

Product Features

LDX-3100 CURRENT SOURCE

0 to 250 mA output range

Low noise, high stability

Constant current and constant power control modes

Slow turn on circuit for laser diode protection

Mounts to LDT-5100 TE Controller for complete OEM laser diode control

LDT-5100 CONTROLLER

High stability (within 0.005°C)

Low noise, bipolar control

Fast settling time with hybrid P-I control loop

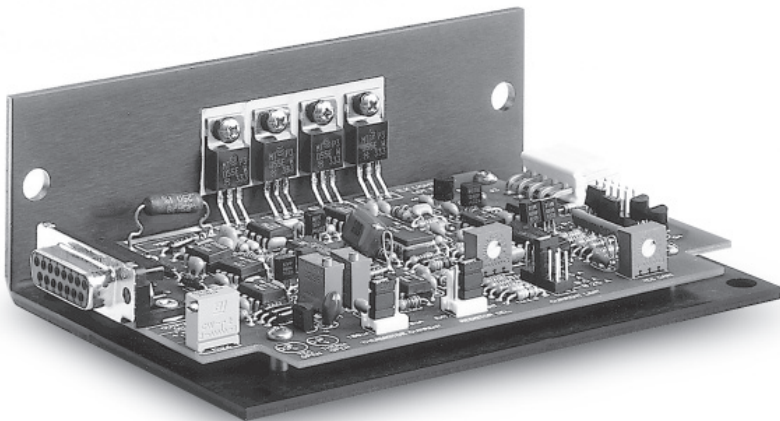
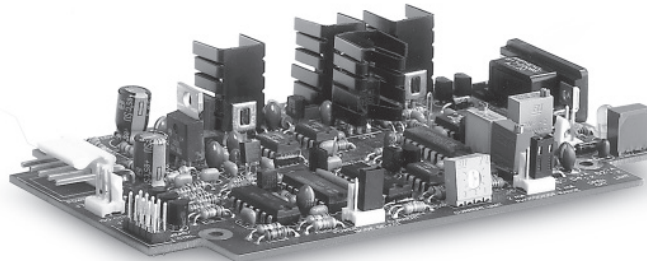
TE module current limit

Integrated heat sink / mounting plate

Designed to compliment ILX Lightwave's line of precision laser diode instrumentation, the LDX-3100 and LDT-5100 offer precise low-noise, high-stability current and temperature control of laser diodes to meet the needs of critical OEM and other space constrained applications.

The LDX-3100 laser diode current source provides the flexibility of a mountable circuit board with laboratory-grade performance and proven laser protection. It can be operated in constant current or constant power modes. Similarly, the LDT-5100 thermoelectric temperature controller provides outstanding temperature stabilization of laser diodes or photodetectors.

The products can be used together or independently and are easily incorporated into other products with demanding laser diode drive requirements. Both are based on ILX Lightwave's proven circuit topologies, and are pin-compatible with ILX Lightwave laboratory instruments and laser mounts.



Board-level laser diode current & TE control for demanding applications

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

LDX 3100

Laser Diode
Current Source

LDT 5100

Temperature
Controller

LDX 3100

Laser Diode
Current Source

LDT 5100

Temperature
Controller

LDX-3100 Specifications

BOARD LEVEL CURRENT CONTROL

The LDX-3100 Current Source is a board level device which, when powered by the appropriate supply, delivers stable, low noise current. The LDX-3100 is optimized to drive laser diodes and LEDs with an output range of 0 to 250 mA, with a compliance voltage >5.5V.

TWO OPERATING MODES FOR FLEXIBILITY

The LDX-3100 can be operated in one of two modes. In constant current mode, a stable current can be adjusted from an on-board trimpot or through an external control voltage. The output can be modulated up to 2 kHz, so it's easy to dither the laser current and power and wavelength tuning. In constant power mode, the photocurrent from the laser's rear-facet

monitor is used in a feedback control loop to the laser drive current to maintain stable laser output power, even if temperature changes.

PROVEN ILX PERFORMANCE

The circuit topology of the LDX-3100 Laser Diode Current Source is based on ILX's LDX-3412 Current Source, which is designed for laboratory benchtop applications. For more information about the LDX-3412, contact a sales engineer at ILX Lightwave.

For more information about laser diodes and driving them safely, please download the following Application Notes from www.ilxlightwave.com.

App Note 3: Protecting Your Laser Diode
App Note 5: Overview of Laser Diode Characteristics
App Note 7: Using Laser Diodes in Atomic Physics
App Note 8: Mode-Hopping in Semiconductor Lasers

LDX-3100 OEM LASER DIODE CURRENT SOURCE

INPUTS

Power Supply:	12–18 V @ 350 mA -12 to -18 V @ 50 mA
Control:	Output On (Default) when power supplied. User can control output on/off with TTL line TTL Signal (VCC required)
Isolated Control: ² Mode Select ³	
Jumper Selectable:	Constant I / Constant I _{pd}
I Set:	
1) External Voltage:	0-5 V, 50 mA/V
2) On-Board:	25-turn pot
I Limit Set:	1-turn pot adjustable, 0 to 250 mA (min.)

Transfer Function:	50 mA/V
Accuracy:	±1.5% of FS (±3.75 mA)

Laser Diode Protection ESD:	JFET (Normally closed) shorting output
Power:	Current Supply regulated onboard, overvoltage protection, transient suppression.

Indicators	
Power On:	Green LED
Current On:	Pads for ext. LED (10 mA)
Error (open circuit):	Pads for ext. LED (10 mA)

Modulation:	
Bandwidth:	2 kHz ⁴
Transfer Function:	50 mA/V

Photodiode Feedback Type:	Differential, zero-bias
Photodiode Range:	20 µA to 2 mA
Stability ⁵ :	±0.1%

GENERAL

Size:	12 mm x 88 mm x 139 mm 0.5"x 3.5"x 5.5" (Printed Circuit Board — includes four 1.25" mounting standoffs)
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Operating Temperature:	0°C–50°C
Storage Temperature:	-40°C to 70°C

OUTPUTS

Laser Output	
Current:	0–250 mA (min.)
Compliance Voltage:	>5.5 V
Temp. Coefficient:	<50 ppm/°C
Short Term Stability (1 hr.):	<50 ppm
Long Term Stability (24 hr.):	<100 ppm
Control Transients ⁶ :	<100 µA
Noise (rms):	<2 µA
Laser Current Measurement:	0–5 V buffered output
Transfer Function:	50 mA/V
Accuracy:	±0.1% of FS (±0.25 mA)
Photodiode I Measurement:	0–5 V buffered output
Transfer Function:	0.4 mA/V
Accuracy:	±0.1% of FS (±2 µA)
Limit Current Measurement:	0–5 V buffered output

NOTES

1. All values measured after a one-hour warm-up period.
2. Isolated control is provided to turn output off and on depending on input (such as TEC error status from LDT-5100). No connection disables this control.
3. Mode may be changed only when output is off.
4. In constant power mode, The bandwidth is reduced to approximately 200 Hz, depending on the photodiode used.
5. Maximum monitor photodiode drift over 30 min. period, after warm up. Assumes zero drift in responsivity of photodiode.
6. Maximum output current transient generated from normal operational (ON/OFF) situations.

ORDERING INFORMATION

LDX-3100	OEM Current Source
CC-305S	Current Source/Laser Diode Mount Interconnect Cable
CC-306S	Current Source/Unterminated Interconnect Cable
CC-350	Power Supply Adaptor Cable (For use when integrating current source board into finished equipment requiring external connection)
LNF-320	Low Noise Filter (ELPAC WM113 & WM220-1)

LDT-5100 Specifications

SUPERIOR TEMPERATURE STABILITY

The LDT-5100 Temperature Controller is a board-level device which, when powered by the appropriate supply, maintains highly stable temperature of a laser diode or photodetector.

Using the resistance of a temperature dependent thermistor as feedback, it stabilizes temperature by driving current to a thermoelectric (TE) module. The TE drive of the LDT-5100 is bipolar, allowing for highly stable temperatures and fast settling times. Desired temperature (thermistor resistance) is set by adjusting an on-board trimpot or by connecting an external reference resistor (for a more precise set point).

LDT-5100 OEM LASER DIODE TE CONTROLLER

INPUTS

Power Supply Input ^{2,3} :	±12 to 18 V @ 75 mA +4.5 to 7 V @ 2 A
Control:	Output On (Default) when power supplied. User can control output on/off with TTL line. (Low = output Off)
Thermistor R Setting ⁴ : External R _{set}	Jumper Selectable int./ext. R _{set} - Thermistor R driven to match reference precision resistor across connector pins 5, 6.
On-Board R _{set}	- 50 kΩ adjustable 10-turn pot
Thermistor Current: I _{TE} Limit:	Jumper selectable 10 μA/100 μA
Jumper Selectable:	250 mA, 500 mA, 1 A, 1.5 A, 2 A
Limit Accuracy:	± 50 mA
TEC Gain:	1 to 50 - adjustable 1-turn pot

OUTPUT

Output Type:	Bipolar, floating, constant current source
Current Range:	-2 A to 2 A
Compliance Voltage:	>2 VDC

Stability (24 hr.)⁵

On-Board R _{set} :	±0.01 °C
External R _{set} :	±0.005 °C
Temperature Coefficient:	
On-Board R _{set} :	0.01 °C/°C (ambient)
External R _{set} :	0.005 °C/°C (ambient)
Thermistor Measurement:	0-5 V Buffered Output

Transfer Function:	
100 μA Range:	10 kΩ/V
10 μA Range:	100 kΩ/V

Accuracy:

100 μA Range:	±50 Ω
10 μA Range:	±500 Ω
I _{TE} Measurement:	-5 V to +5 V Buffered Output
Transfer Function:	400 mA/V
Accuracy:	±40 mA
LED Indicators ⁶ :	
Output On:	PCB pads for external LED

PROVEN DESIGN PLATFORM

The circuit topology of the LDT-5100 Board-Level Temperature Controller is based on ILX Lightwave's LDT-5412 Temperature Controller, which is designed for laboratory benchtop applications. For more information about the LDT-5412, please call an ILX Lightwave sales engineer.

For more information about controlling temperature with thermoelectric (Peltier) modules, please download the following Application Notes from www.ilxlightwave.com.

App Note 1: Controlling Temperature of Diode Lasers and Detectors Thermoelectrically

App Note 2: Selecting and Using Thermistors for Temperature Control

TEC Open Error:	(10 mA), and open-collector output PCB pads for external LED
Sensor Open Error:	(10 mA), and open collector output ⁶ PCB pads for external LED (10 mA), and open-collector output ⁶

GENERAL

Size:	44 mm x 95 mm x 139 mm 1.75" x 3.75" x 5.5" (Printed circuit board with integrated heat-sink / mounting bracket.)
Weight:	8.75 oz.
Operating Temperature:	0°C–50°C
Storage Temperature:	-40°C to 70°C

NOTES

1. All values tested after a one-hour warm-up period.
2. Additional current is needed if external LED indicators are used (approx. 10 mA per LED)
3. Higher voltage allowed with use of additional heat-sinking of mounting plate.
4. Use of an external precision resistor is the recommended method to set desired thermistor R.
5. Over any 24 hr. period, controlling an LDM-4412 mount @ 25°C, with a 10 kΩ thermistor, on 100 μA setting.
6. Open-collector outputs for TEC error and sensor error can be used to control other functions such as laser output disable line on the LDX-3100 current source.

ORDERING INFORMATION

LDT-5100	OEM Thermoelectric Temperature Controller (2 A, 4W; includes heat sink / L-Bracket mount)
CC-350	Power Supply Adaptor Cable (For use when integrating temperature control board into finished equipment requiring external connection)
CC-501S	TE Controller/Unterminated Cable
CC-505S	TE Controller/Laser Diode Mount Interconnect Cable

LDX 3100

Laser Diode
Current Source

LDT 5100

Temperature
Controller

LDX 3100

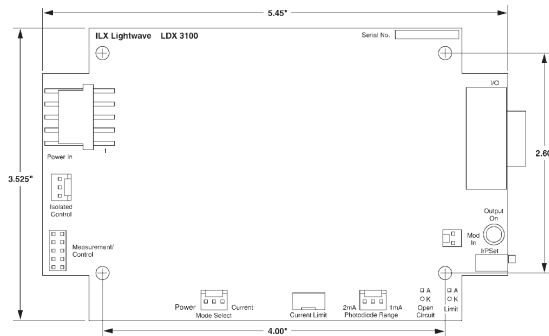
Laser Diode
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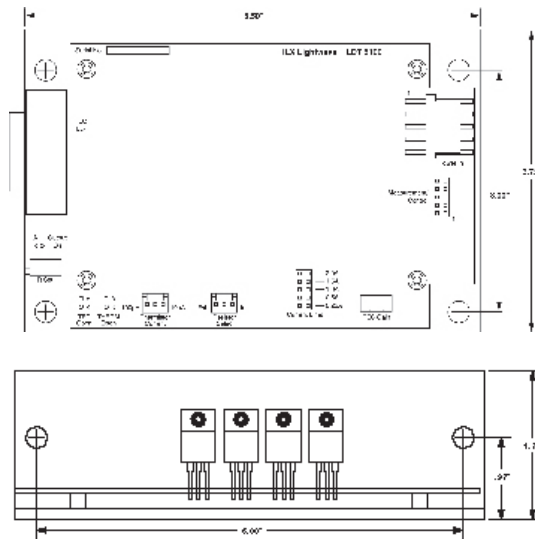
Specifications

LDX-3100 CURRENT SOURCE



The LDX-3100 includes four 1.25" standoffs, and may be mounted to the LDT-5100

LDT-5100 TEMPERATURE CONTROLLER



The LDT-5100 includes a heat sink mounting bracket.

LDX-3100 CONNECTORS

Laser Current, Photodiode, I/O Connector:

- 9-pin, female D-sub
- 1,2 Safety Interlock
- 3 N/C
- 4,5 Laser Diode Cathode (-)
- 6 Photodiode Anode (-)
- 7 Photodiode Cathode (+)
- 8,9 Laser Diode Anode (+)

Power Input Connector:

- 5-pin, Right-angle, 0.156" centers
- 1 N/C
- 2 GND
- 3 -15 VDC
- 4 GND
- 5 +15 VDC

Measurement/ Control Connector:

- 10-pin, 0.1" centers, IDC-compatible
- 1 Output on
- 2 Output status
- 3 +5 V
- 4 Open circuit error
- 5 Ground
- 6 Photodiode current monitor
- 7 Limit sense
- 8 Limit current monitor
- 9 Ground
- 10 Laser current monitor

Modulation Input Connector:

- 2-pin, 0.1" centers

Isolated Control Connector:

- 3-pin, 0.1" centers
- 1 ISO VCC
- 2 N/C
- 3 ISO CTRL

LDT-5100 CONNECTORS

TEC Connector:

- 15-pin D-sub female
- 1,2 TE Module +
- 3,4 TE Module -
- 5,6 External Reference Resistor
- 7 Thermistor +
- 8 Thermistor -
- 9 Analog Ground
- 10 Control Signal (provides 1V/A to drive booster supplies)
- 11-15 N/C

Measurement/ Control Connector:

- 10-pin, 0.1" centers, IDC-compatible
- 1 Output off (input)
- 2 Output on indication (open-collector output)
- 3 N/C
- 4 TEC open error (open-collector output)
- 5 N/C
- 6 Thermistor open error (open-collector output)
- 7 N/C
- 8 TE current monitor
- 9 N/C
- 10 Actual R monitor

Power Input Connector:

- 5-pin, Right-angle, 0.156" centers
- 1 +TE Supply (+4.5 to 7 VDC @ 2 A)
- 2 GND
- 3 -15 VDC
- 4 GND
- 5 +15 VDC

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

ILX Lightwave
Laser Diode Instrumentation & Test Systems

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

www.ilxlightwave.com

For information call
1-800-459-9459

International Inquiries: 406-556-2481
email: sales@ilxlightwave.com



Rev03.061507