

# LDH Series

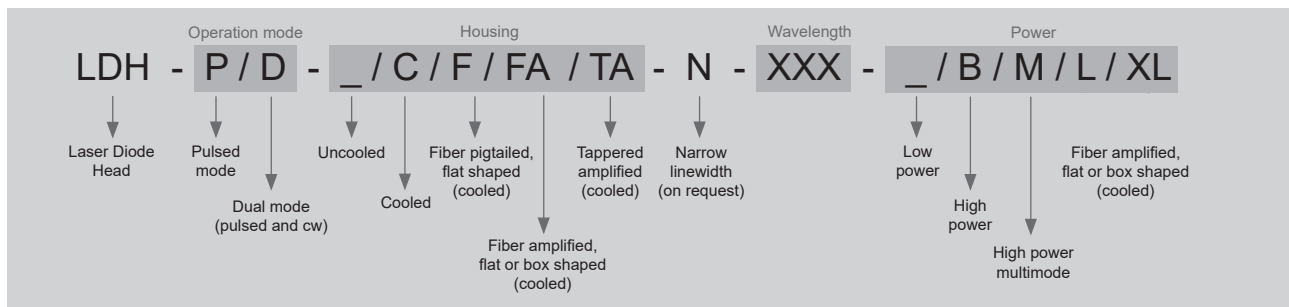
## Picosecond Laser Diode Heads for PDL 800-D / PDL 828

- **NEW** 380 mW pulsed laser heads at 980 nm for up-conversion measurements
- Wavelengths between 375 nm and 1990 nm
- Pulse widths as short as 40 ps (FWHM)
- Repetition rate from single shot to 80 MHz
- Adjustable (average) power up to 50 mW
- Peak power up to 1 W
- Pulsed, burst and CW operated
- TE cooled, collimated beam, optional fiber coupling



### Applications

- Time-resolved measurements
- Lifetime spectroscopy and microscopy, FLIM, FCS, STED
- Semiconductor diagnostic and detector calibration
- LiDAR
- Seeding



C: Laser head with thermoelectric cooler, mandatory for some laser heads, optional for all other laser heads

F: Laser head emits a divergent beam from FC/APC fiber output connector

M: Transversal multimode structure, reduced coupling efficiency into single mode fibers

The following tables list the pulse parameters and power values of the available wavelengths of the LDH Series. The two power adjustment levels specified here refer to the same laser head. These levels can be adjusted using the corresponding driver of the PDL Series (PDL 800-B, PDL 800-D, PDL 808 "Sepia", PDL 828 "Sepia II"). The 'low' adjustment is the best choice for shortest pulses and is usually reached close to the lasing threshold. The 'high' adjustment is used to achieve highest pulse power at moderate pulse length and corresponds to the maximum intensity setting of the driver. Dual mode laser heads (LDH-D Series, pulsed and cw operation) can only be controlled by the PDL 800-D or PDL 828 „Sepia II“ laser driver. These laser heads have a spectral width of a few nm. Special selected laser heads with narrow spectral bandwidth can also be provided.

## Wavelengths

Wavelength (± 10) [nm]	Type (LDH-)	Pulse <sup>1</sup> (FWHM) [ps]	Max rep. rate [MHz]	High avg. power <sup>2</sup> [mW]	Low avg. power <sup>3</sup> [mW]	CW power [mW]
266 (± 3)	P-FA-266	Please see separate data sheet for LDH-P-FA Series.				
355 (± 3)	P-FA-355	Please see separate data sheet for LDH-P-FA Series.				
375	P-C-375	< 40	40	2.0	0.6	--
	P-C-375B	< 40	40	4.0	0.6	--
	D-C-375	< 40	40	4.0	0.6	10
	P-C-375M	< 90	40	10.0	2.5	--
	D-C-375M	< 90	40	10.0	2.5	50
395	P-C-390	< 70	40	5.0	1.0	--
	D-C-390	< 70	40	5.0	1.0	30
405	P-C-405	< 50	80	4.0	0.8	--
	P-C-405B	< 50	40	3.0	1.0	--
	D-C-405	< 50	40	3.0	1.0	50
	P-C-405M	< 90	40	25.0	10.0	--
420	P-C-420	< 70	40	5.0	0.5	--
	D-C-420	< 70	40	5.0	0.5	30
440	P-C-440	< 80	40	2.0	0.4	--
	P-C-440B	< 80	40	4.0	0.8	--
	D-C-440	< 80	40	4.0	0.8	50
	P-C-440M	< 100	40	25.0	10.0	--
	D-C-440M	< 100	40	25.0	10.0	200
450	P-C-450	< 100	40	2.0	0.5	--
	P-C-450B	< 70	40	5.0	0.7	--
	D-C-450	< 70	40	5.0	0.7	10
455	P-C-450M	< 90	40	20.0	4.0	--
	D-C-450M	< 90	40	20.0	4.0	200
470	P-C-470	< 80	40	3.0	0.6	--
	P-C-470B	< 70	40	4.0	0.8	--
	D-C-470	< 70	40	4.0	0.8	60
	P-C-470M	< 120	40	20.0	8.0	--
	D-C-470M	< 120	40	20.0	8.0	200
485	P-C-485	< 110	40	2.0	0.4	--
	P-C-485B	< 90	40	5.0	0.7	--
	D-C-485 <sup>4</sup>	< 90	40	5.0	0.7	50
500	P-C-500	< 130	40	2.0	0.5	--
	P-C-500B	< 100	40	5.0	0.7	--
	D-C-500	< 100	40	5.0	0.7	40
510	P-C-510	< 130	40	2.0	0.3	--
	P-C-510B	< 110	40	4.0	0.6	--
	D-C-510 <sup>4</sup>	< 110	40	4.0	0.6	40
515 (± 3)	P-FA-515L	Please see separate data sheet for LDH-P-FA Series.				
520	P-C-520	< 130	40	2.5	0.7	--
	P-C-520M	< 160	40	25.0	6.0	--
532 (± 3)	P/D-FA-530B/L/XL	Please see separate data sheet for LDH-P-FA Series.				
532 (± 3)	D-TA-530	< 80	80	0.7	0.3	10
	D-TA-530B	< 80	80	1.1	0.5	20
557 (± 3)	P-FA-560	Please see separate data sheet for LDH-P-FA Series.				
561 (± 3)	D-TA-560	< 80	80	0.5	0.3	5
	D-TA-560B	< 80	80	0.7	0.5	20
594 (± 3)	D-TA-595	< 100	80	0.3	0.2	5
	D-TA-595B	< 100	80	0.5	0.4	5
596 (± 3)	P-FA-595B	Please see separate data sheet for LDH-P-FA Series.				

Wavelength (± 10) [nm]	Type (LDH-)	Pulse <sup>1</sup> (FWHM) [ps]	Max rep. rate [MHz]	High avg. power <sup>2</sup> [mW]	Low avg. power <sup>3</sup> [mW]	CW power [mW]
635	P-C-635M	< 120	80	20.0	4.0	--
	D-C-635M	< 120	80	20.0	4.0	100
640	P-C-640B	< 90	80	20.0	2.0	--
	D-C-640	< 90	80	20.0	2.0	50
655	P-C-650	< 90	80	6.0	0.9	--
	D-C-650	< 90	80	6.0	0.9	10
660	P-C-660	< 90	80	10.0	1.0	--
	D-C-660	< 90	80	10.0	1.0	30
665	P-C-670B	< 90	80	4.0	0.7	--
	D-C-670B	< 90	80	4.0	0.7	15
670	P-C-670	< 70	80	2.0	0.7	--
	D-C-670	< 70	80	2.0	0.7	3
685	P-C-690	< 70	80	8.0	1.0	--
	D-C-690	< 70	80	8.0	1.0	20
705	P-C-705	< 70	80	10.0	2.0	--
	D-C-705	< 70	80	10.0	2.0	20
730	P-C-730	< 70	80	6.0	2.0	--
	D-C-730	< 70	80	6.0	2.0	15
760 (± 3)	LDH-P-C-N-760	Please see table below for narrow bandwidth.				
766 (± 3)	P-FA-765XL	Please see separate data sheet for LDH-P-FA Series.				
775 (± 3)	P-FA-775XL	Please see separate data sheet for LDH-P-FA Series.				
785	P-C-780	< 70	80	10.0	1.0	--
	D-C-780	< 70	80	10.0	1.0	40
805	P-C-810	< 90	80	10.0	0.9	--
	D-C-810	< 90	80	10.0	0.9	30
	P-C-810M	< 90	80	30.0	3.0	--
	D-C-810M	< 90	80	30.0	3.0	100
830	P-C-830	< 70	80	8.0	0.3	--
	D-C-830	< 70	80	8.0	0.3	20
	P-C-830M	< 90	80	30.0	10.0	--
	D-C-830M	< 90	80	30.0	10.0	100
840	P-C-840	< 80	80	4.0	0.5	--
	D-C-840	< 80	80	4.0	0.5	30
852 (± 3)	LDH-P-C-N-850	Please see table below for narrow bandwidth.				
905	P-C-905	< 120	80	8.0	2.0	--
	D-C-905	< 120	80	8.0	2.0	50
940	P-C-940	< 90	80	5.0	2.0	--
	D-C-940	< 90	80	5.0	2.0	10
975	P-C-980	< 80	80	6.0	1.8	--
	D-C-980	< 80	80	6.0	1.8	50
976	P-F-980	< 110	80	25.0	7.0	--
	D-F-980	< 110	80	25.0	7.0	100
980	P-C-980MB <sup>5</sup>	< 6000	80	380.0	--	--
1025	P-F-1030	< 90	80	10.0	2.0	--
1062 (± 3)	LDH-P-C-N-1064	Please see table below for narrow bandwidth.				
1062 (± 3)	LDH-D-C-N-1064	Please see table below for narrow bandwidth.				
1063 (± 3)	P-FA-1060/XL	Please see separate data sheet for LDH-P-FA Series.				
1080	P-C-1080	< 50	80	4.0	2.5	--
	D-C-1080	< 50	80	4.0	2.5	30
1120	P-C-1120	< 90	80	5.0	2.5	--
	D-C-1120	< 90	80	5.0	2.5	20
1310 (± 20)	P-C-1310	< 50	80	2.0	0.15	--
	D-C-1310	< 50	80	2.0	0.15	5

These tables are updated on a regular basis based on data of recently manufactured laser heads. Other specifications such as shorter pulse widths or higher powers than listed might be possible depending on the performance of diodes on stock. Please contact us for more information.

Wavelength (± 10) [nm]	Type (LDH-)	Pulse <sup>1</sup> (FWHM) [ps]	Max rep. rate [MHz]	High avg. power <sup>2</sup> [mW]	Low avg. power <sup>3</sup> [mW]	CW power [mW]
1532 to 1560 (± 3)	P-FA-1530/XL	Please see separate data sheet for LDH-P-FA Series.				
1550 (± 30)	P-C-1550	< 50	80	1.0	0.02	--
	D-C-1550	< 50	80	1.0	0.02	2.5
1990 (± 40)	P-F-1990	< 120	80	0.3	0.1	--

<sup>1</sup> Shortest pulse width at min intensity setting above laser threshold. Possible pulse broadening at high intensity settings. Pulses are deconvoluted with 30 ps detection IRF. Shorter pulse widths are available on demand.

<sup>2</sup> Average optical power at max repetition rate and max intensity setting.

<sup>3</sup> Average optical power at max repetition rate and min intensity setting above laser threshold.

<sup>4</sup> Different coupling efficiency into optical fibers for pulsed and CW operation due to astigmatism and possible wavelength shift. The coupling is optimized for pulsed operation as standard.

<sup>5</sup> The max sustained repetition rate without extra cooling is 40 MHz. 80 MHz is meant to be used in burst mode with duty cycle of max 50% for e.g. upconversion application. A sustained operation at 80 MHz is possible with external fan cooling. Without external cooling, possible overheating may occur after a few minutes, leading to safety shut-off.

## On request: narrow spectral bandwidth

The given specification are for information only, possible changes may occur.

Wavelength		Type <sup>4</sup>	Linewidth	Pulse <sup>1</sup>	Max rep. rate	Low avg. power <sup>2</sup>	High avg. power <sup>3</sup>	
Central [nm]	Variation [nm]	(LDH-)	(FWHM) [nm]	(FWHM) [ps]	[MHz]	[mW]	[mW]	
760	± 3	P-C-N-760	< 0.2	< 90	80	0.9	6.0	
782	± 3	P-C-N-780	on request					
852	± 3	P-C-N-850	< 0.3	< 100	80	1.5	9.0	
976	± 3	P-C-N-976	< 0.5	< 90	80	10.0	10.0	
1062	± 3	P-C-N-1064	< 1	< 130	80	1.3	10.0	
1062	± 3	D-C-N-1064	< 1	< 130	80	1.3	10.0	
1063	± 3	P-F-N-1064	< 0.5	< 100	80	0.9	10.0	
1064	± 3	P-C-N-1064	< 1	< 130	80	1.3	10.0	
1275	± 7	P-C-N-1310	< 0.5	< 40	80	0.03	1.3	
1300	± 7	P-C-N-1310	< 0.5	< 40	80	0.03	1.3	
1310	± 7	P-C-N-1310	< 0.5	< 40	80	0.03	1.3	
1325	± 7	P-C-N-1310	< 0.5	< 40	80	0.03	1.3	
1349	± 7	P-C-N-1310	< 0.5	< 40	80	0.03	1.3	
1510	± 3	P-C-N-1550	< 0.2	< 40	80	0.05	1.3	
1530	± 3	P-C-N-1550	< 0.2	< 40	80	0.05	1.3	
1550	± 3	P-C-N-1550	< 0.2	< 40	80	0.05	1.3	
1570	± 3	P-C-N-1550	< 0.2	< 40	80	0.05	1.3	
1590	± 3	P-C-N-1550	< 0.2	< 40	80	0.05	1.3	
1610	± 3	P-C-N-1550	< 0.2	< 40	80	0.05	1.3	
Available upon request: 763, 795, 937, 1083 nm (± 3 nm)								

<sup>1</sup> Shortest pulse width at min intensity setting above laser threshold. Possible pulse broadening at high intensity settings. The instrument response function of 30 ps is deconvoluted. Shorter pulse widths are available on demand.

<sup>2</sup> Average optical power at max repetition rate and max intensity setting.

<sup>3</sup> Average optical power at max repetition rate and min intensity setting above laser threshold.

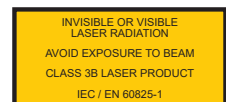
<sup>4</sup> LDH-D-C-N types including CW mode are available as well.

## Specifications

Beam parameters	
Optics focus length	f' = 4.5 mm (typ. for LDH-P/D-C-xxx) f' = 9.0 mm (typ. for LDH-D-TA-xxx)
Numerical aperture	0.55
Typical divergence with optics	typ. Theta    0.11 mrad, typ. Theta ⊥ 0.32 mrad
Polarization	typ. linear, perpendicular to the longer axis of the elliptical beam <sup>1</sup>
PER	typ. > 1:10 (> 10 dB)
Sidemode suppression ratio (SMSR)	typ. < 0.01
Cooling (optional)	
Peltier cooling stability	better than 1 K for ambient temperature between 15 °C and 30°C
Spectral width <sup>2</sup>	
Wavelength < 900 nm	approx. 2-8 nm
Wavelength > 900 nm	approx. 10-20 nm
CW operation	< 1 nm
Power stability (cooled)	
12 hours, DT <sub>ambient</sub> < 3 K	1 % RMS, 3 % peak to peak
Dimensions	
Cooled (ø × length)	62 × 100 mm, with fiber coupling: 62 × 132 mm
Flat type (l × w × h)	195 × 112 × 24 mm
Cooled D-TA-type (ø × length)	68 × 148 mm
„F-type“ with FC/APC connector (l × w × h)	200 × 100 × 35 mm

<sup>1</sup> a few exceptions to this behavior might occur

<sup>2</sup> narrower bandwidth might be available on request



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