

PL2250 SERIES



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 μ s 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

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 **50 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 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

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.

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⁾	na	inquire	inquire	inquire	inquire
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 %	
Pulse duration (FWHM) ⁸⁾					
	30 ps ± 10 %				
Pulse duration stability ⁹⁾					
	±1.0 %				
Repetition rate					
	0–50 Hz	50, 20 or 10 Hz	50, 20 or 10 Hz	20 or 10 Hz	10 Hz
Polarization					
	linear, vertical, >99 %				
Pre-pulse contrast					
	>200:1 (peak-to-peak with respect to residual pulses)				
Optical pulse jitter					
	internal / external				
Internal triggering regime ¹⁰⁾	<50 ps (StdDev) with respect to TRIG1 OUT pulse				
External triggering regime ¹¹⁾	~3 ns (StdDev) with respect to SYNC IN pulse				
SYNC OUT pulse jitter ¹⁰⁾					
	-500 ... 50 ns				
TRIG1 OUT pulse delay ¹²⁾					
	-500 ... 50 ns				
Beam divergence ¹³⁾					
	<1.5 mrad			<0.5 mrad	
Beam pointing stability ¹⁴⁾					
	≤10 μrad			≤30 μrad	
Beam diameter ¹⁵⁾					
	~2.5 mm	~8 mm	~8 mm	~10 mm	~12 mm
Typical warm-up time					
	5 min			30 min	

PHYSICAL CHARACTERISTICS

Laser head size (W × L × H)	456×1031×249 mm ±3 mm	456×1233×249 mm ±3 mm (for PL2251A, B with harmonics and C models) 456×1031×249 mm ±3 mm (for PL2251A, B models without harmonics)			
Electric cabinet size (W × L × H)	12 V DC power adapter, 85×170×41 mm ±3 mm	550×600×550 ±3 mm (19" standard, MR-9)			
Umbilical length	2.5 m				

OPERATING REQUIREMENTS

Water consumption (max 20 °C)	air cooled	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 ¹⁶⁾	110–240 V AC, 50/60 Hz	single phase, 200–240 V AC, 16 A, 50/60 Hz			
Power ¹⁷⁾	<0.15 kVA	<1.5 kVA	<1.5 kVA	<2.5 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 PL2250 series laser with custom -FiH option.

⁷⁾ Averaged from pulses, emitted during 30 sec time interval.

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

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

¹⁰⁾ With respect to TRIG1 OUT pulse. <10 ps jitter is provided with PRETRIG option.

¹¹⁾ With respect to SYNC IN pulse.

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

¹³⁾ Average of X- and Y-plane full angle divergence values measured at the 1/e² level at 1064 nm.

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

¹⁵⁾ Beam diameter is measured at 1064 nm at the 1/e² point.

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

¹⁷⁾ For 10 Hz version.



OPTIONS

► **Pretrigger for streak camera triggering option**

PL2250 series lasers have build-in low-jitter delay generator for streak camera triggering. Provides low jitter < 10 ps rms triggering pulse.

► **Option P20** provides 20 ps ± 10% output pulse duration. Pulse energies are 30% lower in comparison to the 30 ps pulse duration version. Linewidth < 2 cm⁻¹ at 1064 nm. 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 80 ps ±10% output pulse duration. Pulse energy specifications as below:

Model	PL2250	PL2251	PL2251A	PL2251B	PL2251C
Pulse energy at 1064 nm	1.5 mJ	60 mJ	100 mJ	160 mJ	200 mJ

► **Option PLL** allows locking the master oscillator pulse train repetition rate to an external RF generator, enabling precise external triggering with low jitter. Inquire for more information.

BEAM PROFILE

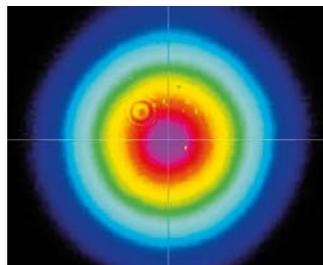


Fig 1. Typical near field output beam profile of PL2250 series laser

OUTLINE DRAWINGS

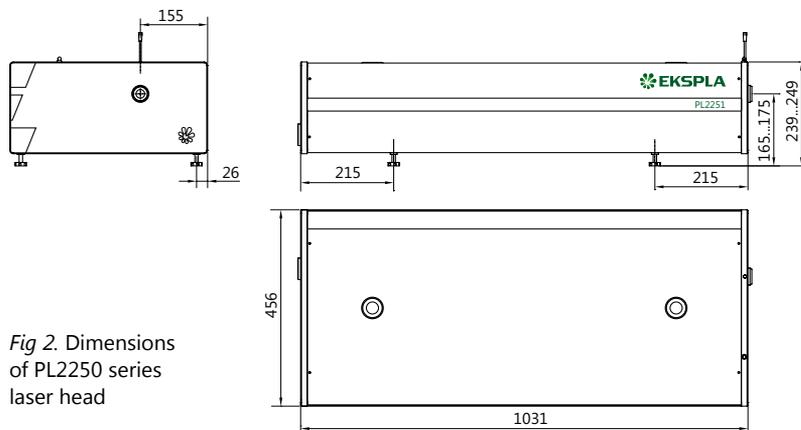
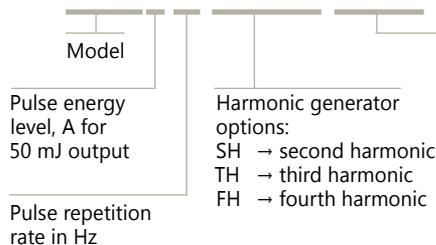


Fig 2. Dimensions of PL2250 series laser head

ORDERING INFORMATION

PL2251A-50-SH/TH/FH-PRETRIG



Other options:

- PRETRIG → pre-trigger option
- P20 → 20 ps pulse duration option
- P80 → 80 ps pulse duration option
- AW → water-air heat exchanger option
- PLL → pulse repetition rate locking option
- FS → seeding option