

FLINT

Ultrafast Yb Oscillator



FEATURES

- First choice for seeding of Yb based ultrashort pulse amplifiers
- Excellent pulse contrast due to the high nonlinearity inherent for optical Kerr effect
- High output power up to 10 W (pulse energy up to 130 nJ at 76 MHz)
- Ideal source for broadband THz generation
- Spectrum bandwidth is broad enough for seeding simultaneously Yb and Nd based laser sources in OPCPA systems
- Optional CEP stabilization
- Possibility to lock output pulse phase to external clock
- Sub-80 fs pulses directly from the cavity of the laser without any additional external pulse compressors

The FLINT oscillator is based on Yb:KGW crystal end-pumping by high brightness laser diode module. Generation of femtosecond pulses is provided by Kerr lens mode-locking, which is induced by perturbation of the cavity length. Once started, mode-locking remains stable over a long period of time and is immune to minor mechanical impact. Chirped mirrors are used in the laser cavity to adjust precisely the group velocity dispersion and cavity length. The oscillator can be equipped with external electrooptical Pulse Picker and appropriate timing electronics allowing selection of a single pulse at repetition rates up to 100 kHz. Piezo-actuator can be implemented in customized oscillators in order to control the cavity length. FLINT oscillator can also be equipped with Carrier Envelope Phase (CEP) stabilization system.

The oscillator module is machined from a single monolithic aluminium block which is cooled by water to ensure stable and robust operation. The oscillator housing has two separate sections: cavity section and pump module section on the opposite side. Detector module, which includes a photodiode for oscillator power monitoring, is attached to the front side. The oscillator is contained in an external casing in order to reduce the performance impact of environmental temperature changes. The special design of the external casing includes three point kinematic mounts which are used to support the oscillator preventing any mechanical stress caused by differences of thermal expansion between the optical table and the laser housing.

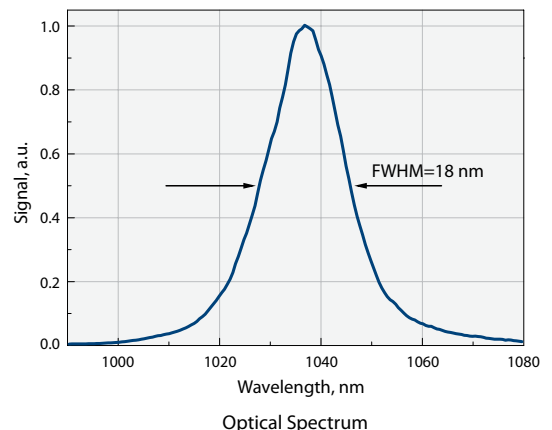
SPECIFICATIONS

Model	FLINT 1.0	FLINT 2.0	FLINT 4.0	FLINT 6.0
Max. average power	>1 W	>2 W	>4 W	>6 W
Pulse duration (assuming Gaussian pulse shape)	<80 fs	<100 fs	<100 fs	<100 fs
Pulse energy	>12 nJ	>25 nJ	>50 nJ	>75 nJ
Repetition rate	76 ± 0.5 MHz ¹⁾			
Centre wavelength	1035 ± 10 nm ²⁾			
Output pulse stability	< 0.5 % rms over 24 hours ³⁾			
Polarization	Linear, horizontal			
Beam pointing stability	<10 μrad/°C			
Beam quality	TEM ₀₀ ; M ² < 1.2			
Optional 2H generator	Conversion efficiency >30% at 517 nm			

¹⁾ Other repetition rates are available in the range from 64 MHz to 84 MHz.

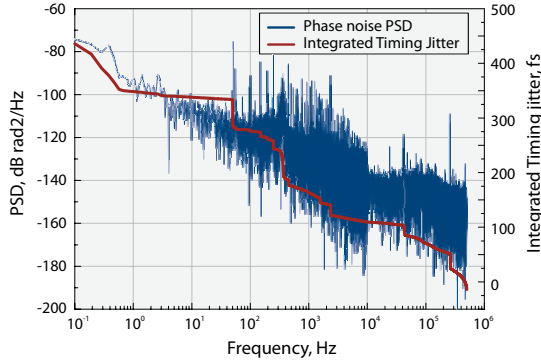
²⁾ The center wavelength can be specified with tolerance ±2 nm for customized oscillators.

³⁾ With power lock on under stable environment.



LOCKING OF THE OPTICAL PULSE TO AN EXTERNAL SIGNAL

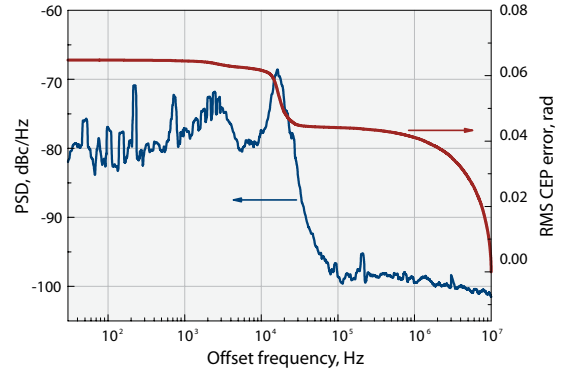
PHAROS oscillator can be equipped with piezo actuators for precise control of the cavity length. This feature allows one to lock the optical pulse of the laser to an external signal with timing jitter <450 fsec in the 0.1 Hz – 500 kHz frequency range.



Timing jitter between oscillator pulse and external clock signal in 0.1 Hz – 500 kHz frequency range.

CARRIER ENVELOPE PHASE (CEP) STABILIZATION

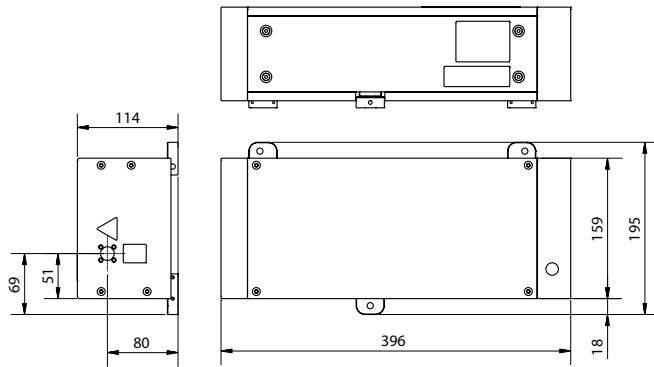
PHAROS oscillator can be equipped with nonlinear interferometer and feedback loop throughout the pump current of the laser diode bar for CEP stabilization. The figure on the right shows typical measurement of power spectrum density and integrated CEP phase error. The integrated phase error in the frequency range from 50 Hz to 10 MHz is <70 mrad (in loop measurement).



Single side power spectral density of f_{ceo} phase noise (in loop) and the integrated phase jitter.

PHYSICAL DIMENSIONS

Laser head (L × W × H)	396 × 195 × 114 mm
Laser head with 2H (L × W × H)	408 × 270 × 114 mm
Power supply and chiller rack (4HU, 19") (L × W × H)	640 × 520 × 420 mm
Chiller (<100 W)	Different options



Outline drawing

OPTIONAL EQUIPMENT

Harmonic generator HIRO	see p. 16
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UTILITY REQUIREMENTS

Electric	110 VAC, 50-60 Hz, 2 A or 220 VAC, 50-60 Hz, 1 A
Room temperature	15-30 °C (air conditioning recommended)
Relative humidity	20-80 % (non-condensing)