LDC 3726

Laser Diode Controller

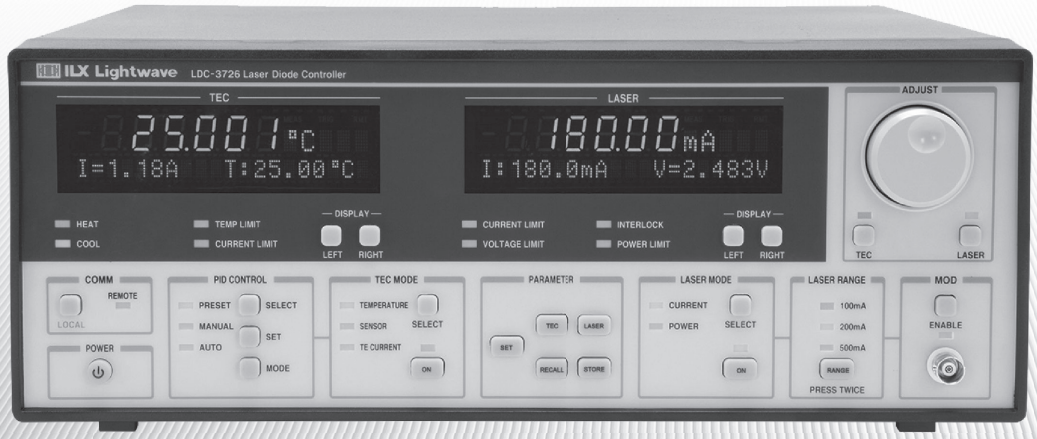
Product Features

- Precision, low noise current source with integrated temperature controller for consistent, high accuracy measurements
- Multiple levels of laser protection to prevent damage to laser diodes for worry free operation
- LIV capabilities via remote interfacing for characterizing laser diodes
- 4-wire laser forward voltage and TEC voltage measurement
- Temperature controller compatible with thermistor, IC, and RTD temperature sensors
- Built-in analog modulation up to 1 MHz for carrier signal applications
- USB and GPIB computer interfaces
- TTL trigger output
- LabVIEW® drivers

The LDC-3726 Laser Diode Controller is an industry leading combination laser current source and temperature controller. The design of the LDC-3726 allows it to deliver up to 500 mA at 10V of low noise current with stability better than 40 ppm. The integrated power temperature controller is designed to provide up to 32W of cooling power while maintaining the TEC noise and ripple below 1 mA rms.

All of ILX Lightwave proven laser diode protection strategies have been designed into each model including slow start, adjustable current limits and compliance voltage, intermittent contact protection, and shorting relays. In addition, the LDC-3726 incorporates standard features including multiple current ranges, analog current modulation, 4-wire voltage measurement of the laser and TEC, and USB and GPIB remote interface.

For operation in R&D or production environments, remote operation is available through a USB or GPIB interface. Remote commands have been structured in SCIP format and, where possible, standard SCIP commands have been used. A trigger output is provided for integration into an automated measurement system where the TTL level output indicates a current step change for initiation of a measurement. A robust and easy to modify LabVIEW® driver is available for download.



Precision Laser Diode Controller

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LASER CURRENT SOURCE

LDC-3726

DRIVE CURRENT OUTPUT [1]

Output Current Range:	0–100mA	0–200mA	0–500mA
Setpoint Resolution (Display):	0.001mA	0.01mA	0.01mA
Setpoint Resolution (Remote):[12]	2µA	4µA	10µA
Setpoint Accuracy (Unmodulated):[14]	±(0.025% of SP ± 0.01% of FS)	±(0.025% of SP ± 0.01% of FS)	±(0.025% of SP ± 0.01% of FS)
(Modulated 3726 Only):	±(0.19% FS - 0.155% SP)	±(0.19% FS - 0.155% SP)	±(0.19% FS - 0.155% SP)
Compliance Voltage:	0–10V adjustable	0–10V adjustable	0–10V adjustable
Temperature Coefficient:	<50ppm/°C	<50ppm/°C	<50ppm/°C
Short-Term Stability (one-hour):[2]	<20ppm	<20ppm	<20ppm
Long-Term Stability (24-hour):[3]	<40ppm	<40ppm	<40ppm
Noise and Ripple (rms)[4]			
High Bandwidth Mode (rms):	10µA	10µA	10µA
Low Bandwidth Mode (with LNF-320):	1.5µA	2µA	2µA
Transients			
Operational:[5]	<2mA	<3mA	<3mA
1 kV EFT/Surge: [6]	<20mA/<30mA	<20mA/<30mA	<20mA/<30mA

COMPLIANCE VOLTAGE LIMIT ADJUST

Range:	0–11V	0–11V	0–11V
Setpoint Resolution (Display):	0.1V	0.1V	0.1V
Setpoint Resolution (Remote):	50mV	50mV	50mV
Accuracy:	±0.1% FS	±0.1% FS	±0.1% FS

DRIVE CURRENT LIMIT SETTINGS

Range:	1–101mA	1–202mA	1–505mA
Resolution:	0.5mA	1mA	2.5mA
Accuracy:	±(0.3% of SP + 0.25 mA)	±(0.3% of SP + 0.25 mA)	±(0.3% of SP + 0.25 mA)

PHOTODIODE FEEDBACK

Type:	Differential	Differential	Differential
Photodiode Reverse Bias:	0–5V adjustable	0–5V adjustable	0–5V adjustable
Photodiode Current Range:	5 to 5000µA	5 to 5000µA	5–5000µA
Output Stability:[7]	±0.02% of SP	±0.02% of SP	±0.02% of SP
Setpoint Accuracy:	±1.5µA	±1.5µA	±1.5µA

EXTERNAL ANALOG MODULATION

Input:	0–10V, 1 kΩ	0–10V, 1 kΩ	0–10V, 1 kΩ
Transfer Function:	10mA/V	20mA/V	50mA/V
Bandwidth (3dB)			
High Bandwidth:[8,13]	DC to 1MHz	DC to 1MHz	DC to 1MHz
Low Bandwidth:[9]	DC to 15kHz	DC to 15kHz	DC to 15kHz

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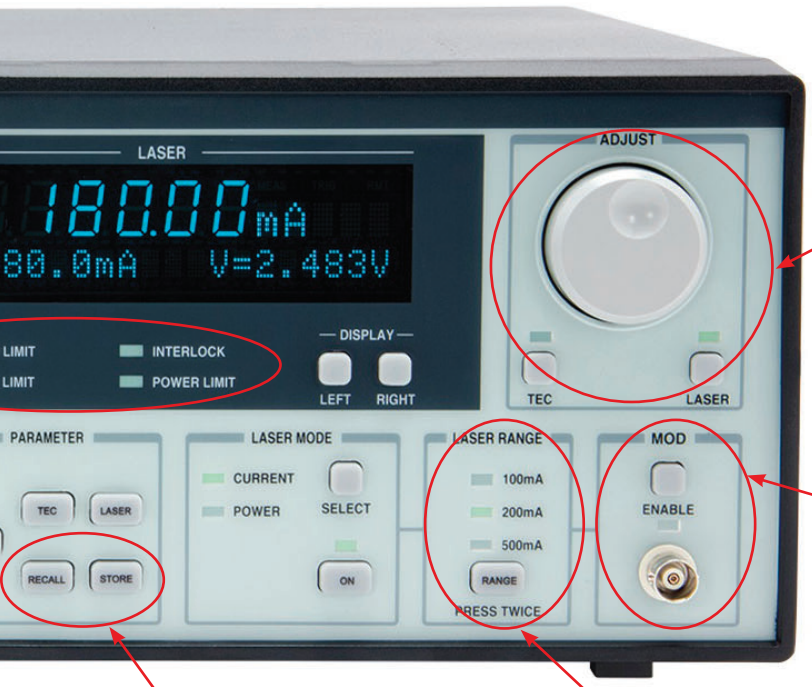

Smooth adjustment knob for fine control of settings on TEC or laser

Modulation input for carrier signal applications

Store and recall settings for quick test configuration setup

Three current ranges for higher accuracy with application needs

TRIGGER OUTPUT

Type:	TTL	TTL	TTL
Pulse Width:	13 µs	13 µs	13 µs
Delay:	12 ms	12 ms	12 ms

MEASUREMENT (DISPLAY)

Output Current			
Range:	0–100.0mA	0–200.0mA	0–500mA
Resolution:	0.002mA	0.01mA	0.01mA
Accuracy:	±0.05% FS	±0.05% FS	±0.05% FS
Photodiode Current			
Range:	0–5000µA	0–5000µA	0–5000µA
Resolution:	1µA	1µA	1µA
Accuracy:	±2µA	±2µA	±2µA
Photodiode Responsivity [10]			
Range (µA/mW):	0.00–1000.00	0.00–1000.00	0.00–1000.00
Resolution:	0.01µA/mW	0.01µA/mW	0.01µA/mW
Optical Power			
Range (mW):	0.00–100.00	0.00–500.00	0.00–500.00
Resolution:	0.01mW	0.01mW	0.01mW
Forward Voltage			
Range:	0.000–10.000V	0.000–10.000V	0.000–10.000V
Resolution:	1mV	1mV	1mV
Accuracy:[11]	±2mV	±2mV	±2mV

GENERAL

I/O Connectors	
TEC I/O:	Female, 15-pin, D-sub
Analog Input:	BNC
Remote Interface:	GPIB IEEE 488.1; USB 2.0 (B-Type)
Power Requirements [A]	AC Input Selector; 115/230 VAC; 100-120 VAC / 220-240 VAC; 500W; 50-60 Hz
Size (HxWxD):	5.0" x 13.9" x 13.6"; 127 mm x 353 mm x 345 mm
Weight:	22.8 lbs.; 10.34 kg.
Operating Temperature:	10°C to 40°C
Storage Temperature:	-30°C to 70°C
Humidity:	<85% relative, non-condensing
Compliance:	CE

A Output De-Rating = 3.7 mA/V below 103VAC to 90 VAC

CURRENT SOURCE NOTES

1 All values relate to a one-hour warm-up period.
2 Over any one-hour period, half-scale output.
3 Over any 24-hour period, half-scale output.
4 Measured electrically with a frequency range of 100Hz to 340kHz (High Bandwidth), 100Hz to 17kHz (Low Bandwidth).
5 Maximum output current transient resulting from normal operational situations (e.g., power on-off, current on-off), as well as accidental situations (e.g., power line plug removal). To protect the laser in all condition it is recommend setting both the current and voltage limit just above typical operating conditions and enabling the TEC output prior to the laser current output.
6 Maximum output current transient resulting from a 1000V power line transient spike. Tested to ILX Technical Standard #LDC-00196; request ILX App Note #13.
7 Maximum monitor photodiode current drift over any 30 minute period. Assumes zero drift in responsivity of photodiode.
8 50% modulation at mid-scale output. Higher bandwidth is possible with smaller modulation signal.
9 Small signal specification is for typical 10% modulation depth. Large signal specification assumes 50% modulation depth at mid-scale output.
10 Responsivity value is user-defined and is used to calculate the optical power.
11 Four wire voltage measurement at the load. Voltage measurement accuracy while driving calibration load. Accuracy is dependent upon load and cable used.
12 Based on resolution of digital to analog converters used in circuit.
13 3726 high bandwidth achieved with load impedances less than 4 ohms.
14 Under factory testing conditions. Single resistance test load.

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Specifications

TEMPERATURE CONTROL[1]

LDC-3726

Temperature Control Range:[2]	
Thermistor Sensor:	–100°C to +200°C
IC Sensor:	–100°C to +150°C
RTD Sensor:	–100°C to +200°C
Temperature Setpoint and Measurement Repeatability and Accuracy:[3]	
0°C:	±0.001°C / ±0.01°C
25°C:	±0.002°C / ±0.04°C
50°C:	±0.007°C / ±0.15°C
75°C:	±0.05°C / ±0.9°C
Temperature Stability:[4]	
1 Hour:	±0.001°C
24 Hours:[4]	±0.002°C

TEMPERATURE SENSOR

Types:	
Thermistor:	NTC (2-wire)
IC-V Semiconductor IC Sensor:	LM-335 voltage output; 5 to 14 mV/K
IC-I Semiconductor IC Sensor:	AD-590 current output; 1 µA/K
RTD Sensor	Platinum 100Ω / 1000Ω (2-wire)
Thermistor Sensor Resistance	
10 µA Bias Setting	
Range:	0 to 450 kΩ
Resolution (Display):[6]	0.01 kΩ
Accuracy:	±180 Ω
100 µA Bias Setting	
Range:	0 to 45 kΩ
Resolution (Display):[6]	0.001 kΩ
Accuracy:	±18 Ω
IC-V Sensor Voltage	
Nominal Bias:	1 mA
Range:	0 to 6V
Resolution (Display):[6]	0.0001 V
Accuracy:	±2 mV
IC-I Sensor Current	
Nominal Bias:	5 to 15 V
Range:	0 to 600 µA
Resolution (Display):[6]	0.001 µA
Accuracy:	±0.18 µA
RTD Sensor Resistance	
1 mA Bias Setting	
Range:	0 to 1500 Ω
Resolution (Display):[6]	0.01 Ω
Accuracy:	±0.8 Ω
2.5 mA Bias Setting	
Range:	0 to 200 Ω
Resolution (Display):[6]	0.001 Ω
Accuracy:	±0.1 Ω
User Sensor Calibration	
Thermistor:	Steinhart-Hart, 3 constants
IC Sensors:	Slope, Offset
RTD	R_0, A, B, C

TEC OUTPUT

Output Type:	Bi-directional, linear
Isolation:	Floating with respect to earth ground
Current Setpoint	
Range:	-4.00A to +4.00A
Resolution (Display):[6]	0.01A
Accuracy:	±0.025A
Current Limit	
Range:	-4.05A to +4.05A
Accuracy:	±0.025A
Voltage Measurement [7]	
Range:	-8.00V to +8.00V
Resolution (Display):[6]	0.01V
Accuracy:	±0.01V
Compliance Voltage:	±8V
Maximum Output Power:	32W
Current Noise and Ripple:[5]	<1.0 mA rms

AUXILIARY I/O SPECIFICATIONS

Analog Control Input	
Input Voltage Range:	-5V to +5V
Input Resistance:	>100 kΩ
Gain:[9]	2 °C/V
Bandwidth:	5 Hz
External Fan Control Output [8]	
Output Voltage Range:	0 to +12V
Maximum Current:	500 mA

TEMPERATURE CONTROL NOTES

1 All values are specified for an ambient temperature of 23±5°C after a 1 hour warm up unless otherwise specified.
2 Software limits of range. Actual range depends on the physical load, sensor type, and TEC module used.
3 Accuracy figures represent the uncertainty that the LDC-3706 series adds to the measurement. This figure does not include the sensor calibration uncertainties. Thermistor accuracy figures are quoted for a typical 10 kΩ thermistor and 100 µA current setting for -5°C to 50°C.
4 Temperature stability measurements made in a stable, ambient environment ±0.5°C with a 10 kΩ thermistor on the 100 µA setting after a 2 hour warm up period. Stability is defined as ±(Tmax-Tmin)/2 over the measurement period.
5 Measured over the full DC current range into a 1Ω load.
6 Maximum resolution available when operating in the control mode (using the 7-segment display) resolution will be reduced when displayed on the lower display. In remote operation, six significant digits of resolution are reported.
7. Measured at the output connector. Users may enter in cable resistance to provide an accurate voltage measurement at the load.
8. Unregulated output and requires a minimum of a 120mA current draw.

ORDERING INFORMATION

LDC-3726	Laser Diode Controller
LDM-4405	Laser Diode Mount, TO-Can
LDM-4990	Laser Diode Mount, TO-Can
LDM-4982	Laser Diode Mount, DIL
LDM-4983	Laser Diode Mount, 13-Pin Butterfly
LDM-4984	Laser Diode Mount, 14-Pin Butterfly
TS-510	Calibrated 10kΩ Thermistor
CC-305S	Current Source/Laser Diode Mount Interconnect Cable
CC-306S	Current Source/Unterminated Interconnect Cable
CC-355S	Current Source/Laser Diode Mount Interconnect Cable, 5 meter
CC-501HT	Temperature Controller/Laser Diode Mount Interconnect Cable
CC-505S	Temperature Controller/Laser Diode Mount Interconnect Cable

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