PL2250 SERIES

Hybrid Mode-locked 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 **50 Hz** repetition rate*
- *Streak camera triggering pulse with <10 ps jitter*
- *Excellent beam pointing stability*
- *Thermo stabilized second, third or fourth harmonic generator options*
- *PC control via USB and LabVIEW™ drivers*
- *Remote control via keypad*

APPLICATIONS

- *Time resolved spectroscopy*
- *SFG/SHG spectroscopy*
- *Nonlinear spectroscopy*
- *OPG pumping*
- *Remote laser sensing*
- *Satellite ranging*
- *Other spectroscopic and nonlinear optics experiments*

PL2250 series lasers set a new standard in high pulse energy picosecond lasers. Their innovative and 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. Harmonics 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 µs lead of triggering pulse is available as a pretrigger option.

Precise pulse energy control, excellent short-term and long-term stability, and up to 50 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 controlled from a user-friendly remote control pad or USB interface.

The remote pad allows easy control of all parameters and features a backlit display that is easy to read even while wearing laser safety eyewear. Alternatively, the laser can be controlled from a personal computer with supplied software for a Windows™ operating system. LabVIEW™ drivers are supplied as well.

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SPECIFICATIONS [1]

Model	PL2250	PL2251	PL2251A	PL2251B	PL2251C
Pulse energy					
at 1064 nm	1 mJ	30 mJ	50 mJ [2]	80 mJ [2]	100 mJ
at 532 nm [3]	0.45 mJ	15 mJ	25 mJ	40 mJ	50 mJ
at 355 nm [4]	0.3 mJ	10 mJ	15 mJ	24 mJ	30 mJ
at 266 nm [5]	0.15 mJ	3 mJ	7 mJ	10 mJ	12 mJ
at 213 nm [6]	–	1.5 mJ	3 mJ	4.5 mJ	6 mJ
Pulse energy stability (StdDev) [7]					
at 1064 nm	<0.2 %	<0.8 %			
at 532 nm	<0.4 %	<1.0 %			
at 355 nm	<0.5 %	<1.1 %			
at 266 nm	<0.5 %	<1.2 %			
at 213 nm	–	<2.5 %			
Pulse duration (FWHM) [8]	30±3 ps				
Pulse duration stability [9]	±1.0 ps				
Repetition rate	0–50 Hz	50 or 10 Hz	50, 20 or 10 Hz	20 or 10 Hz	10 Hz
Polarization	linear, vertical, >100:1				
Pre-pulse contrast	>200:1				
Triggering mode	internal / external				
SYNC OUT pulse jitter [10]	<0.1 ns				
SYNC OUT pulse delay [11]	-500...50 ns				
Beam divergence [12]	<1.5 mrad	<0.6 mrad	<0.5 mrad	<0.5 mrad	<0.5 mrad
Beam pointing stability [13]	<10 µrad	<50 µrad			
Beam diameter [14]	~2.5 mm	~6 mm	~8 mm	~10 mm	~12 mm
Typical warm-up time	5 min	30 min			
PHYSICAL CHARACTERISTICS					
Laser head size (W × L × H)	453 × 1024 × 260 mm	453 × 1224 × 250 mm			
Electric cabinet size (W × L × H)	12 VDC power adapter, 85 × 170 × 41 mm	550 × 600 × 550 mm			
Umbilical length, m	2.5 m				
OPERATING REQUIREMENTS					
Water consumption (max 20 °C)	air cooled	<8 l/min			
Room temperature	22±2 °C				
Relative humidity	20–80 % (non-condensing)				
Power requirements [15]	110-240 VAC, 50/60 Hz	single phase, 208 or 230 VAC, 16 A, 50/60 Hz			
Power [16]	<0.15 kVA	<1.5 kVA	<1.5 kVA	<2 kVA	<2.5 kVA

1) 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.

2) PL2251A-50 has 40 mJ at 1064 nm, PL2251B-20 has 70 mJ at 1064 nm output energy. Inquire for these energies at other wavelengths.

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

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

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

6) For -FiH option. Outputs are not simultaneous. Please inquiry for pulse energies at other wavelengths. FiH option is supplied in separate harmonics unit.

7) Averaged from 300 pulses.

8) Inquire for optional pulse durations in 20–90 ps range.

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

10) 10 ps jitter is provided with PRETRIG option.

11) SYNC OUT lead or delay can be adjusted with 0.25 ns steps in specified range.

12) Full angle measured at the $1/e^2$ point at 1064 nm .

13) RMS value measured from 300 shots.

14) Beam diameter is measured at 1064 nm at the $1/e^2$ point.

15) Three phase 208 or 380 VAC mains are required for 50 Hz versions.

16) For 10 Hz version.

OPTIONS

- **Option PRETRIG** provides low jitter pulse for streak camera triggering with delay in -1000...5100 µs range and < 10 ps rms jitter.
- **Option P20** – 20 ps pulse duration option. Pulse energy decreases in comparison with 30 ps version of the laser, other specifications remains the same. See table below for pulse energy specifications:

Model	PL2251-10	PL2251A-10	PL2251B-10	PL2251C -10
1064 nm	20 mJ	35 mJ	60 mJ	80 mJ
532 nm	10 mJ	17 mJ	30 mJ	40 mJ
355 nm	7 mJ	12 mJ	18 mJ	24 mJ
266 nm	3 mJ	5 mJ	8 mJ	10 mJ

- **Option P80** provides less than 80 ps output pulse duration. Pulse energy specifications are presented below:

Model	PL2250	PL2251	PL2251A	PL2251B	PL2251C
Pulse energy at 1064 nm	1.5 mJ	60 mJ	100 mJ	160 mJ	200 mJ
Pulse duration (FWHM) *	<80 ps				

* Inquire for other pulse durations in 20–90 ps range.

BEAM PROFILE

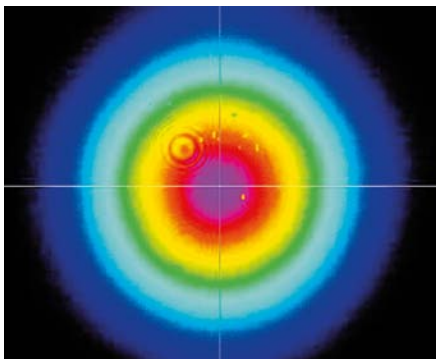

Fig 1. Typical near field output beam profile of PL2250 series laser

OUTLINE DRAWINGS

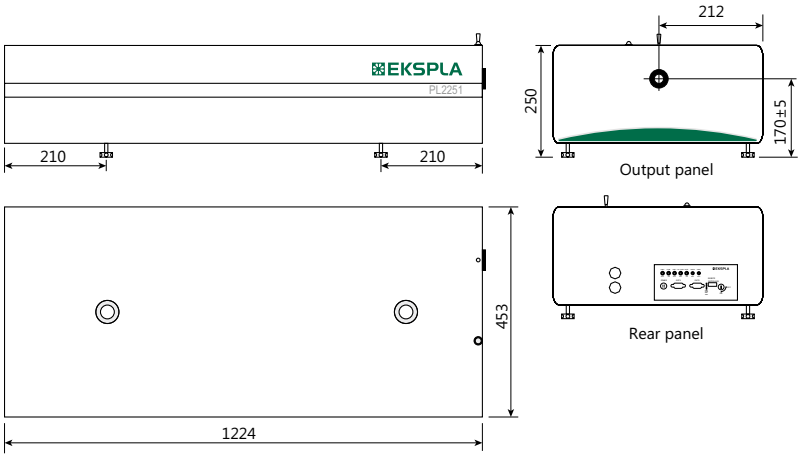

Fig 2. Dimensions of PL2250 series laser head

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ORDERING INFORMATION

PL2251A-50-SH/TH/FH-PRETRIG

- Model
- Pulse energy level, A for 50 mJ output
- Pulse repetition rate in Hz
- Harmonic generator options:
  - SH → second harmonic
  - TH → third harmonic
  - FH → fourth harmonic
- Other options:
  - PRETRIG → pre-trigger option
  - P20 → 20 ps pulse duration option
  - AW → water-air heat exchanger option
  - PLL → pulse repetition rate locking option
  - FS → seeding option