

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

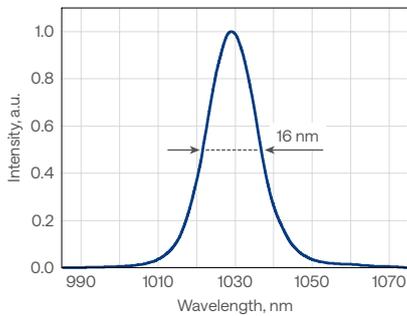
Down to 50 fs pulse duration

CEP stabilization or repetition rate locking

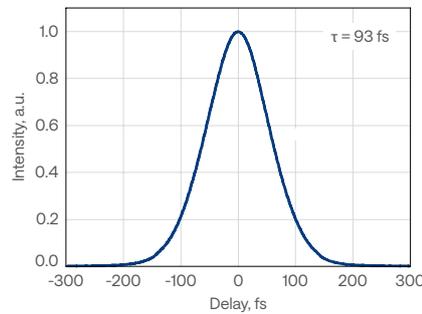


FLINT-FL1

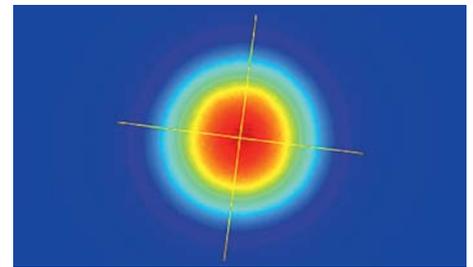
FLINT-FL1
Typical spectrum



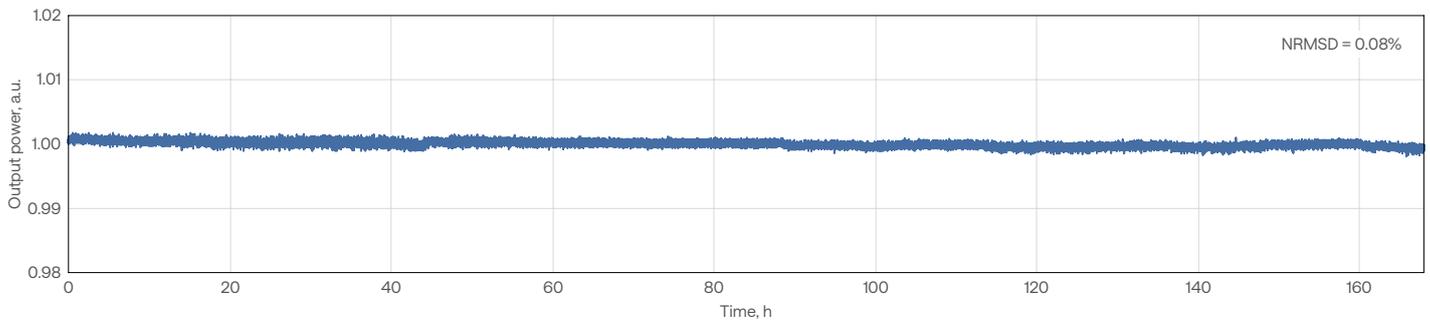
FLINT-FL1
Typical pulse duration



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 AND 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 |
| | Chiller | 600 W |
| | | 150 W |
| | | 1000 W |

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

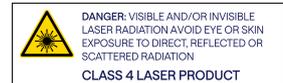
²⁾ Standard repetition rate is 80 MHz; custom repetition rate can be factory preset from the given range.

³⁾ Depends on the repetition rate. Values are given for 80 MHz.

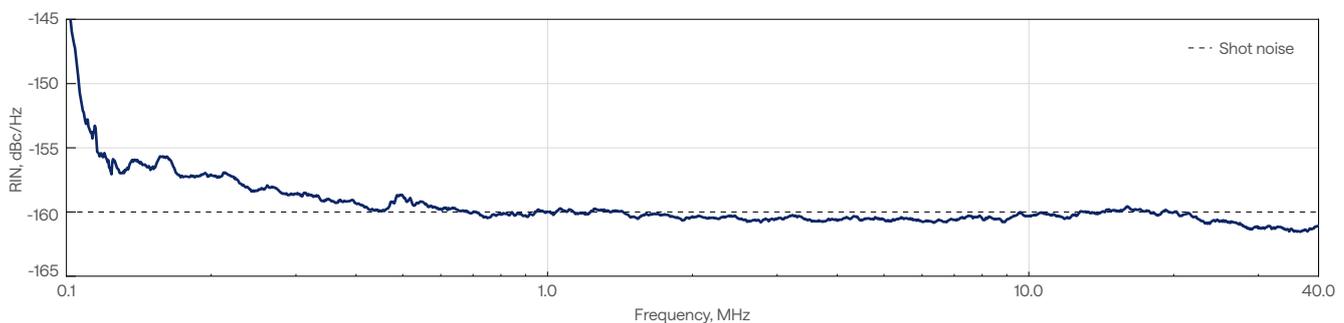
⁴⁾ With enabled power-lock, under stable environmental conditions. Expressed as normalized root mean squared deviation (NRMSD).

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

⁶⁾ Conversion efficiency specified at maximum power.



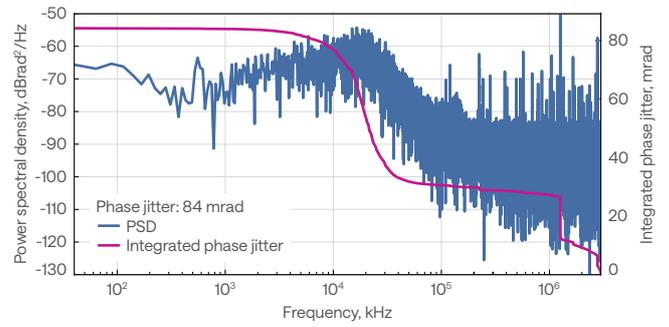
FLINT oscillator relative intensity noise (RIN), shot-noise limited at -160 dBc/Hz above 1 MHz



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 $1/4^{\text{th}}$ of the repetition rate with a < 100 mrad standard deviation.

CEP-locked FLINT oscillator phase noise data

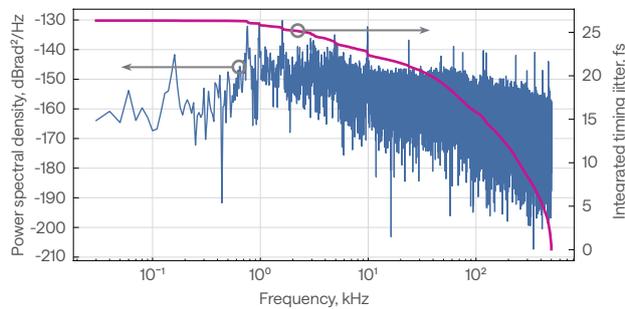


Repetition rate locking

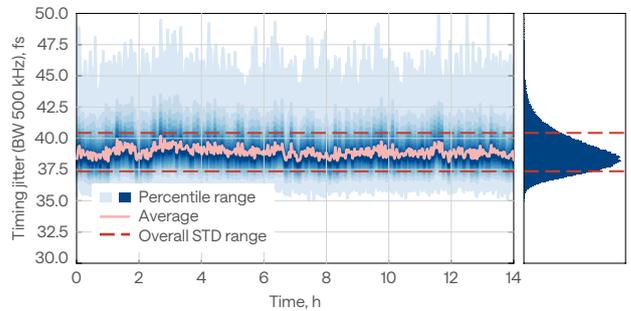
FLINT oscillators can be customized for repetition rate locking applications. Coupled with the necessary feedback electronics, the oscillator's repetition rate can be synchronized to an external RF source using the two piezo stages installed within the cavity.

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

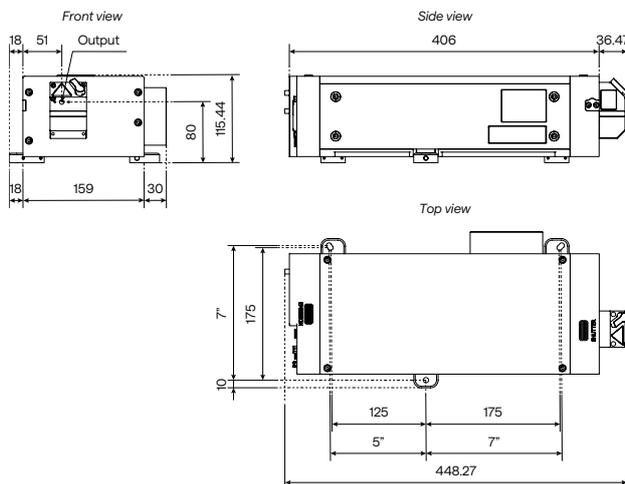


Timing jitter stability over 14 h FLINT oscillator locked to a 2.8 GHz RF source



Drawings

FLINT-FL1



FLINT-FL2

