

# PL2250 SERIES



PL2250 series lasers cost-effective design improves laser reliability and reduces running and maintenance costs.

## Innovative design

The heart of the system is a diode pumped solid state (DPSS) master oscillator placed in a hermetically sealed monolithic block. The flashlamp pumped regenerative amplifier is replaced by an innovative diode pumped regenerative amplifier. Diode pumping results in negligible thermal lensing, which allows operation of the regenerative amplifier at variable repetition rates, as well as improved long-term stability and maintenance-free operation.

The optimized multiple-pass power amplifier is flashlamp pumped and is optimized for efficient amplification of pulse while maintaining a near Gaussian beam profile and low wavefront distortion. The output pulse energy can be adjusted in approximately 1% steps, at the same time as pulse-to-pulse energy stability remains less than 0.8% rms at 1064 nm.

Angle-tuned KD\*P and KDP crystals mounted in thermostabilised ovens are used for second, third and fourth harmonic generation. Harmonic

separators ensure the high spectral purity of each harmonic directed to different output ports.

Built-in energy monitors continuously monitor output pulse energy. Data from the energy monitor can be seen on the remote keypad or PC monitor. The laser provides several triggering pulses for synchronization of the customer's equipment. The lead or delay of the triggering pulse can be adjusted in 0.25 ns steps from the control pad or PC. Up to 1000  $\mu$ s lead of triggering pulse is available as a pretrigger feature.

Precise pulse energy control, excellent short-term and long-term stability, and up to 20 Hz repetition rate makes PL2250 series lasers an excellent choice for many demanding scientific applications.

## Simple and convenient laser control

For customer convenience the laser can be operated from master device or personal computer through USB (VCP, ASCII commands), RS232 (ASCII commands), LAN (REST API) or RS232 (ASCII commands), LAN (REST API) depending on the system configuration or from remote control pad with backlit display that is easy to read even while wearing laser safety glasses.

## Flash-Lamp Pumped Picosecond Nd:YAG Lasers

### FEATURES

- ▶ Hermetically sealed DPSS master oscillator
- ▶ Diode pumped regenerative amplifier
- ▶ Flashlamp pumped power amplifier producing up to **100 mJ** per pulse at 1064 nm
- ▶ **30 ps** pulse duration (20 ps optional)
- ▶ Excellent pulse duration stability
- ▶ Up to **20 Hz** repetition rate
- ▶ Streak camera triggering pulse with <10 ps jitter
- ▶ Excellent beam pointing stability
- ▶ Thermo-stabilized second, third, fourth and fifth harmonic generator options
- ▶ PC control
- ▶ Remote control via keypad

### APPLICATIONS

- ▶ Time resolved fluorescence (including streak camera measurements)
- ▶ SFG/SHG spectroscopy
- ▶ Nonlinear spectroscopy
- ▶ Laser-induced breakdown spectroscopy
- ▶ OPG pumping
- ▶ Remote laser sensing
- ▶ Satellite ranging
- ▶ Other spectroscopic and nonlinear optics experiments

SPECIFICATIONS <sup>1)</sup>

| Model  | PL2251A   | PL2251B             | PL2251C |
|--|---|---------------------|---------|
| <b>Pulse energy</b>                                    |   |                     |         |
| at 1064 nm   | 50 mJ <sup>2)</sup>                                   | 80 mJ <sup>2)</sup> | 100 mJ  |
| at 532 nm <sup>3)</sup>                                | 25 mJ   | 40 mJ               | 50 mJ   |
| at 355 nm <sup>4)</sup>                                | 15 mJ   | 24 mJ               | 30 mJ   |
| at 266 nm <sup>5)</sup>                                | 7 mJ  | 10 mJ               | 12 mJ   |
| at 213 nm <sup>6)</sup>                                |   | inquire             |         |
| <b>Pulse energy stability, (StdDev.) <sup>7)</sup></b> |   |                     |         |
| at 1064 nm   |   | < 0.8 %             |         |
| at 532 nm  |   | <1.0 %              |         |
| at 355 nm  |   | < 1.1 %             |         |
| at 266 nm  |   | < 1.2 %             |         |
| <b>Pulse duration (FWHM) <sup>8)</sup></b>             |   |                     |         |
|  |   | 29 ± 5 ps           |         |
| <b>Pulse duration stability <sup>9)</sup></b>          |   |                     |         |
|  |   | ± 1.0 ps            |         |
| <b>Repetition rate</b>                                 |   |                     |         |
|  | 20 or 10 Hz   |                     | 10 Hz   |
| <b>Polarization</b>                                    |   |                     |         |
|  | linear, vertical, >99 %                               |                     |         |
| <b>Pre-pulse contrast</b>                              |   |                     |         |
|  | >200:1 (peak-to-peak with respect to residual pulses) |                     |         |
| <b>Optical pulse jitter</b>                            |   |                     |         |
|  | internal / external                                   |                     |         |
| <b>Internal triggering regime <sup>10)</sup></b>       |   |                     |         |
|  | <50 ps (StdDev) with respect to TRIG1 OUT pulse       |                     |         |
| <b>External triggering regime <sup>11)</sup></b>       |   |                     |         |
|  | ~3 ns (StdDev) with respect to SYNC IN pulse          |                     |         |
| <b>SYNC OUT pulse delay <sup>12)</sup></b>             |   |                     |         |
|  | -500 ... 50 ns  |                     |         |
| <b>Beam divergence <sup>13)</sup></b>                  |   |                     |         |
|  | < 0.5 mrad  |                     |         |
| <b>Beam pointing stability (RMS) <sup>14)</sup></b>    |   |                     |         |
|  | ≤ 20 μrad   |                     |         |
| <b>Beam diameter <sup>15)</sup></b>                    |   |                     |         |
|  | ~ 8 mm  | ~10 mm              | ~12 mm  |
| <b>Typical warm-up time</b>                            |   |                     |         |
|  | 30 min  |                     |         |

PHYSICAL CHARACTERISTICS

|                                   |   |  |  |
|-----------------------------------|---|--|--|
| Laser head size (W × L × H)       | 456×1233×249 mm ±3 mm (for PL2251A, B with harmonic and C models)<br>456×1031×249 mm ±3 mm (for PL2251A, B models without harmonic) |  |  |
| Electric cabinet size (W × L × H) | 550×600×550 ±3 mm (19" standard, MR-9)  |  |  |
| Umbilical length                  | 2.5 m   |  |  |

OPERATING REQUIREMENTS

|                                   |   |           |           |
|-----------------------------------|---|-----------|-----------|
| Water consumption (max 20 °C)     | water cooled, water consumption (max. 20 °C), <8 l/min, 2 bar |           |           |
| Room temperature                  | 22 ± 2 °C   |           |           |
| Relative humidity                 | 20–80 % (non-condensing)                                      |           |           |
| Power requirements <sup>16)</sup> | single phase, 200–240 V AC, 16 A, 50/60 Hz                    |           |           |
| Power <sup>17)</sup>              | < 1.5 kVA   | < 2.5 kVA | < 2.5 kVA |

<sup>1)</sup> Due to continuous improvement, all specifications are subject to change without notice. Parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture. Unless stated otherwise, all specifications are measured at 1064 nm and for basic system without options.

<sup>2)</sup> PL2251B-20 has 70 mJ at 1064 nm output energy. Inquire for these energies at other wavelengths.

<sup>3)</sup> For -SH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.

<sup>4)</sup> For -TH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.

<sup>5)</sup> For -FH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.

<sup>6)</sup> For PL2250 series laser with custom -FiH option.

<sup>7)</sup> Averaged from pulses, emitted during 30 sec time interval.

<sup>8)</sup> FWHM. Inquire for optional pulse durations in 20 – 90 ps range. Pulse energy specifications may differ from indicated here.

<sup>9)</sup> Measured over 1 hour period when ambient temperature variation is less than ±1 °C.

<sup>10)</sup> With respect to TRIG1 OUT pulse. <10 ps jitter is provided optionally with PRETRIG feature.

<sup>11)</sup> With respect to SYNC IN pulse.

<sup>12)</sup> TRIG1 OUT lead or delay can be adjusted with 0.25 ns steps in specified range.

<sup>13)</sup> Average of X- and Y-plane full angle divergence values measured at the 1/e<sup>2</sup> level at 1064 nm.

<sup>14)</sup> Beam pointing stability is evaluated from fluctuations of beam centroid position in the far field.

<sup>15)</sup> Beam diameter is measured at 1064 nm at the 1/e<sup>2</sup> point.



<sup>16)</sup> Three phase 208 or 380 VAC mains are required for 50 Hz versions.

<sup>17)</sup> For 10 Hz version.

If laser is optimised for pumping parametrical generator, maximum output energy may be different than specified for stand alone application.

**OPTIONS**

► **Option P20** provides 20 ps ± 10% output pulse duration. Pulse energies are 30% lower in comparison to the 30 ps pulse duration version. Linewidth <math>2 \text{ cm}^{-1}</math> at 1064 nm. See table below for pulse energy specifications:

| Model   | PL2251A-10 | PL2251B-10 | PL2251C -10 |
|---------|------------|------------|-------------|
| 1064 nm | 35 mJ      | 60 mJ      | 80 mJ       |
| 532 nm  | 17 mJ      | 30 mJ      | 40 mJ       |
| 355 nm  | 12 mJ      | 18 mJ      | 24 mJ       |
| 266 nm  | 5 mJ       | 8 mJ       | 10 mJ       |

► **Option P80** provides 80 ps ±10% output pulse duration. Pulse energy specifications as below:

| Model                   | PL2251A | PL2251B | PL2251C |
|-------------------------|---------|---------|---------|
| Pulse energy at 1064 nm | 70 mJ   | 100 mJ  | 160 mJ  |

**BEAM PROFILE**

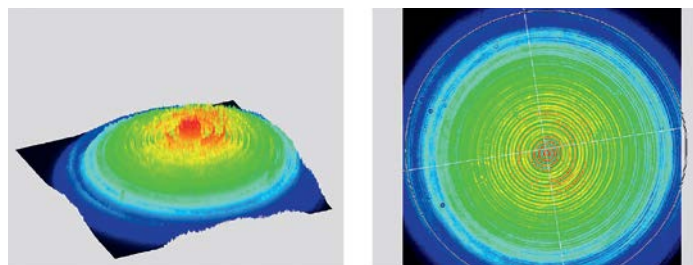


Fig 1. Typical near field output beam profile of PL2250 series laser

**OUTLINE DRAWINGS**

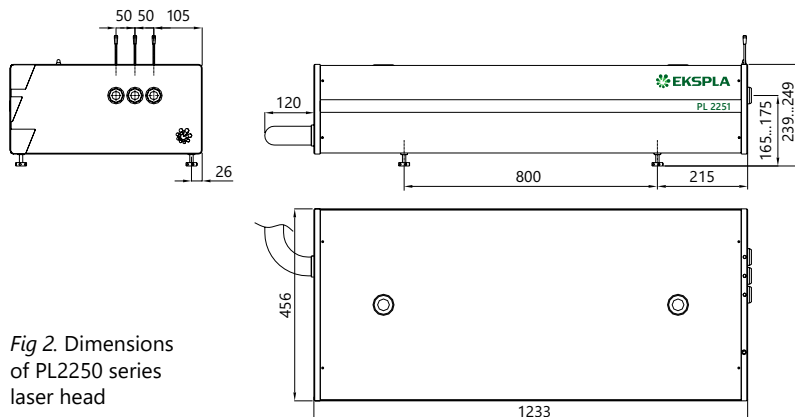
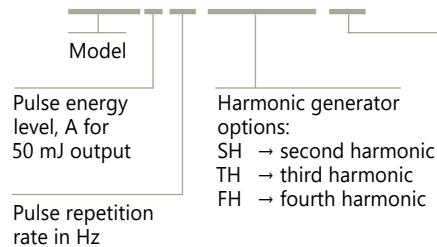


Fig 2. Dimensions of PL2250 series laser head

**ORDERING INFORMATION**

**Note:** Laser must be connected to the mains electricity all the time. If there will be no mains electricity for longer than 1 hour then laser (system) needs warm up for a few hours before switching on.

**PL2251A-50-SH/TH/FH-P20**



**Other options:**

- P20 → 20 ps pulse duration option
- P80 → 80 ps pulse duration option
- AW → water-air heat exchanger option
- FS → seeding option