FLINT

Femtosecond Oscillators

FEATURES

- < 40 fs pulse duration
- Up to 260 nJ pulse energy
- Up to 20 W output power
- 76 MHz repetition rate
- Industrial-grade design
- Automated second harmonic generator
- CEP stabilization option
- Repetition rate locking to an external source

FLINT-FL2

FLINT is a series of femtosecond Yb oscillators providing industrial-grade design and state-of-the-art output parameters such as 20 W output power at 76 MHz repetition rate and sub-40 fs pulse duration. FLINT oscillators are based on Kerr-lens mode-locking. Once started, the mode-locking remains stable over a long time. Furthermore, oscillator cavity length can be adjusted with an optional piezo actuator. FLINT oscillators support carrier-envelope phase (CEP) stabilization and repetition rate locking to an external source.

SPECIFICATIONS

Model	FL1-02	FL1-08	FL2-12	FL2-20	FL2-SP	
Maximum output power	2 W	8 W	12 W	20 W	0.5 W	2 W
Pulse duration [1]	< 100 fs	< 120 fs	< 120 fs	< 170 fs	< 40 fs	< 50 fs
Maximum pulse energy [2]	25 nJ	105 nJ	157 nJ	260 nJ	6 nJ	25 nJ
Repetition rate	≈ 76 MHz [3]		≈ 76 MHz		≈ 76 MHz [4]	
Center wavelength	1035 [5] ± 10 nm	1030 ± 3 nm	1029 ± 3 nm	1026 ± 2 nm	1040 ± 10 nm	
Polarization	Linear, horizontal					
Beam quality	TEM_{00}; M^2 < 1.2					
Beam pointing stability	< 10 µrad/°C					
Pulse-to-pulse energy stability [6]	RMS deviation [7] < 0.5% over 24 h					
Long-term power stability	RMS deviation [7] < 0.5% over 100 h					
Internal 2H generator [8]	n/a		Optional; conversion efficiency > 30%			
Internal attenuator	n/a		Yes			

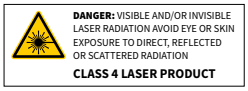
PHYSICAL DIMENSIONS

Laser head (L × W × H)	430 × 195 × 114 mm	542 × 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

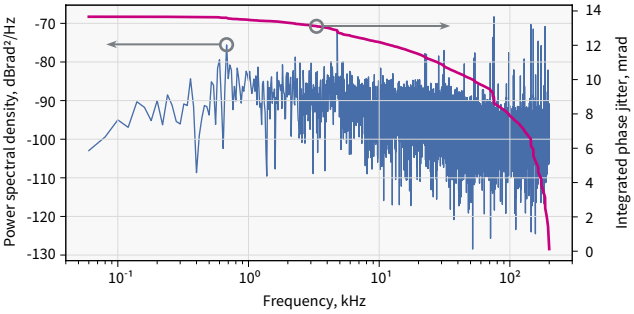
Operating temperature	15 – 30 °C (air conditioning recommended)		
Relative humidity	< 80% (non-condensing)		
Electrical requirements	100 V AC, 7 A – 240 V AC, 3 A; 50 – 60 Hz	100 V AC, 12 A – 240 V AC, 5 A; 50 – 60 Hz	
Rated power	200 W		
Power consumption	100 W	150 W	
Power consumption (chiller)	200 W	800 W	200 W

[1] Assuming Gaussian pulse shape.
[2] Depends on repetition rate. Approximate values are given for 76 MHz.
[3] Other repetition rates are available in the range from 60 to 100 MHz.
[4] Other repetition rates are available in the range from 70 to 80 MHz.
[5] Choice of a particular central wavelength with ±1 nm tolerance is available upon request.
[6] With enabled power-lock, under stable environment.
[7] Normalized to average pulse energy, NRMSD.
[8] For 3H or 4H generation, refer to HIRO for FLINT.



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.

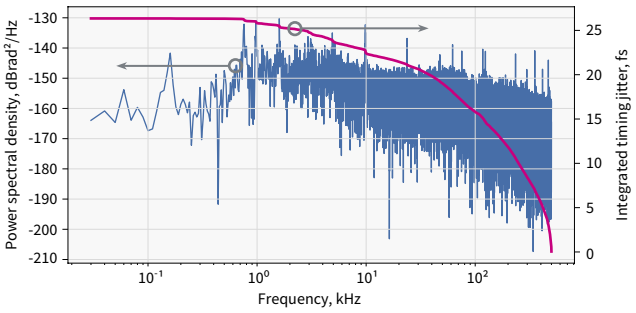


Phase noise data of CEP locked FLINT oscillator

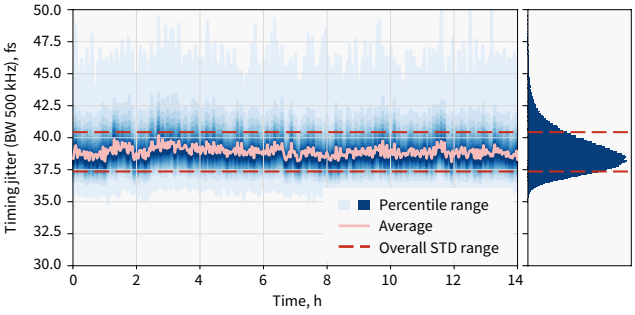
REPETITION RATE LOCKING

FLINT oscillators are customizable for repetition rate locking applications. Coupled with the necessary feedback electronics, the repetition rate can be 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.

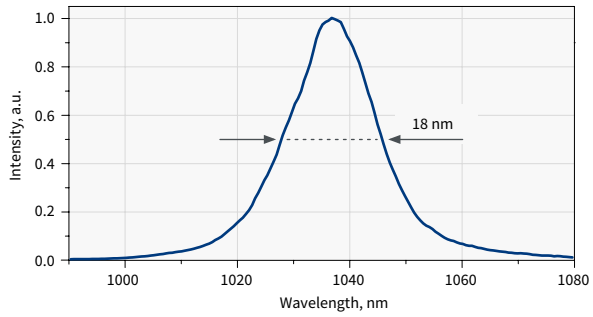


Phase noise data of FLINT oscillator
locked to a 2.8 GHz RF source

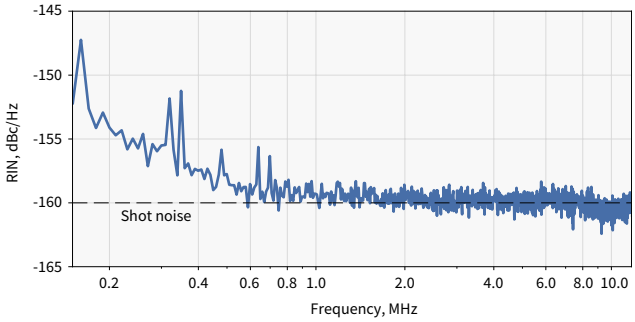


Timing jitter stability over 14 h;
FLINT oscillator locked to a 2.8 GHz RF source

PERFORMANCE

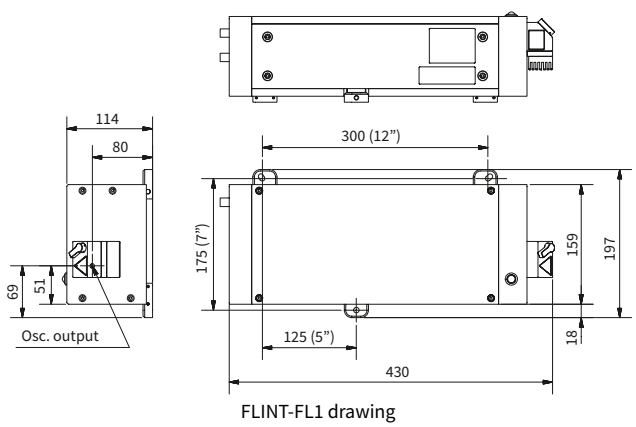


Typical FLINT optical spectrum

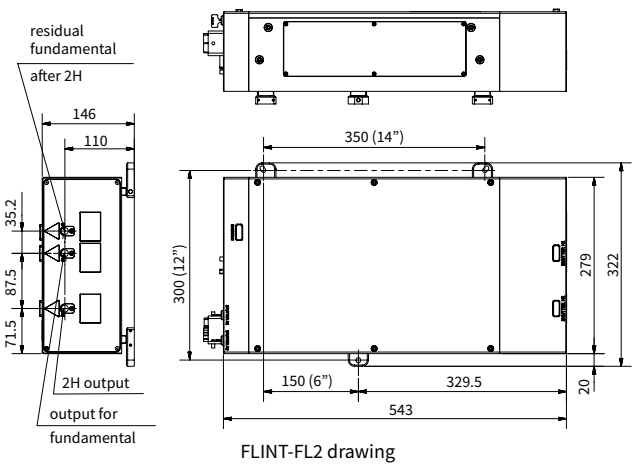


Relative intensity noise (RIN) of FLINT oscillator,
shot-noise limited at -160 dBc/Hz above 1 MHz

DRAWINGS



FLINT-FL1 drawing



FLINT-FL2 drawing