

## Product Features

Five models with output current from 10 to 120 amps

CW and QCW operating modes

High setpoint accuracy and 4-wire forward voltage measurements

Multiple laser diode protection features

Event and pulse trigger input and output with programmable delays

Temperature monitor with thermistor input

Power monitor input for external photodiode

IEEE488/GPIB interface

The LDX-3600 Series High Power Laser Diode Drivers are a family of high performance current sources designed specifically for controlling and testing high power laser diodes. Five family members provide currents from 10 amps to 120 amps with a compliance voltage of up to 10V in CW or QCW modes. High setpoint accuracy, low output noise, and 4-wire voltage measurement make these drivers ideal for precision, high power laser diode L-I-V testing. A unique power display mode allows laser diode power to be set based on programmable slope efficiency and threshold current parameters. External output power monitoring is supported through an independent photodiode measurement circuit.

Multiple laser diode protection features include adjustable voltage and current limits, output shorting relays, and low operating and power line transients. In addition, all 3600 Series drivers accept a thermistor input for temperature monitoring with programmable temperature limits providing additional laser diode protection.

Designed for automated laser diode testing in CW or pulse mode, these drivers combine an IEEE488/GPIB interface with trigger inputs and outputs for fast, accurate laser diode characterization. For virtual instrument programming, LabView instrument drivers are available free of charge and can be downloaded from the ILX website.

# LDX 3600 Series

High Power  
Laser Diode  
Driver



## High Performance Current Sources for High Power Laser Diode Testing

 **ILX Lightwave**  
Laser Diode Instrumentation & Test Systems

# LDX 3600 Series

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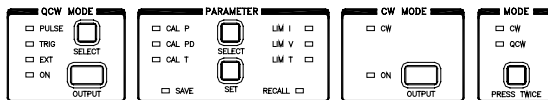
## HIGH POWER PRECISION LASER DIODE TESTING

Each LDX-3600 Series Laser Diode Driver was designed as a current source specifically for high power laser diodes. Precision low noise current control with a set point accuracy of 0.1% of reading is delivered to the laser during R&D or manufacturing testing including L-I-V testing, qualification testing, or pulse testing. Designed for precision high power L-I-V testing, each LDX-3600 provides precision forward voltage measurement with 4-wire measurement accuracy.

## A CHOICE OF LASER CURRENT CONTROL MODES

Each LDX-3600 can be operated at full scale current and voltage in CW or QCW mode saving time and reducing cost of test by eliminating multiple instruments and test set-ups. Conduct CW L-I-V testing and pulse testing of high power laser diodes all at the same test station, without moving the laser or changing the output cable. With the 3600's there is no need for another QCW instrument, simply change operating modes from the front panel or through the GPIB interface, set up the test parameters and start testing quickly in either mode. In QCW mode, the pulse output can be generated either internally with programmable pulse width, duty cycle and frequency parameters or through an external pulse trigger.

Additionally, a unique power display mode allows laser diode power to be set based on programmable slope efficiency and threshold current parameters.



CW and QCW Operating Modes

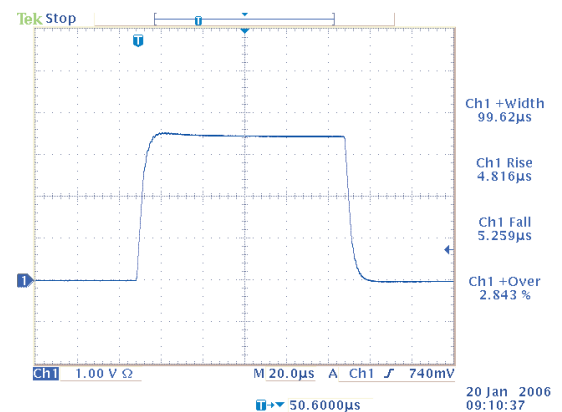
## PRECISION PULSE CONTROL FOR HIGH POWER LASER TESTING

The LDX-3600 Series offer several QCW operating modes delivering clean pulses with low overshoot and fast rise and fall times. Digital control of pulse width, duty cycle and frequency provide quick and easy control of pulse parameters for maximum flexibility in varying test applications. The pulsed output can be generated in one of three modes, 1) internal pulse, 2) triggered, and

3) external pulse. If the LDX-3600 is being used in diode-pumped solid state laser and amplifier testing, programmable input and output trigger delays allow for optimizing Q-switch timing and energy extraction without the need for any external delay generators.

## DESIGNED TO PROTECT HIGH POWER LASER DIODES

Eliminate problematic current spiking common with voltage sources. Each LDX-3600 Series Laser Diode Driver was designed as a current source specifically for high power laser diodes. The LDX-3600 Series Laser Diode Drivers provide multiple laser diode protection features such as current and voltage limits, slow start turn-on, isolated supplies, and immunity to operational and power line transients. Careful attention to design has resulted in minimal overshoot in QCW mode or while rapidly stepping current in CW mode at any output current level. Transients from normal instrument operation such as output on/off have been thoroughly tested and minimized as well as transients from inadvertent instrument operation (such as mode switching). All LDX-3600's accept a thermistor input, a temperature monitor provides additional protection with a programmable temperature limit which disables the current source output in a limit condition.



Current Overshoot in QCW mode at 20A Output

## AUTOMATE HIGH POWER LASER TESTING

Remote instrument operation is available on all LDX-3600 Series High Power Drivers through an IEEE488/GPIB interface. All instrument controls and functions are accessible through the IEEE488/GPIB interface for easy remote programming and control in automated test systems where repeatable and accurate

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High Power  
Laser Diode  
Driver



The LDX-3660 accepts an external pulse to generate the output pulse.  
The pulse is measured with the oscilloscope via a current probe.

test sequencing, measurements, and data handling are required. Whether the application is data intensive L-I-V testing, pulsed control for thermal characterization, or R&D evaluations, remote operation of the LDX-3600's saves time and ensures systematic data collection and instrument operation.

## PRECISION L-I-V TESTING

Each LDX-3600 Series Laser Diode Driver was developed specifically for precision L-I-V testing of high power laser diodes with 0.1% set point accuracy, low noise and forward voltage measurement capability. Additionally, the instrument can perform power measurements through an independent photo-diode input calibrated through a user-programmable responsivity. Accurate forward voltage measurements even with high current and long cable lengths are accomplished real time through a four wire measurement system. Reduce total system cost with these high current drivers; there is no need for separate pulsed sources or voltage measuring instruments for high power L-I-V testing.

## EASE OF OPERATION

Designed for ease of use and readability, the LDX-3600 Series front panel features dual 7-segment LED displays with instrument controls grouped by mode and function. The dual display lets you view laser parameters simultaneously with the bright 7-segment LED display highly visible from a distance and in darkened labs. Parameters such as current and voltage limits and calibration constants are easily selected and adjusted with the rotary digital encoder. Each display is easily configured to indicate laser parameters

such as current, voltage, power, and temperature with discrete control pushbuttons located below each display. System errors such as open circuits and current or voltage limits are indicated with discrete LED's with an error code indicated on the appropriate seven-segment LED display.

## SAVE AND RECALL INSTRUMENT SETTINGS

For multiple instrument test configurations, the LDX-3600 Series Laser Diode Drivers offer a SAVE and RECALL feature. The SAVE function allows you to store all the front panel settings for any given instrument configuration to a numbered bin. The RECALL function allows you to retrieve any of the saved configurations at any time through simple front panel button presses or remotely through the GPIB interface. This saves time in instrument re-configuration for different manufacturing runs or R&D experiments.

## PUT OUR EXPERTISE TO WORK

ILX Lightwave is a recognized world leader in Laser Diode Instrumentation and Test Systems. Our products are not only renowned for their reliability, quality, and value, they're backed by industry-leading after sales support. For more information about the LDX-3600 Series High Power Laser Diode Drivers, and our complete family of Laser Diode Instrumentation and Test Systems, call us today or visit our website at [www.ilxlightwave.com](http://www.ilxlightwave.com).

## Specifications <sup>1</sup>

	LDX-3650	LDX-3660	LDX-3670	LDX-3680	LDX-3690
<b>DRIVE CURRENT OUTPUT</b>					
Output Current Range:	0A to 10A	0A to 20A	0A to 40A	0A to 80A	0A to 120A
Set-Point Resolution:	10 mA	10 mA	100 mA	100 mA	100 mA
Set-Point Accuracy <sup>2</sup> :	0.05% +5 mA	0.05% +10 mA	0.1% +20 mA	0.1% +80 mA	0.1% +120 mA
Settling Time <sup>3</sup> :	20 $\mu$ s	20 $\mu$ s	20 $\mu$ s	50 $\mu$ s	50 $\mu$ s
Maximum Power:	100W	200W	400W	800W	1200W
Compliance Voltage <sup>4</sup> :	10V max	10V max	10V max	10V max	10V max
Temperature Coefficient:	50 ppm/ $^{\circ}$ C	50 ppm/ $^{\circ}$ C	50 ppm/ $^{\circ}$ C	50 ppm/ $^{\circ}$ C	50 ppm/ $^{\circ}$ C
Stability <sup>5</sup> :	100 ppm	100 ppm	100 ppm	100 ppm	100 ppm
Noise and Ripple <sup>6</sup> :	5 mA	10 mA	20 mA	40 mA	60 mA
Transients:					
Operational <sup>7</sup> :	<40 mA	<40 mA	<40 mA	<40 mA	<40 mA
1kV EFT/Surge <sup>8</sup> :	<80 mA	<80 mA	<100 mA	<320 mA	<320 mA

## QCW MODE<sup>9</sup>

Pulse Width:					
Range:	40 $\mu$ s to 600 ms	40 $\mu$ s to 600 ms	40 $\mu$ s to 400 ms	40 $\mu$ s to 10 ms	40 $\mu$ s to 10 ms
Resolution:	1 $\mu$ s	1 $\mu$ s	1 $\mu$ s	1 $\mu$ s	1 $\mu$ s
Accuracy:	$\pm$ 1 $\mu$ s	$\pm$ 1 $\mu$ s	$\pm$ 1 $\mu$ s	$\pm$ 1 $\mu$ s	$\pm$ 1 $\mu$ s
Pulse Frequency:					
Range:	1 to 1000 Hz	1 to 1000 Hz	1 to 1000 Hz	1 to 1000 Hz	1 to 1000 Hz
Resolution:	0.1 Hz	0.1 Hz	0.1 Hz	0.1 Hz	0.1 Hz
Accuracy <sup>10</sup> :	$\pm$ 0.1%	$\pm$ 0.1%	$\pm$ 0.1%	$\pm$ 0.1%	$\pm$ 0.1%
Duty Cycle:					
Resolution:	0.1 to 60%	0.1 to 60%	0.1 to 40%	0.1 to 20%	0.1 to 20%
Rise/Fall Time <sup>11</sup> :	<10 $\mu$ s	<10 $\mu$ s	<10 $\mu$ s	<15 $\mu$ s	<15 $\mu$ s
Overshoot:	<5%	<5%	<5%	<5%	<5%

## VOLTAGE LIMIT

Range:	0 – 14 V	0 – 14 V	0 –14 V	0 – 14 V	0 – 14 V
Resolution:	100 mV	100 mV	100 mV	100 mV	100 mV
Accuracy <sup>10</sup> :	$\pm$ 1% + 10 mV	$\pm$ 1% + 10 mV	$\pm$ 1% + 10 mV	$\pm$ 1% + 10 mV	$\pm$ 1% + 10 mV

## CURRENT LIMIT

Range:	0 to 10.1A	0 to 20.2A	0 to 40.4A	0 to 85A	0 to 130A
Resolution:	10 mA	10 mA	10 mA	10 mA	10 mA
Accuracy <sup>12</sup> :	0.05% + 5 mA	0.05% + 5 mA	0.1% + 20 mA	0.1% + 80 mA	0.1% + 120 mA

## EVENT TRIGGERING (ALL MODELS)

Trigger Output:	TTL Level; Active high, 50 $\Omega$
Pulse Width:	10 $\mu$ s
Delay:	Programmable
Accuracy:	6 $\mu$ s
Range:	10 $\mu$ s to 1 s
Resolution:	1 $\mu$ s
Jitter:	1 $\mu$ s
Trigger Input:	TTL Level; rising edge triggered, single shot to 1 KHz; high impedance
Delay to Output:	Programmable
Accuracy:	6 $\mu$ s
Range:	10 $\mu$ s to 1 s
Resolution:	1 $\mu$ s
Jitter:	1 $\mu$ s

## PULSE TRIGGERING (ALL MODELS)

Trigger Input:	TTL level; single shot to 1 KHz
Delay to Output:	1 $\mu$ s
Trigger Output:	TTL level

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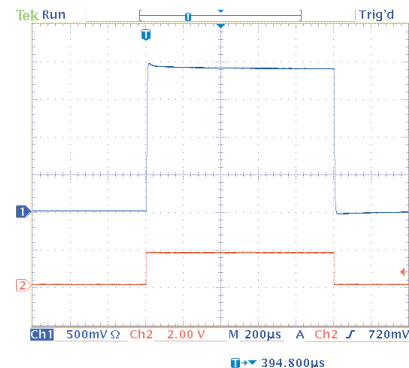
## Specifications

	LDX-3650	LDX-3660	LDX-3670	LDX-3680	LDX-3690
<b>ANALOG OUTPUT</b>					
Transfer Function <sup>13</sup> :	400 mV/A	200 mV/A	100 mV/A	50 mV/A	33.3 mV/A
Accuracy <sup>10</sup> :	±3%	±3%	±3%	±3%	±3%
<b>MEASUREMENT</b>					
Forward Voltage:					
Range:	0.00 to 10.00 V	0.00 to 10.00 V	0.00 to 10.00 V	0.00 to 10.00 V	0.00 to 10.00 V
Resolution:	10 mV	10 mV	10 mV	10 mV	10 mV
Accuracy <sup>14</sup> :	±20 mV	±20 mV	±20 mV	±20 mV	±20 mV
PD Current					
Range:	0 to 10000 µA	0 to 10000 µA	0 to 10000 µA	0 to 10000 µA	0 to 10000 µA
Resolution:	3 µA	3 µA	3 µA	3 µA	3 µA
Accuracy <sup>15</sup> :	0.1%	0.1%	0.1%	0.1%	0.1%
PD Responsivity					
Range (mA/W) <sup>16</sup> :	0.001 to 20.000	0.001 to 20.000	0.001 to 20.000	0.001 to 20.000	0.001 to 20.000
Resolution (mA/W):	.001	.001	.001	.001	.001
Power Control Range:					
Range (W):	0.0 to 250.0	0.0 to 250.0	0.0 to 250.0	0.0 to 250.0	0.0 to 250.0
Resolution (W):	0.1	0.1	0.1	0.1	0.1
P1 (Slope Efficiency):					
Range (W/A):	0.00 to 20.00	0.00 to 20.00	0.00 to 20.00	0.00 to 20.00	0.00 to 20.00
Resolution (W/A):	0.01	0.01	0.10	0.10	0.10
P2 (Threshold):					
Range (A):	0.000 to 10.00	0.000 to 20.00	0.000 to 40.00	0.000 to 80.00	0.000 to 120.00
Resolution (A):	0.01	0.01	0.01	0.01	0.01
Temperature Monitor					
Sensor Type:	NTC Thermistor	NTC Thermistor	NTC Thermistor	NTC Thermistor	NTC Thermistor
Temperature Range:	-99° to +199.9°C	-99° to +199.9°C	-99° to +199.9°C	-99° to +199.9°C	-99° to +199.9°C
Thermistor Current:	100 µA	100 µA	100 µA	100 µA	100 µA
Accuracy <sup>17</sup> :	±0.1°C	±0.1°C	±0.1°C	±0.1°C	±0.1°C

## NOTES

- All values relate to a on-hour warm-up period at room temperature, 25°C.
- ± (% of set point + mA)
- Time from start of current ramp to set point with the output enabled for step sizes <3A.
- At the rear panel of the instrument.
- ± % of FS over 1 hour
- RMS electrical noise measured on a 1Ω resistive load over a 300 KHz bandwidth.
- Maximum output current transient from normal operations (e.g. power on-off, current on-off) as well as accidental situations (e.g., power line plug removal).
- Maximum output current transient resulting from a 1000V power-line transient spike.
- All QCW mode pulse specifications taken with ILX output cable. Use of the instrument using alternative cabling may affect pulse performance.
- % of reading
- Measured from 10% to 90% points at half-scale output.
- ± (% of set point + mA) Firmware controlled limit accuracy. Internal hardware limit scaled with set-point limit.
- Output voltage is 4V full scale.
- Four wire voltage measurement at the load. Voltage measurement accuracy while driving calibration load. Accuracy is dependent upon load and cable used.
- ± (% of reading + µA)
- mA/W, the responsivity value is user-defined and is used to calculate the optical power.
- At 25°C, accuracy while using default thermistor constants and ILX Lightwave TS-510 calibrated 10 kΩ thermistor.

In keeping with our commitment to continuing improvement, ILX Lightwave reserves the right to change specifications without notice for such changes.



20 Jan 2006  
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Externally Triggered Pulse Output

**ILX Lightwave**  
Laser Diode Instrumentation & Test Systems

P.O. Box 6310, Bozeman, MT 59771 • FAX: 406-586-9405

[www.ilxlightwave.com](http://www.ilxlightwave.com)

For information call  
**1-800-459-9459**

International Inquiries: 406-556-2481  
email: [sales@ilxlightwave.com](mailto:sales@ilxlightwave.com)

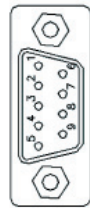


Rev06. 091506

# LDX 3600 Series

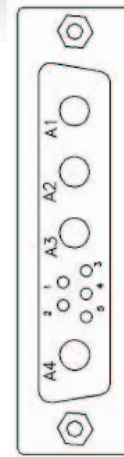
High Power  
Laser Diode  
Driver

## REAR PANEL (LDX-3650, LDX-3660 and LDX-3670 ONLY)



Measurement Connector  
Pinout

- 1-PD Cathode
- 2-PD Anode
- 3-Vsense-
- 4-Vsense+
- 5-Thermistor+
- 6-N/C
- 7-N/C
- 8-N/C
- 9-Thermistor-



Output Connector Pinout

- A1-Laser Anode
- A2-Laser Anode
- A3-Laser Cathode
- A4-Laser Cathode
- 1-N/C
- 2-N/C
- 3-N/C
- 4-N/C
- 5-N/C

## Specifications

### GENERAL

**GPIB Interface:** IEEE488/GPIB  
 **Power Requirements:** 100-120 VAC  $\pm$ 10%  
 220-240 VAC  $\pm$ 10%  
 **Size (HxWxD):** 146mm x 483mm x 451mm  
 5.25" x 19" x 17.75"  
 **Weight**  
 LDX-3650: 12.2 kg (27 lbs.)  
 LDX-3660: 12.2 kg (27 lbs.)  
 LDX-3670: 13.6 kg (30 lbs.)  
 LDX-3680: 15.4 kg (34 lbs.)  
 LDX-3690: 15.4 kg (34 lbs.)  
 **Operating Temperature:** 0°C to 40°C  
 **Storage Temperature:** -40°C to 70°C  
 **Humidity:** 20-85% non-condensing  
 **EMC:** 98/336/EEC  
 **Safety:** 21CFR 1040.10  
 EN60825-1/EN60950  
 EN61010/EN61326  
 73/23/EEC  
 Low voltage directive

### Connectors:

**Current Output:**  
 LDX-3650, 3660, 3670 Hybrid DB25 pin  
 LDX-3680, 3690 High current dual crown clip  
 **Measurement:** DB 9 rear panel  
 **Interlocks:** Terminal Block; rear panel  
 **Ext. Pulse Input/Output:** BNC front panel  
 **Input/Output Trigger:** BNC rear panel  
 **Analog Out:** BNC rear panel

### LASER DIODE PROTECTION

**Output Shorting Relay:** Normally closed  
 **Current Ramp Time:** 30 ms to full scale  
 **Output Enable Delay:** 2s  
 **Fault Response Time:** < 100  $\mu$ s  
 **Transient Protection:** Output On/Off  
 Power Up/Down  
 EFT/Surge, 1000V  
 **Adjustable Current Limit:** 0 to full scale  
 **Redundant Hardware Current Limit:** 0 to full scale  
 **Adjustable Voltage Limit:** 0 to 14V

### ORDERING INFORMATION

LDX-3650 10A High Power Laser Diode Current Source  
 LDX-3660 20A High Power Laser Diode Current Source  
 LDX-3670 40A High Power Laser Diode Current Source  
 LDX-3680 80A High Power Laser Diode Current Source  
 LDX-3690 120A High Power Laser Diode Current Source  
 CC-340 40A Unterminated High Power Current Source  
 Interconnect Cable  
 CC-390 120A Current Source Interconnect Cable  
 LabView Instrument Driver

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