3H)	<1.15 (2H) n/a (4H)	n/a
	> 400 µJ pump	<1.2 (2H)	<1.2 (2H) <1.3 (3H)	<1.2 (2H) n/a (4H)	

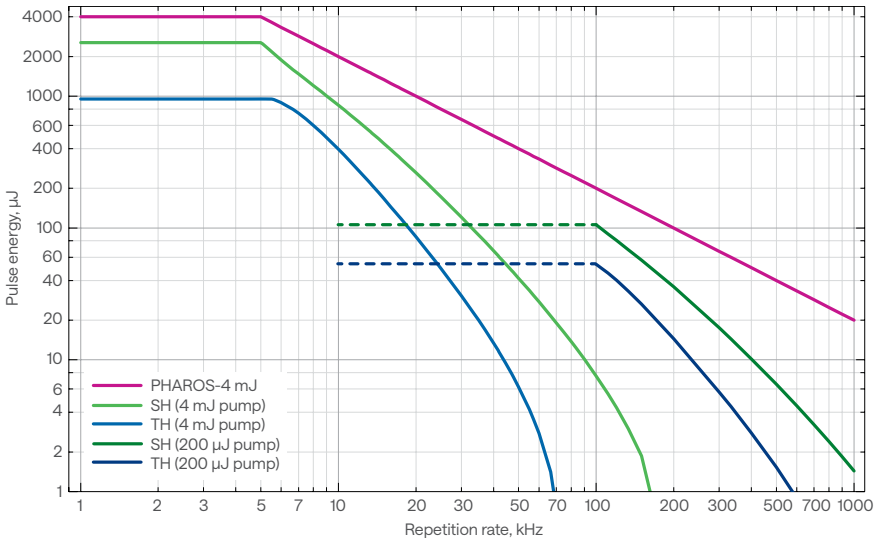
[1] *Depends on pump laser model.*

[2] *Maximum output power of 2 W at 20 – 1000 µJ pump or 1 W at 1000 – 4000 µJ pump.*

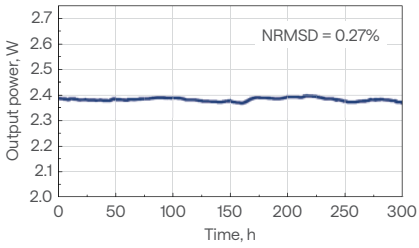
[3] *Maximum output power of 150 mW.*



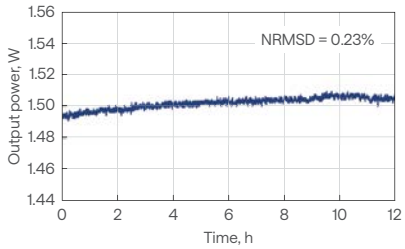
PHAROS with HG pulse energy vs repetition rate



3H output power stability



4H output power stability



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 for PHAROS / CARBIDE and FLINT

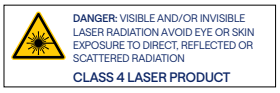
HIRO for PHAROS / CARBIDE

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)]		
Polarization [7)]	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 200 kHz.*
5) *Maximum output power of 1 W.*
6) *Maximum ouput power of 150 mW. Only for HIRO-HP/HE.*
7) *Different polarization is available upon request.*



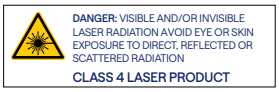
HIRO for FLINT

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

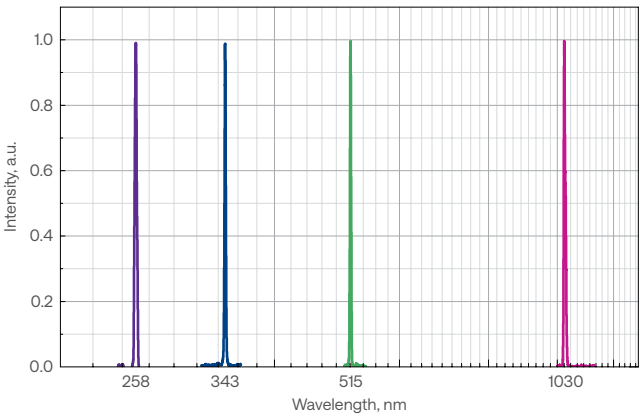
PHYSICAL DIMENSIONS

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

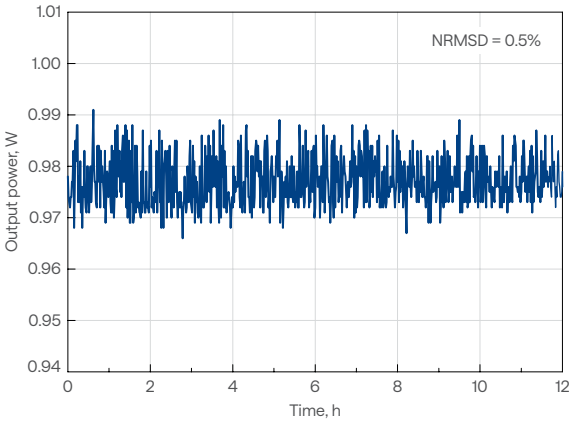
[1] *For high power 2H, refer to HG for FLINT.*
[2] *For pump power of > 500 mW.*



HIRO outputs

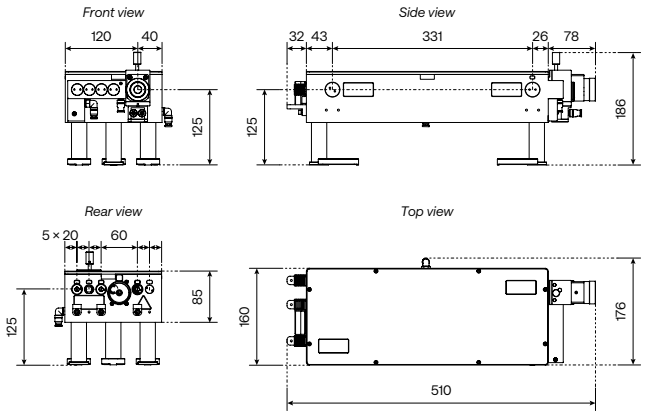


4H output power stability

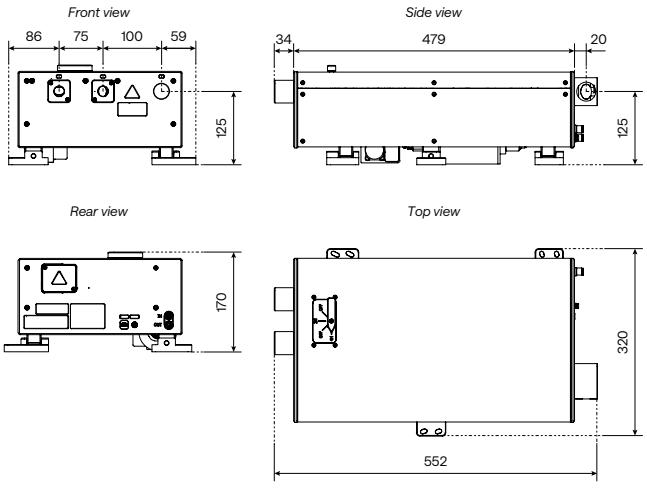


Drawings

HIRO drawing



HIRO-HP/HE drawing



Wavelength-Tunable Sources

LIGHT CONVERSION's OPAs offer a broad tuning range from deep-UV to mid-IR. Coupled with our femtosecond lasers, these OPAs provide an invaluable source for ultrafast spectroscopy, nonlinear microscopy, and a variety of other scientific applications.

I-OPA	The only commercial industrial-grade OPA combines wavelength tunability with robust industrial design.
ORPHEUS | NEO	The next-generation of OPAs with exceptional stability and multiple detectors for continuous power monitoring and diagnostics.
ORPHEUS	Classic OPAs that many are used to. Just like TOPAS, they are quite simple yet offer an extensive range of parameters.

Continuous wavelength tunability from UV to MIR

Pulse duration from tens of femtoseconds to a few picoseconds

Leading OPA manufacturer for more than 30 years

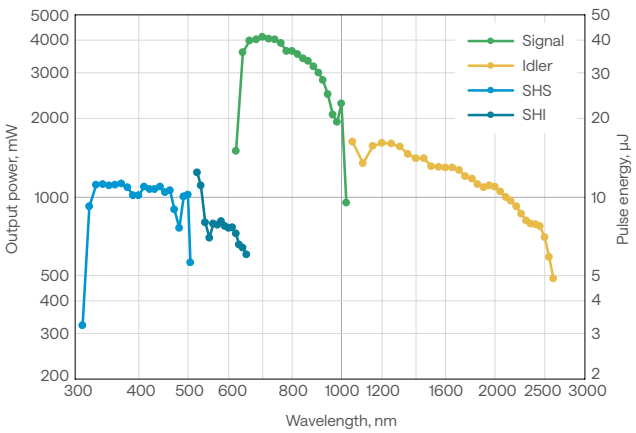
I-OPA

Industrial-Grade Optical Parametric Amplifier

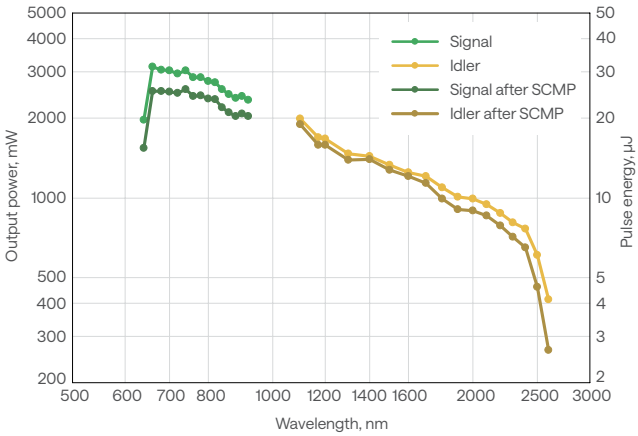
I-OPA-TW on air-cooled CARBIDE-CB5

- 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

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



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 – 10000 nm (DFG)
Pulse compression options [2]	n/a	SCMP (signal pulse compressor) ICMP (idler pulse compressor) GDD-CMP (compressor with GDD control)	n/a

PUMP LASER REQUIREMENTS

Pump laser	PHAROS or CARBIDE
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

Operating temperature [6]	19 – 25 °C (air conditioning recommended)
Relative humidity [6]	20 – 70% (non-condensing)
Electrical requirements	n/a [7]

[1] *In case of 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 – 900 nm, 40 – 100 fs @ 1200 – 2000 nm.*

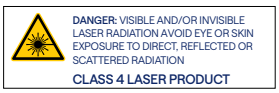
[3] *Output pulse duration depends on selected wavelength and pump laser pulse duration.*

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

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

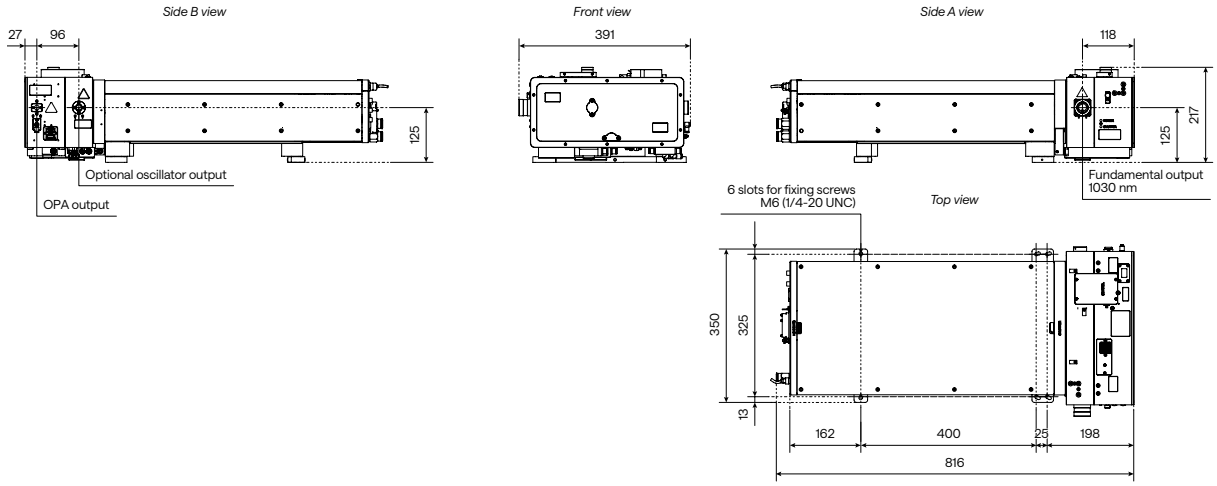
[6] *Specifications are guaranteed for a maximum temperature variation of ± 1 °C and humidity variation of ± 10%.*

[7] *I-OPA is powered by the same electrical source as the pump laser. Thus, refer to the pump laser electrical requirements.*

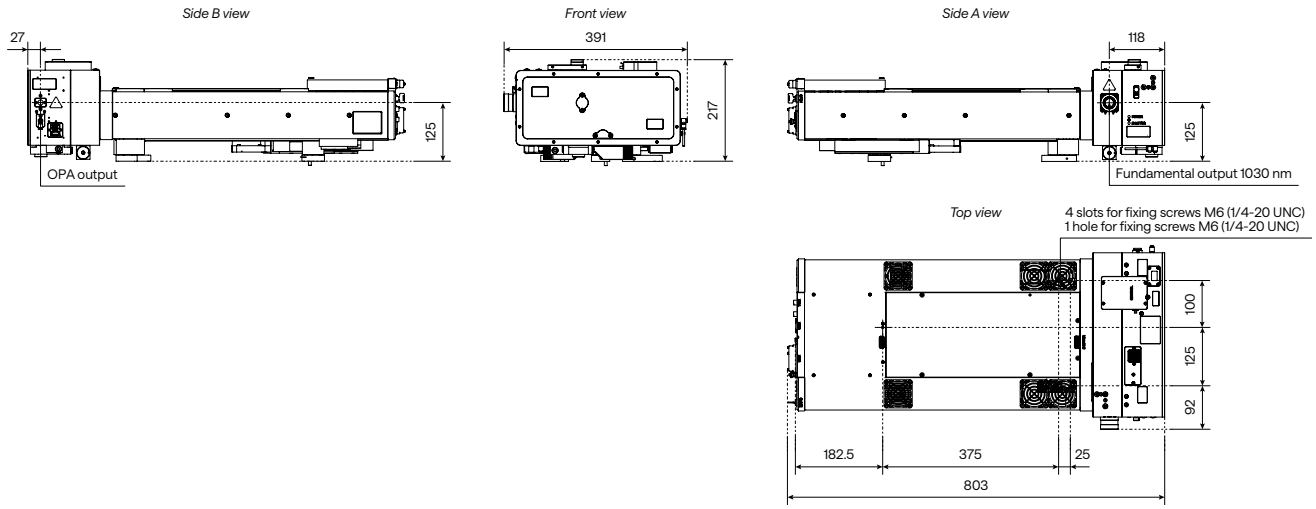


Drawings

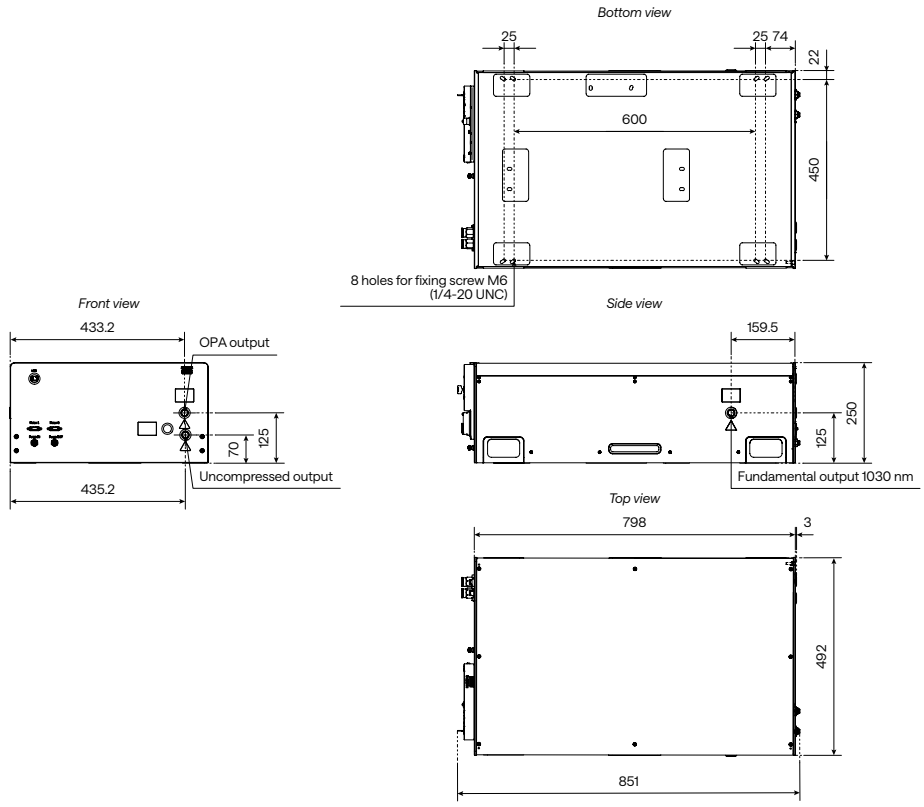
CARBIDE-CB3 with **I-OPA-HP** drawing and output ports



CARBIDE-CB5 with **I-OPA-HP** drawing and output ports



PHAROS-PH2 with **I-OPA-HP** drawing and output ports

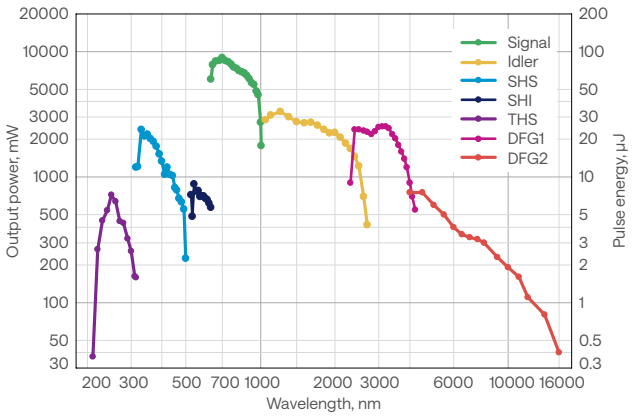


ORPHEUS | NEO

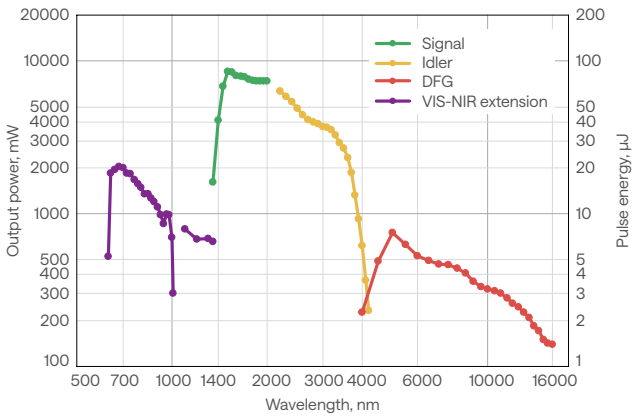
Next-Generation Optical Parametric Amplifier

- From UV to MIR
- Continuous power monitoring and diagnostics
- Pumped by PHAROS-UP for ultrashort pulses
- Up to 80 W, 800 µJ pump at up to 2 MHz
- Fully integrated wavelength extensions
- Exceptional output stability

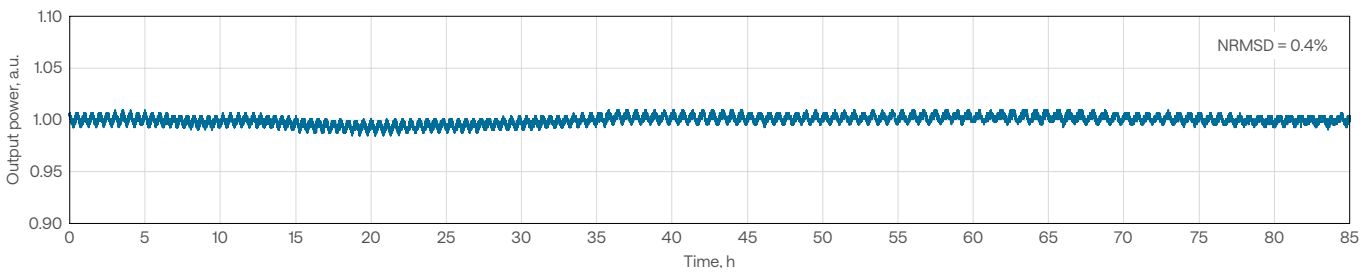
ORPHEUS-NEO typical tuning curves in HP configuration.
Pump: 80 W, 800 µJ, 100 kHz



ORPHEUS-NEO-ONE typical tuning curves in ONE configuration.
Pump: 80 W, 800 µJ, 100 kHz



ORPHEUS-NEO typical long-term power stability at 800 nm



ORPHEUS-NEO specifications

Model	ORPHEUS-NEO	ORPHEUS-NEO-ONE
Configuration	ORPHEUS	ORPHEUS-ONE
Pump power	Up to 80 W	
Pump pulse energy	20 – 800 µJ	
Repetition rate	Up to 2 MHz	
Tuning range	640 – 1000 nm (signal) 1050 – 2600 nm (idler)	1400 – 2000 nm (signal) 2100 – 4200 nm (idler)
Conversion efficiency	> 7% @ 700 nm (40 – 800 µJ pump; up to 1 MHz)	> 9% @ 1550 nm (40 – 800 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	60 – 220 cm^{-1} @ 700 – 960 nm	50 – 150 cm^{-1} @ 1450 – 2000 nm
Pulse duration [1]	120 – 400 fs	100 – 400 fs
Beam quality, M^2	< 1.3 @ 800 nm	< 1.3 @ 1550 nm
Beam diameter [2]	2.1 ± 0.6 mm @ 800 nm	2.1 ± 0.6 mm @ 1550 nm
Beam divergence (full-angle)	< 2 mrad @ 800 nm	< 4 mrad @ 1550 nm
Long-term power stability, 8 h [3]	< 1% @ 800 nm	< 1% @ 1550 nm
Pulse-to-pulse energy stability, 1 min [3]	< 1% @ 800 nm	< 1% @ 1550 nm
Wavelength extension options; conversion efficiency	210 – 320 nm (THS); > 0.4% @ 250 nm	640 – 1000 nm and 1050 – 1350 nm (VIS–NIR); > 1% @ 700 nm
	320 – 500 nm (SHS) and 525 – 640 nm (SHI); > 1.2% @ 350 nm	
	2500 – 4200 nm (DFG1); > 3% @ 3000 nm	4000 – 16000 nm (DFG); > 0.3% @ 10000 nm (for > 40 µJ pump)
	4000 – 16000 nm (DFG2); > 0.2% @ 10000 nm	

PUMP LASER REQUIREMENTS

Configuration	PHAROS or CARBIDE
Center wavelength	1030 ± 10 nm
Maximum pump power	80 W
Maximum repetition rate	2 MHz
Pump pulse energy	20 – 800 µJ
Pump pulse duration	180 – 500 fs

ENVIRONMENTAL & UTILITY REQUIREMENTS

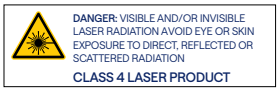
Operating temperature [4]	19 – 25 °C (air conditioning recommended)
Relative humidity [4]	20 – 70% (non-condensing)
Electrical requirements	100 – 240 V AC, 4.5 A; 50 – 60 Hz
Rated power	280 W
Power consumption	Standby: 20 W Max during wavelength tuning: 200 W

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

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

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

[4] *Specifications are guaranteed for a maximum temperature variation of ± 1 °C and humidity variation of ± 10%.*



ORPHEUS-NEO-UP specifications

Model	ORPHEUS-NEO-UP	ORPHEUS-NEO-ONE-UP
Configuration	ORPHEUS	ORPHEUS-ONE
Pump power	Up to 20 W	
Pump pulse energy	20 – 400 µJ	
Repetition rate	Up to 1 MHz	
Tuning range	640 – 1000 nm (signal) 1050 – 2600 nm (idler)	1450 – 2000 nm (signal) 2100 – 4500 nm (idler)
Conversion efficiency	> 7% @ 700 nm	> 9% @ 1550 nm
Spectral bandwidth	120 – 300 cm^{-1} @ 700 – 2600 nm	150 – 300 cm^{-1} @ 1500 – 1900 nm & 2200 – 3500 nm [1]
Pulse duration [2]	< 100 fs @ 700 – 1000 nm < 120 fs @ 1060 – 2000 nm	< 120 fs @ 1500 – 1900 nm
Beam quality, M^2	< 1.3 @ 800 nm	< 1.3 @ 1550 nm
Beam diameter [3]	2.1 ± 0.6 mm @ 800 nm	2.1 ± 0.6 mm @ 1550 nm
Beam divergence (full-angle)	< 2 mrad @ 800 nm	< 4 mrad @ 1550 nm
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; conversion efficiency	210 – 320 nm (THS); > 0.2% @ 250 nm	640 – 1000 nm and 1050 – 1450 nm (VIS–NIR); > 1% @ 700 nm
	320 – 500 nm (SHS) and 525 – 640 nm (SHI); > 1.2% @ 350 nm	
	2500 – 4500 nm (DFG1); > 3% @ 3000 nm	4500 – 14000 nm (DFG); 0.2% @ 10000 nm
	4500 – 14000 nm (DFG2); > 0.1% @ 10000 nm	

PUMP LASER REQUIREMENTS

Configuration	PHAROS-UP
Center wavelength	1030 ± 10 nm
Maximum pump power	20 W
Maximum repetition rate	1 MHz
Pump pulse energy	20 – 400 µJ
Pump pulse duration	80 – 100 fs

ENVIRONMENTAL & UTILITY REQUIREMENTS

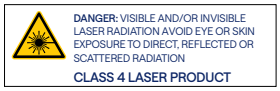
	Refer to www.lightcon.com

[1] *Spectral bandwidth is equal to 150 – 250 cm^{-1} @ 5000 – 12000 nm.*

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

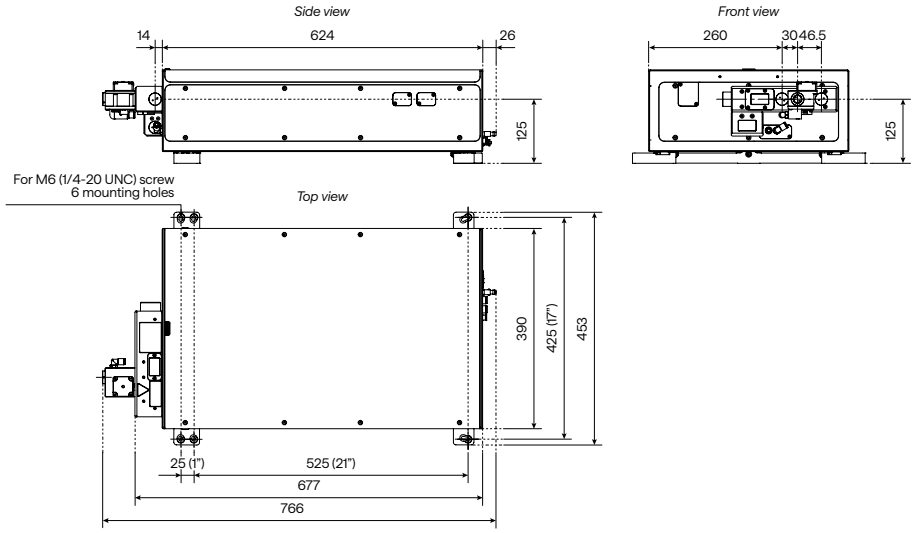
[3] *FW 1/e², measured at laser output, using maximum pulse energy.*

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



Drawings

ORPHEUS-NEO / ORPHEUS-NEO-UP drawings

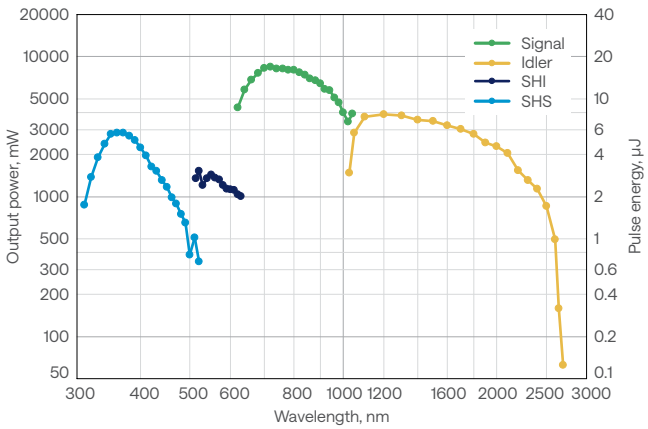


ORPHEUS

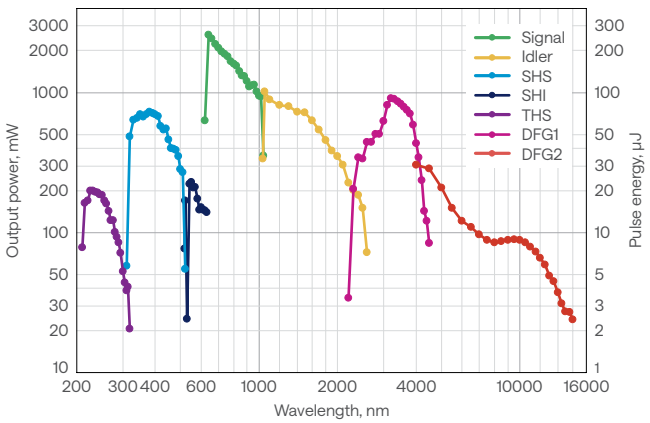
Collinear Optical Parametric Amplifier

- Continuous tunability from UV to MIR, 190 – 16000 nm
- High energy and high power models for all needs
- Single-shot – 2 MHz repetition rate
- Up to 80 W pump power
- Up to 2 mJ pump pulse energy

ORPHEUS-HP typical tuning curves.
Pump: 80 W, 160 µJ, 500 kHz



ORPHEUS-HE typical tuning curves.
Pump: 20 W, 2 mJ, 10 kHz



For custom tuning curves visit
http://toolbox.lightcon.com/tools/tuningcurves

Specifications

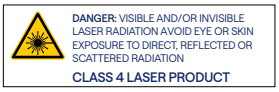
Model	ORPHEUS-HP		ORPHEUS-HE
MAIN OUTPUT (630 – 2600 nm)			
Tuning range	630 –1030 nm (signal) 1030 – 2600 nm (idler)		
Maximum pump power	80 W		
Pump pulse energy	8 – 20 µJ	20 – 400 µJ	400 – 2000 µJ
Conversion efficiency at peak	> 4.5% (signal) > 2% (idler)	> 9% (signal) > 4% (idler)	
Pulse duration	120 – 400 fs		
Spectral bandwidth @ 700 – 960 nm	60 – 220 cm^{-1}		
Long-term power stability, 8 h [1]	< 2% @ 800 nm		
Pulse-to-pulse energy stability, 1 min [1]	< 2% @ 800 nm		
WAVELENGTH EXTENSIONS (190 – 16000 nm)			
Pump pulse energy	8 – 20 µJ	20 – 400 µJ	400 – 2000 µJ
315 – 630 nm (SHS/SHI)	> 1.2% @ 350 nm	> 2.4% @ 350 nm	
210 – 315 nm (THS)	> 0.4% @ 250 nm [2]	> 0.8% @ 250 nm [2]	
190 – 215 nm (DUV)	n/a	> 0.3% @ 200 nm [3]	Contact sales@lightcon.com
2200 – 4200 nm (DFG1)	> 1.5% @ 3000 nm	> 3% @ 3000 nm	
4000 – 16 000 nm (DFG2)	> 0.1% @ 10000 nm	> 0.2% @ 10000 nm	
PUPM LASER REQUIREMENTS			
Pump laser	PHAROS or CARBIDE		
Center wavelength	1030 ± 10 nm		
Maximum pump power	80 W		
Maximum repetition rate	2 MHz	200 kHz	
Pump pulse energy	8 – 400 µJ	400 – 2000 µJ	
Pulse duration [4]	180 – 500 fs		
ENVIRONMENTAL & UTILITY REQUIREMENTS			
	Refer to www.lightcon.com		

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

[2] *Maximum output power of 400 mW.*

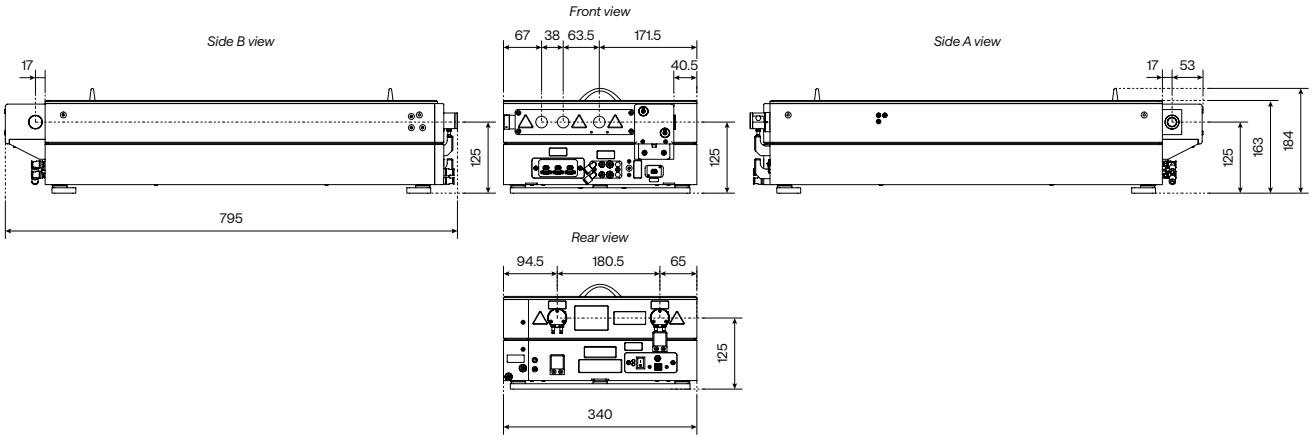
[3] *DUV conversion efficiency is specified for pump power up to 10 W and up to 200 kHz. In case of higher pump power, conversion efficiency decreases. Maximum output power of 40 mW @ 200 nm.*

[4] *FWHM, assuming Gaussian pulse shape.*



Drawings

ORPHEUS-HP/HE drawings



Ultrafast Spectroscopy Applications

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

Femtosecond pump-probe

Time-resolved fluorescence spectroscopy

Flash photolysis

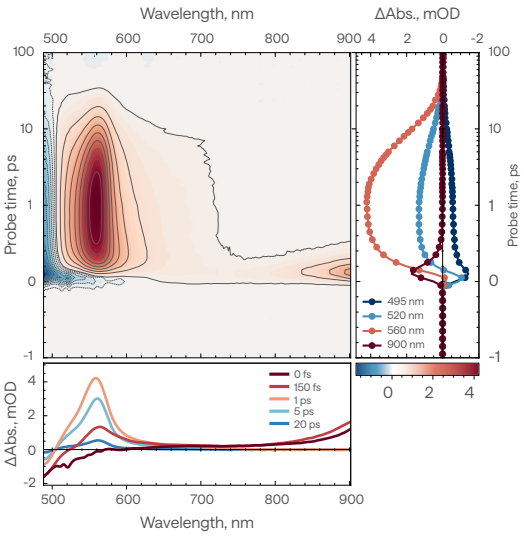
Ultrafast Spectroscopy

HARPIA | TA

Femtosecond pump-probe

Spectral dynamics of beta-carotene in solution acquired using **HARPIA-TA**.

MEASUREMENT CONDITIONS
Pulse repetition rate: 100 kHz
Pump wavelength: 490 nm
Pump energy: < 10 nJ
Acquisition time: 13 s per spectrum (per delay point)

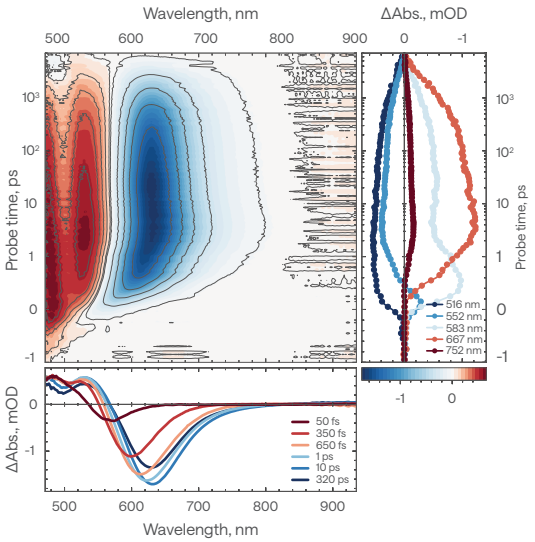


HARPIA | LIGHT

Femtosecond pump-probe

Spectral dynamics of DCM laser dye in solution acquired using **HARPIA-LIGHT**.

MEASUREMENT CONDITIONS
Pulse repetition rate: 60 kHz
Pump wavelength: 343 nm
Acquisition time: 3 s per spectrum (per delay point)

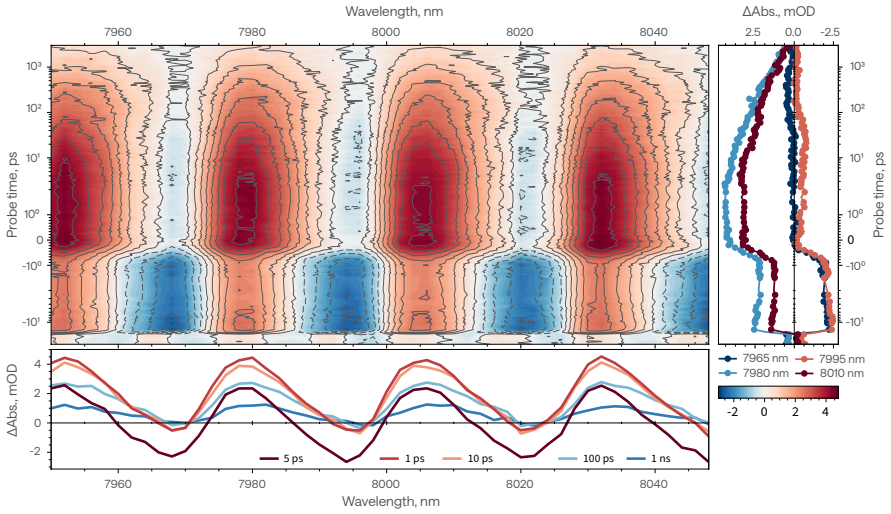


HARPIA | TA

IR femtosecond pump-probe

Pump-probe dynamics of GaAs wafer in IR measured using signal and reference single-channel detectors of **HARPIA-TA**.

MEASUREMENT CONDITIONS
Pulse repetition rate: 75 kHz
Pump wavelength: 700 nm
Acquisition time: 1 s per point



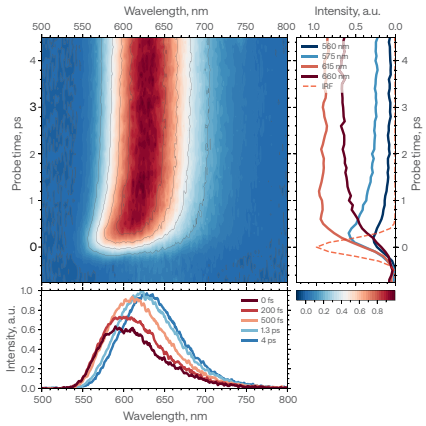
HARPIA | TF

Time-resolved fluorescence spectroscopy

Time-resolved fluorescence spectroscopy provides information on molecular processes in the excited state. The **HARPIA-TF** module for the **HARPIA-TA** system combines Kerr gate or fluorescence upconversion with TCSPC techniques. Utilizing a high repetition rate **PHAROS** or **CARBIDE** femtosecond laser, fluorescence dynamics are measured while exciting the samples with pulse energies down to several nanojoules.

Kerr gate measurement

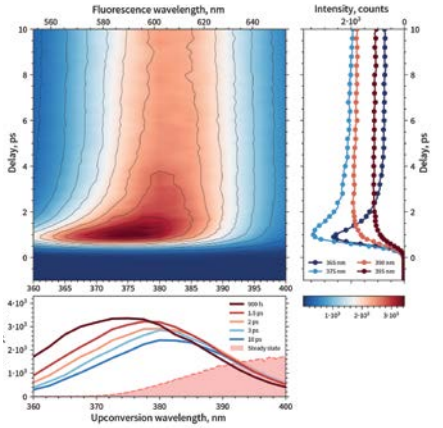
Kerr gate measurements in DCM illustrate the method's ability to probe fluorescence evolution with a sub-picosecond temporal resolution.



Fluorescence upconversion

Fluorescence dynamics of DCM laser dye in solution acquired using **HARPIA-TF** in fluorescence upconversion mode.

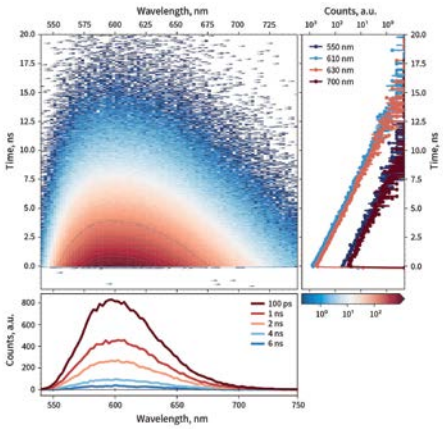
MEASUREMENT CONDITIONS
Repetition rate: 100 kHz
Pump wavelength: 430 nm



TCSPC

Fluorescence dynamics of DCM laser dye in solution acquired using **HARPIA-TF** in TCPSC mode.

MEASUREMENT CONDITIONS
Repetition rate: 100 kHz
Pump wavelength: 430 nm

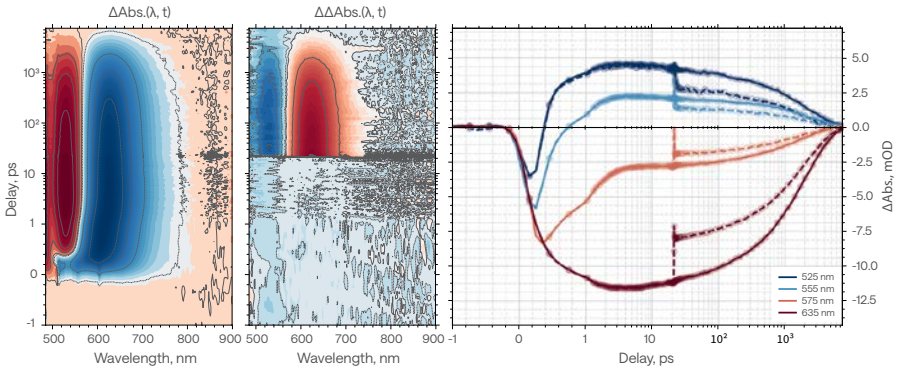


HARPIA | TB

Femtosecond pump-dump-probe

Pump-dump-probe dynamics of DCM laser dye measured using **HARPIA-TB** with a dump pulse resonant to the emission band of DCM.

MEASUREMENT CONDITIONS
Pulse repetition rate: 50 kHz
Pump wavelength: 515 nm
Dump wavelength: 700 nm
Dump delay: 21 ps
Pump energy: 90 nJ
Dump energy: 190 nJ

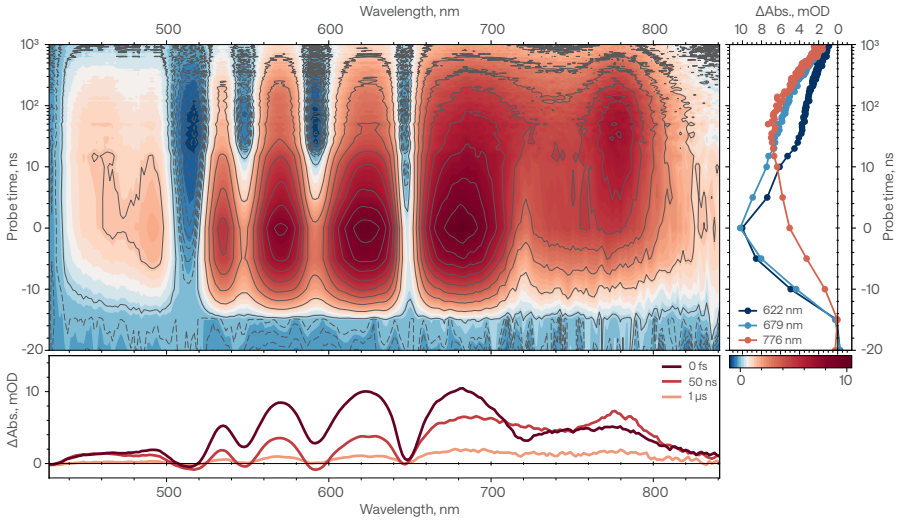


HARPIA | TA-FP

Flash photolysis

Nanosecond spectral dynamics of meso-Tetraphenylporphine in solution acquired using **HARPIA-TA-FP** flash photolysis mode.

MEASUREMENT CONDITIONS
Pulse repetition rate: 1.8 kHz
Pump wavelength: 343 nm
Pump energy: 5.4 µJ



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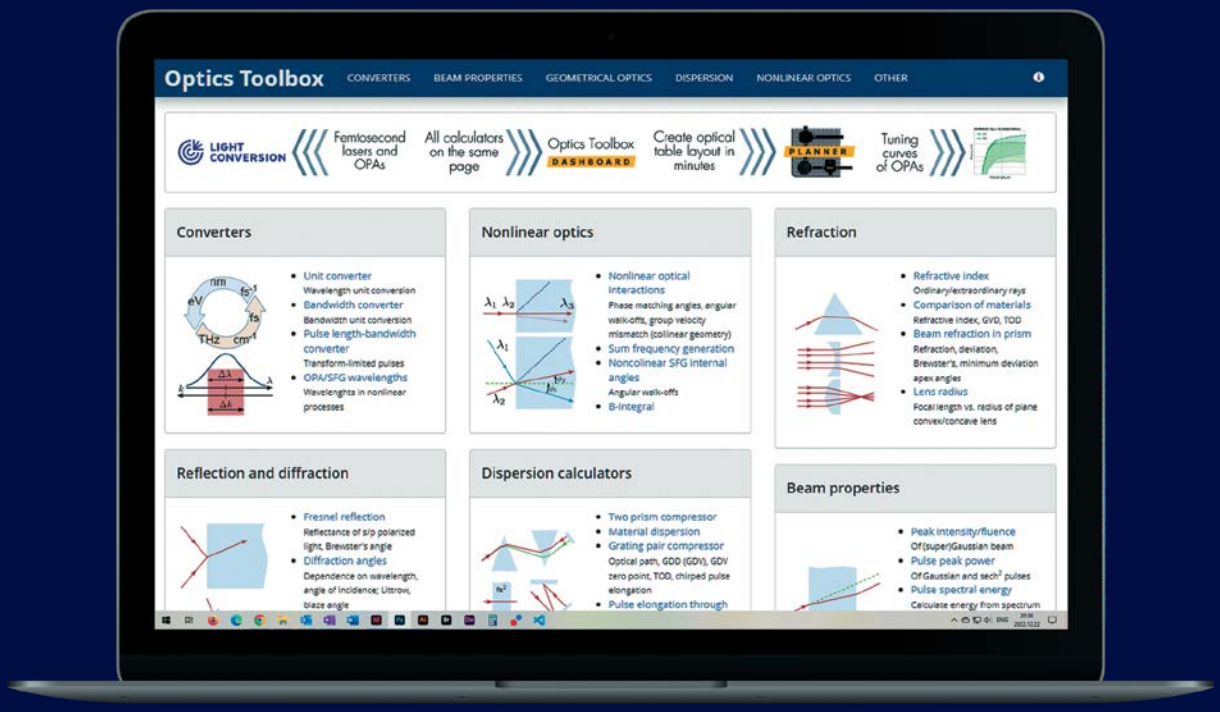

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