

PL2230 SERIES



Ekspla is proud to introduce the first commercial fully diode pumped high pulse energy mode-locked laser, producing 28 ps pulses with up to 35 mJ (50 mJ preliminary) at 50 Hz pulse repetition rate.

Innovative design

The heart of the system is a diode pumped solid state (DPSS) master oscillator placed in a sealed monolithic block, producing high repetition rate pulse trains (88 MHz) with a low single pulse energy of several nJ. Diode pumped amplifiers are used for amplification of the pulse to 35 mJ (50 mJ preliminary) output. The high-gain regenerative amplifier has an amplification factor in the proximity of 10^6 . After the regenerative amplifier, the pulse is directed to a multipass power amplifier that is optimized for efficient stored energy extraction from the Nd:YAG rod, while maintaining a near Gaussian beam profile and low wavefront distortion. The output pulse energy can be adjusted in approximately 1% steps, while

pulse-to-pulse energy stability remains at less than 0.5% 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 guided 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 on a PC monitor.

The laser provides triggering pulses for the synchronisation of your equipment. The lead of the triggering pulse can be up to 500 ns and is user adjustable in ~ 0.25 ns steps from a personal computer. If required, up to 1000 μ s lead of triggering pulse is available when a PRETRIG option is installed.

Precise pulse energy control, excellent short-term and long-term stability, and a 50 Hz repetition rate makes PL2230 series lasers an excellent choice for many demanding scientific applications.

Diode Pumped High Energy Picosecond Nd:YAG Lasers

FEATURES

- ▶ **New!** Beam profile improvement using advanced beam shaping system
- ▶ Hermetically sealed DPSS master oscillator
- ▶ Diode pumped regenerative amplifier
- ▶ Diode pumped power amplifier producing up to **35 mJ** per pulse (50 mJ preliminary) at 1064 nm
- ▶ Air-cooled
- ▶ **<30 ps** pulse duration
- ▶ Excellent pulse duration stability
- ▶ Up to **100 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 through USB and with supplied 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 applications

Simple and convenient laser control

For customer convenience the laser can be controlled through a user-friendly remote control pad or USB interface.

The remote pad allows easy control of all parameters and features a back-lit display that is easy to read even with laser safety eye-wear.

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 | PL2230-100 | PL2231-100 | PL2231-50 | PL2231A-50 | PL2231B-20 | PL2231C-20 |
|--|--|------------------|-----------|------------|--------------|------------|
| | | | | | Preliminary | |
| Pulse energy (not less than) ²⁾ | | | | | | |
| at 1064 nm | 3.0 mJ | 15 mJ | 35 mJ | 50 mJ | 100 mJ | 140 mJ |
| at 532 nm ³⁾ | 1.3 mJ | 7 mJ | 16 mJ | 23 mJ | 45 mJ | 60 mJ |
| at 355 nm ⁴⁾ | 0.9 mJ | 5 mJ | 10 mJ | 14 mJ | 28 mJ | 35 mJ |
| at 266 nm ⁵⁾ | 0.3 mJ | 1.5 mJ | 4 mJ | 6 mJ | 11 mJ | 15 mJ |
| at 213 nm ⁶⁾ | 0.2 mJ | 0.7 mJ | 1.8 mJ | 2.5 mJ | 5 mJ | 7 mJ |
| Pulse energy stability (StdDev) ⁷⁾ | | | | | | |
| at 1064 nm | <0.2 % | | | <0.5 % | | |
| at 532 nm | <0.4 % | | | <0.8 % | | |
| at 355 nm | <0.5 % | | | <1.1 % | | |
| at 266 nm | <0.5 % | | | <1.2 % | | |
| at 213 nm | <1.5 % | | | <1.5 % | | |
| Pulse duration (FWHM) ⁸⁾ | 28 ps ± 10 % | | | | 80 ps ± 10 % | |
| Pulse duration stability ⁹⁾ | ± 1 % | | | | | |
| Power drift ¹⁰⁾ | ± 2 % | | | | | |
| Pulse repetition rate | 0 – 100 Hz | 100 Hz | 50 Hz | 50 Hz | 20 Hz | |
| Polarization | vertical, >99 % at 1064 nm | | | | | |
| Pre-pulse contrast | > 200:1 (peak-to-peak with respect to residual pulses) | | | | | |
| Beam profile ¹¹⁾ | close to Gaussian in near and far fields | | | | | |
| Beam divergence ¹²⁾ | <1.5 mrad | <0.7 mrad | | | | |
| Beam propagation ratio M ² | <1.3 | <2.5 | | | | |
| Beam pointing stability ¹³⁾ | ≤ 10 μrad StdDev | ≤ 30 μrad StdDev | | | | |
| Typical beam diameter ¹⁴⁾ | ~2.5 mm | ~5 mm | ~6 mm | ~7 mm | ~7 mm | ~7 mm |
| Optical pulse jitter | | | | | | |
| Internal triggering regime ¹⁵⁾ | < 50 ps (StdDev) with respect to TRIG1 OUT pulse | | | | | |
| External triggering regime ¹⁶⁾ | ~3 ns (StdDev) with respect to SYNC IN pulse | | | | | |
| TRIG1 OUT pulse delay ¹⁷⁾ | -500 ... 50 ns | | | | | |
| Typical warm-up time | 5 min | 30 min | | | | |

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. Specifications for models PL2231A, B and C are preliminary and should be confirmed against quotation and purchase order.

²⁾ Outputs are not simultaneous.
³⁾ For PL2230 series laser with -SH, -SH/TH, -SH/FH or -SH/TH/FH option or -SH/TH/FH/FIH module.
⁴⁾ For PL2230 series laser with -TH, -SH/TH or -SH/TH/FH option or -SH/TH/FH/FIH module.
⁵⁾ For PL2230 series laser with -SH/FH or -SH/TH/FH option or -SH/TH/FH/FIH module.
⁶⁾ For PL2230 series laser with -SH/TH/FH/FIH module.
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⁾ Measured over 8 hours period after 20 min warm-up when ambient temperature variation is less than ± 2 °C.
¹¹⁾ Near field Gaussian fit is >80%.
¹²⁾ Average of X- and Y-plane full angle divergence values measured at the 1/e² level at 1064 nm.
¹³⁾ Beam pointing stability is evaluated from fluctuations of beam centroid position in the far field.
¹⁴⁾ Beam diameter is measured at 1064 nm at the 1/e² level.
¹⁵⁾ With respect to TRIG1 OUT pulse. <10 ps jitter is provided with PRETRIG option.

¹⁶⁾ With respect to SYNC IN pulse.
¹⁷⁾ TRIG1 OUT lead or delay can be adjusted with 0.25 ns steps in specified range.



SPECIFICATIONS ¹⁾

| Model | PL2230-100 | PL2231-100 | PL2231-50 | PL2231A-50 | PL2231B-20 | PL2231C-20 |
|-------------------------------------|---|---|-----------|---------------------|---------------------|------------|
| | | | | Preliminary | | |
| PHYSICAL CHARACTERISTICS | | | | | | |
| Laser head size (W × L × H) | 456×1031×249 ± 3 mm | | | 456×1233×249 ± 3 mm | 456×1432×249 ± 3 mm | |
| Electrical cabinet size (W × L × H) | 12 V DC power adapter, 85×170×41 ± 3 mm | 471×391×147 ± 3 mm | | | 520×600×331 ± 3 mm | |
| Umbilical length | 2.5 m | | | | | |
| OPERATING REQUIREMENTS | | | | | | |
| Cooling ¹⁸⁾ | Built in chiller | | | | | |
| Room temperature | 22 ± 2 °C | | | | | |
| Relative humidity | 20 – 80 % (non-condensing) | | | | | |
| Power requirements | 110–240 V AC, 50/60 Hz | Single phase, 110–240 V AC, 5 A, 50/60 Hz | | | | |
| Power consumption | < 0.15 kVA | < 1.0 kVA | | < 1.5 kVA | | |

¹⁸⁾ Air cooled. Adequate room air conditioning should be provided.

OPTIONS

- ▶ **Pretrigger for streak camera triggering option (–PRETRIG)**
PL2230 series lasers have build-in low-jitter delay generator for streak camera triggering. Provides low jitter < 10 ps StdDev triggering pulse.
- ▶ **Option P20** provides 20 ps ±10% output pulse duration. Pulse energies are ~ 30 % lower in comparison to the 28 ps pulse duration version. See table below for pulse energy specifications:

| Model | PL2231 | PL2231A |
|---------|--------|---------|
| 1064 nm | 25 mJ | 40 mJ |
| 532 nm | 11 mJ | 16 mJ |
| 355 nm | 7 mJ | 10 mJ |
| 266 nm | 3 mJ | 4 mJ |

- ▶ **Option P80** provides 80 ps ±10% output pulse duration. Pulse energy specifications are same as those of 28 ps lasers.

BEAM PROFILE

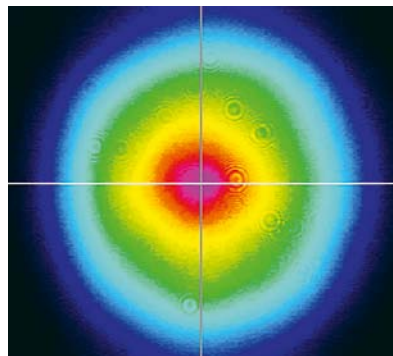


Fig 1. Typical near field output beam profile of PL2231 model laser

OUTLINE DRAWINGS

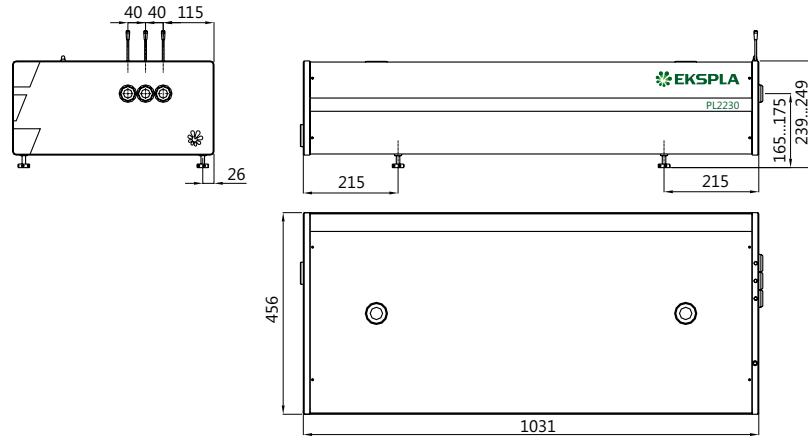


Fig 2. Dimensions of PL2230 series laser head

ORDERING INFORMATION

