

# Picosecond Diode Lasers with Driver

PICOPOWER™-LD Series

Standard wavelengths:  
375, 405, 450, 488, 510, 635, 670, 785, 850, 976,  
1030, 1047, 1053, 1064, 1310, 1550 nm.  
More than 60 other customer-specific wavelengths  
in the range 375 nm - 2300 nm.



Laser pulses as short as  
12 ps and more than 2 W peak power  
for specific wavelengths.  
Exchangeable laser heads.

## Features

- Laser pulses as short as 12 ps for specific wavelengths
- More than 2 W peak power for specific wavelengths
- Proprietary high-frequency design for the shortest & highest peak power diode laser pulses available on the market
- Collimated free-space output or fiber-coupled
- Exchangeable laser heads with different wavelengths for greatest flexibility
- Single-, dual and multi-channel driver models
- Proprietary diode laser driver generating picosecond high-current pulses
- Built-in superior performance frequency generators for repetition rate adjustment from 1 Hz to 20, 50 or 100 MHz with a step of 1 Hz
- External TTL trigger capability and synchronized output TTL or NIM

## Applications

- Microscopy
  - Confocal Laser Scanning Microscopy (CLSM)
  - Fluorescence / Phosphorescence Lifetime Imaging Microscopy (FLIM / PLIM)
  - Stimulated Emission Depletion Microscopy (STED)
  - Fluorescence Recovery After Photobleaching (FRAP)
  - Total Internal Reflection Fluorescence Microscopy (TIRFM)
  - Time-Resolved Photoluminescence (TRPL)
- Spectroscopy
  - Fluorescence (Lifetime) Correlation Spectroscopy (FCS / FLCS)
  - Fluorescence Lifetime Measurements and Time-Resolved Spectroscopy
  - Single Molecule Spectroscopy / Detection
  - Time-Correlated Single Photon Counting (TCSPC)
- Laser Physics
  - Single Photon Generation
  - Seeding of Fiber Lasers and MOPA Systems
- Other
  - Laser Imaging and 3-D Laser Scanning
  - Time-Response Characterization of Opto-Electronic Devices
  - Diffuse Optical Tomography and Imaging
  - Time of Flight (TOF) Experiments
  - Optical Time Domain Reflectometry (OTDR)

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Picosecond Diode Laser Heads: Typical Performance for STANDARD MODELS						
Models with Free-Space Beam <sup>1)</sup>	Wavelength (nm) <sup>2)</sup>	Spectral Width (nm) <sup>3)</sup>	Pulse Width (ps) @ 50 MHz	Peak Power (mW)	Average Power (mW) @ 50 MHz <sup>4)</sup>	Maximum Repetition Rate (MHz) <sup>5)</sup>
<b>FABRY-PÉROT LASER TYPE</b>						
PICOPOWER-LD-375	375 ±5	< 1.5	30	1000	1.5	50
PICOPOWER-LD-405-L	405 ±5	< 3	25	> 1000	1.3	100
PICOPOWER-LD-405-H	405 ±5	< 3	25	> 2000	2.5	100
PICOPOWER-LD-450	450 ±10	< 4	50	750	1.9	100
PICOPOWER-LD-488	488 ±10	< 6	70	350	1.3	70
PICOPOWER-LD-510	510 ±10	< 5	75	300	1.1	50
PICOPOWER-LD-635	635 ±5	< 2	65	1300	4.3	80
PICOPOWER-LD-660	660 ±5	< 2	60	600	1.9	50
PICOPOWER-LD-670	670 ±10	< 5	40	400	0.8	100
PICOPOWER-LD-785	785 ±10	< 4	60	220	0.7	90
PICOPOWER-LD-810	810 ±5	< 8	50	400	1	100
PICOPOWER-LD-850	850 ±10	< 4	80	350	1.4	100
PICOPOWER-LD-900	900 ±10	< 7	45	100	0.3	100
PICOPOWER-LD-976	976 ±10	< 10	45	1100	2.5	50
PICOPOWER-LD-1053 <sup>6)</sup>	1053 ±5	< 25	25	1200	1.5	70
PICOPOWER-LD-1550 <sup>6)</sup>	1550 ±20	< 2	25	80	0.1	100
<b>DFB LASER TYPE (Narrow Linewidth) <sup>7)</sup></b>						
PICOPOWER-LD-532	532 ±2	< 0.2	40	20	0.04	50
PICOPOWER-LD-561	561 ±2	< 0.2	40	20	0.04	50
PICOPOWER-LD-594	594 ±2	< 0.2	40	20	0.04	50
PICOPOWER-LD-1030 <sup>6)</sup>	1030 ±2	< 0.2	30	350	0.5	100
PICOPOWER-LD-1047 <sup>6)</sup>	1047 ±2	< 0.1	40	100	0.2	50
PICOPOWER-LD-1053 <sup>6)</sup>	1053 ±2	< 0.1	40	100	0.2	50
PICOPOWER-LD-1064 <sup>6)</sup>	1064 ±2	< 0.2	30	350	0.5	100
PICOPOWER-LD-1310 <sup>6)</sup>	1310 ±2	< 1.5	20	150	0.15	100
PICOPOWER-LD-1550 <sup>6)</sup>	1550 ±2	< 0.3	12	130	0.08	100

**Notes:**

- <sup>1)</sup> All wavelengths are available with fiber-coupling in single-mode SM or PM fibers with typical efficiency of 25% - 30% (exception: 375 nm is with multi-mode fiber).
- <sup>2)</sup> More than 60 customer-specific wavelengths in the range 375 nm - 2300 nm are available.
- <sup>3)</sup> Spectral width is larger for fiber-coupled diode lasers.
- <sup>4)</sup> Higher average powers are available for longer pulse durations.
- <sup>5)</sup> All diode lasers can be operated up to 100 MHz or even higher with lower peak powers and larger pulse widths on a special order.
- <sup>6)</sup> These diode lasers can be used for seeding of fiber and bulk amplifiers.
- <sup>7)</sup> Customer-specific wavelengths in the range 760 nm - 2300 nm are also available.

Beam profile is TEM<sub>00</sub>, but slightly elliptical.

Laser class is typically 3B to 1M depending on the wavelength.

Picosecond Diode Laser Heads: Mechanical Specifications		
Dimensions and Weight	Ø 25 × 155 mm, 140 g or 40 × 37 × 144 mm <sup>3</sup> , 250 g	<ul style="list-style-type: none"> <li>• Customer-specific housing is also available.</li> <li>• Fiber-coupled diode lasers are integrated in the driver, but optionally they can have a stand-alone laser head.</li> </ul>



## Picosecond Diode Laser Drivers: Typical Specifications

Parameters	Specifications			Comments
<b>MECHANICAL</b>				
Dimensions and Weight	255 × 118 × 270 mm, 2.6 kg			19" rack, OEM and customer-specific options are available
<b>ELECTRICAL</b>				
<b>Models</b>	<b>PLDD-20M</b>	<b>PLDD-50M</b>	<b>PLDD-100M</b>	
Frequency Range	1 Hz - 20 MHz	1 Hz - 50 MHz	1 Hz - 100 MHz	
Step	1 Hz	1 Hz	1 Hz	
Frequency Generator	Built-in superior performance frequency generator			Period jitter: < 10 ps
Pulse-to-Pulse Amplitude Instability <sup>1)</sup>	< 1% rms			
External TRIG IN	TTL into 50 Ω, rising edge			Duty cycle: 50%
Delay Laser Output to TRIG IN (TTL)	43 ns (typ.)			
Delay Laser Output to SYNC OUT (TTL)	34 ns (typ.)			
SYNC OUT (TTL)	+3.5 V into 50 Ω			
SYNC OUT (NIM), optional	-800 mV into 50 Ω			Pulse width is typically 5 ns
Delay Laser Output to SYNC OUT (NIM)	30 ns (typ.)			
Jitter <sup>1)</sup> : Laser Pulse to External Trigger	< 4 ps			External trigger with rise time < 0.2 ns and amplitude 5 V ± 0.5 V
Jitter <sup>1)</sup> : Laser Pulse to SYNC OUT (TTL)	< 4 ps			External trigger with rise time < 0.2 ns and amplitude 5 V ± 0.5 V or internal trigger
<b>GENERAL</b>				
Voltage / Current Requirements	100 V AC / 0.2 A, 230 V AC / 0.1 A			12 V DC supply input is optionally available
Power Consumption	20 W (typ.)			
Operating Temperature	15°C to 35°C (59°F to 95°F)			

**Note:** <sup>1)</sup> These values are valid up to 30 MHz and for amplitudes not less than 50% of the maximum ones.

## Picosecond Diode Laser Drivers: Options

Optional Features	Comments
• CW Mode	The optional CW mode (in addition to the pulsed mode operation) provides much higher output power which is very useful e.g. for alignment purposes <sup>1)</sup>
• Variable Amplitude	Provides easy control of the peak and average power <sup>2)</sup>
• Additional Laser Heads	Allows use of a single diode laser driver to drive more than one laser head <sup>3)</sup>
• Wavelength TEC Tuning	Wavelength TEC tuning is recommended for red or infrared diode lasers
• NIM Sync Output	Some signal processing devices may require NIM sync input -800 mV by default / optionally: variable 5 ns pulse width FWHM
• Multiple Independent Channels	Allows to drive two diode laser heads simultaneously. Two channels are available in the standard housing. More than two channels are possible with 19" rack housing.

**Notes:**

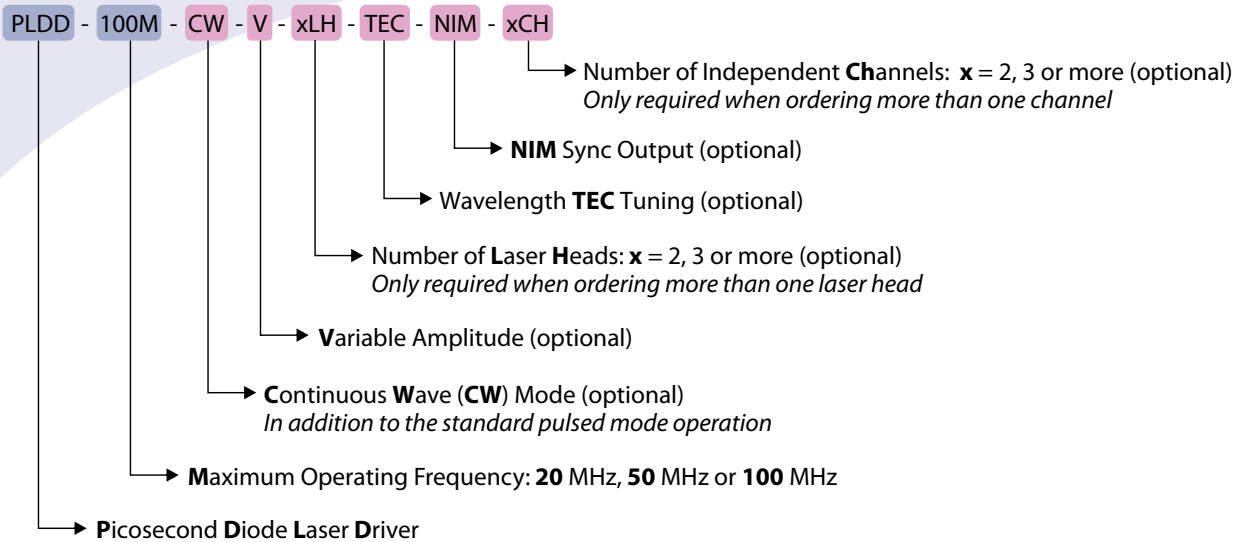
<sup>1)</sup> CW mode may reduce the peak or average power for frequencies > 50 MHz.

<sup>2)</sup> Amplitudes lower than 50% from the maximum amplitude may have larger instability or larger pulse width.

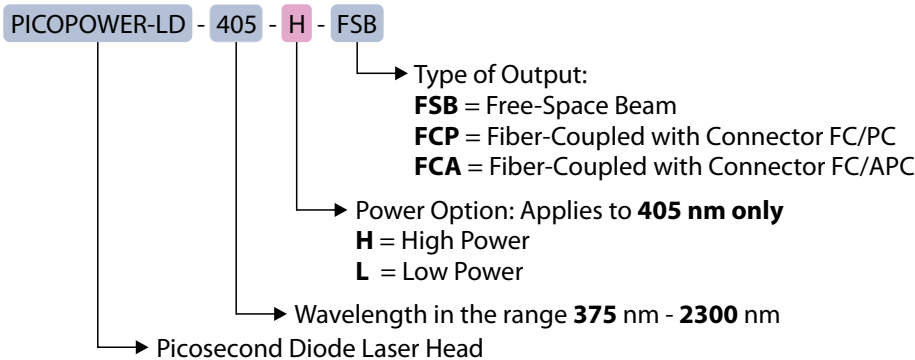
<sup>3)</sup> Some combinations of different diode laser heads may reduce the maximum operating frequency.

Customer-specific parameters are available upon request. Please contact us for further information.  
Specifications are subject to change without prior notice.

**Ordering Information for Picosecond Diode Laser Driver**



**Ordering Information for Picosecond Diode Laser Heads**



*Note: Pink color marks the optional parameters which are available to be ordered.*

**Ordering Example: Picosecond Diode Laser with Driver and Additional Laser Head**

<i>Picosecond Diode Laser Driver:</i> <b>PLDD-50M-V-2LH-NIM</b>	This driver has a max. frequency of <b>50 MHz</b> and includes the following options: <ul style="list-style-type: none"> <li>• Variable amplitude</li> <li>• More than one laser head: <b>2 Laser Heads</b></li> <li>• <b>NIM</b> sync output</li> </ul>
<i>First Diode Laser Head:</i> <b>PICOPOWER-LD-1064-FC/APC</b>	Picosecond Diode Laser Head <ul style="list-style-type: none"> <li>• Wavelength: <b>1064 nm</b></li> <li>• Fiber-Coupled with <b>FC/APC</b> connector</li> </ul>
<i>Second Diode Laser Head:</i> <b>PICOPOWER-LD-635-FSB</b>	Picosecond Diode Laser Head <ul style="list-style-type: none"> <li>• Wavelength: <b>635 nm</b></li> <li>• Free-Space <b>Beam</b></li> </ul>



**WARNING – VISIBLE AND INVISIBLE LASER RADIATION**  
**AVOID EXPOSURE TO BEAM**  
**CLASS 3B LASER PRODUCT**  
 IEC / EN 60825-1

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