

## Product Features

Mainframe  
8 independent channels  
with up to 16 isolated outputs

Fast GPIB/IEEE-488 interface

“Smart” modules for flexibility and speed

Laser Current Sources  
High compliance voltage

Direct modulation up to 1.2MHz

Four-wire measurement of laser diode forward voltage

Advanced laser protection features including adjustable voltage limit

TEC Controllers  
TEC voltage measurement

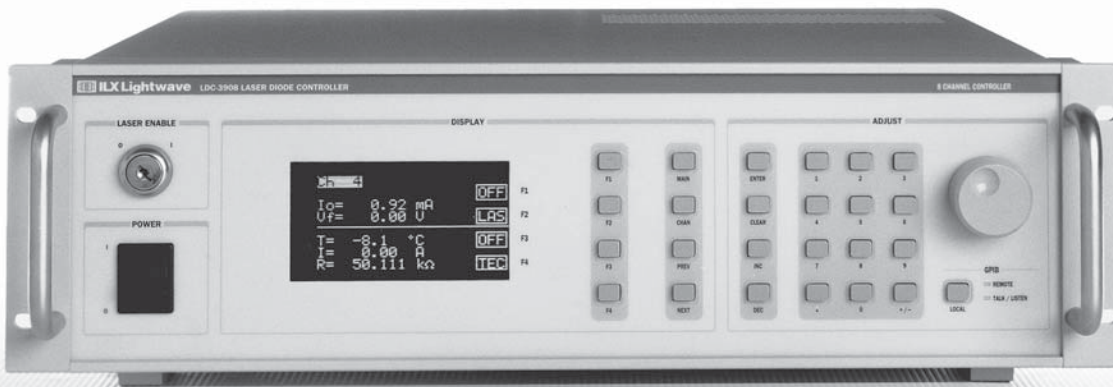
Resistive heater control adapters available

The LDC-3908 8-Channel Laser Diode Controller has all of the same great features as our popular LDC-3916 16-Channel Laser Diode Controller. In fact, modules are interchangeable between the two instruments. The smaller size and lighter weight of the LDC-3908 make it an ideal instrument for smaller channel count applications such as R&D or production test of EDFAs and Raman amplifiers.

Handles on the front panel and flip-up feet on the bottom facilitate bench-top use, while flanges facilitate installation into standard 19 inch instrument racks. “Smart” modules include controller modules with up to 1.5A of laser current source and 9W of TEC control, dual current source modules with two isolated currents of up to 1A, a dual 9W TEC module, a 3A laser current module, and a 3A 24W TEC module.

# LDC 3908

## 8 Channel Laser Diode Controller



## 8 Channels of Laser Diode Control

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

# LDC 3908

## 8 Channel Laser Diode Controller

### Front Panel Interface Provides Simple Operation

The front-panel interface features a bright vacuum fluorescent display, making the information readable from almost any angle. You can easily monitor the operations of up to four channels at a time. Simple and intuitive menus, supported by screen-specific soft-keys, allow you to quickly configure and operate each channel. Menu depths have been intentionally limited to keep the front-panel operation concise, while more sophisticated operations are reserved for the GPIB interface. Setpoints and other values can be entered through your choice of numeric keypad entry, up-down arrow keys, or a rotary adjustment knob.

### Powerful GPIB Interface Offers Robust, Automated Control

A powerful processor platform drives the LDC-3908 8 Channel Laser Diode Controller. When coupled with GPIB technology from National Instruments' HS488 TNT chipset, you get all the processing capability needed for mission-critical production testing. With microprocessors on each module, the mainframe engine manages 8 independent control channels quickly and reliably. Free LabVIEW® instrument drivers are available upon request or by downloading them from [www.ilxlightwave.com](http://www.ilxlightwave.com).

### High Performance Modules Support Future System Expansion

Designed to provide the cleanest, safest power available for laser diode control, each module's control functions are handled locally and communicated quickly to the host processor. On-board intelligence simplifies future addition of modules since all operational and calibration data is stored in the module. Simply plug in your new module and power up the system. Your

mainframe never needs to leave the rack. This simplicity, coupled with low noise, high stability outputs, and state-of-the-art laser diode protection equals ultimate performance.

### State-of-the-Art Current Source Design Brings New Levels of Performance

This new current source topology uses an innovative, proprietary control loop and incorporates the latest techniques for signal filtering and circuit board shielding. These advancements provide unbeatable stability and unparalleled noise performance, ideal for the most demanding production test applications. This design also incorporates adjustable compliance voltage and faster shutoff, helping prevent dangerous "reconnect" transients that can occur from intermittent connections between the controller and your laser diode. This new level of protection adds to our proven list of protection features: independent current limits, output shorting circuits, and a slow start turn-on feature.

### New Capabilities from the Flexible Current Source You Trust

Operational modes including constant current, constant current high-bandwidth, or constant optical power are selectable from the front panel or via the GPIB interface. Measurement of your laser diode's forward voltage is possible with 4-wire accuracy, which can be helpful in production environments where longer cable runs are common. A single, rear-panel modulation port can individually enable direct modulation of each channel's laser current. This new current source design supports modulation bandwidths of up to 1.2MHz (small signal), achieving the highest direct modulation levels available today. Modules also include reverse photodiode bias capabilities, especially important for telecom wavelength devices.

# LDC 3908

8 Channel Laser  
Diode Controller



## High-Stability TEC Control Keeps Your Device Temperature in Check

Equipped with a smart integrator control loop and an expanded gain setting range, the temperature control circuits optimize settling times. These modules also provide voltage measurement of your TEC and allow internal selection of thermistor current ranges via front-panel or GPIB. Achieve unparalleled temperature stabilities with ultra-stable design topology and low noise bipolar output stages.

## Flexible Control Over a Wide Range of Applications

By combining true modularity with high channel density, the LDC-3908 easily grows with your applications. When coupled with our 16-channel mounting tray, this controller also serves as a cost effective DWDM optical source set. Simply mount your choice of WDM DFB laser diodes in the mounting tray, connect to the controller, and you'll have full control over 8 WDM signal sources at a time. If your specified test wavelengths change, simply drop in

new DFB laser diodes. For even higher channel counts, add another controller and mounting tray to your rack. If your device drive specifications change, look to ILX Lightwave for new modules that can be easily added to your system in the future.

## Protect Your Investment with the Leader in Laser Diode Protection

The LDC-3908 8 Channel Controller provides all of ILX Lightwave's proven laser protection features like independent current limits, slow-start turn-on circuits, and isolated power supplies.\* The adjustable compliance voltage capability brings even greater levels of protection to your devices. Designed for time-critical production test needs, the LDC-3908 will satisfy your test requirements with fast, reliable, and secure laser diode control.

\* Semiconductor lasers are sensitive devices. Always take appropriate antistatic precautions and use extreme care when handling laser diodes. For more information, request ILX Application Note #3, "Protecting Your Laser Diode."

# LDC 3908

## 8 Channel Laser Diode Controller

### Specifications<sup>1</sup>

## Fine Temperature Resolution Controller Module

|   |                                |
|---|--------------------------------|
| <b>CURRENT SOURCE<sup>1</sup></b>             | <b>3916371</b><br>500mA/9W     |
| <b>LASER CURRENT OUTPUT</b>                   |                                |
| Output Current Range:                         | 0–500mA                        |
| Setpoint                                      |                                |
| Resolution:                                   | 10µA                           |
| Accuracy:                                     | ±0.1% of FS                    |
| Compliance Voltage:                           | >6V (adjustable voltage limit) |
| Temperature Coefficient:                      | <50ppm/°C                      |
| Short-Term Stability (one-hour): <sup>2</sup> | <20ppm                         |
| Long-Term Stability (24 hours): <sup>3</sup>  | <50ppm                         |
| Noise and Ripple <sup>4</sup>                 |                                |
| High bandwidth:                               | <10µA rms                      |
| Low bandwidth:                                | <5µA rms                       |
| Transients                                    |                                |
| Operational: <sup>5</sup>                     | <3mA                           |
| 1kV EFT:                                      | <4mA                           |
| Surge: <sup>6</sup>                           | <8mA                           |

### LASER DRIVE LIMIT SETTINGS

|               |         |
|---------------|---------|
| Current Limit |         |
| Range:        | 0–500mA |
| Resolution:   | 0.2mA   |
| Accuracy:     | ±0.7mA  |
| Voltage Limit |         |
| Range:        | 0–7.5V  |
| Resolution:   | 0.1V    |

### PHOTODIODE FEEDBACK

|                                |  |
|--------------------------------|--|
| Type:                          | Differential 10Ω Input.<br>Selectable Zero Bias<br>or 5 V Reverse Bias |
| Photodiode Current Range:      | 0–5000µA   |
| Output Stability: <sup>7</sup> | 0.01%  |
| Setpoint Accuracy:             | ±0.1% of FS  |

### EXTERNAL ANALOG MODULATION

|                                       |              |
|---------------------------------------|--------------|
| Input: <sup>8</sup>                   | 0–10V, 50Ω   |
| Transfer Function:                    | 50mA/V       |
| High Bandwidth Mode                   |              |
| Small Signal Bandwidth: <sup>9</sup>  | DC to 1.2MHz |
| Large Signal Bandwidth: <sup>10</sup> | DC to 1.0MHz |
| Low Bandwidth Mode:                   | DC to 30kHz  |

### LASER CURRENT MEASUREMENT (DISPLAY)

|                         |                   |
|-------------------------|-------------------|
| Output Current          |                   |
| Range:                  | 0–500.00mA        |
| Resolution:             | 0.01mA            |
| Accuracy (at 25°C):     | ±0.05% of FS      |
| Photodiode Current      |                   |
| Range:                  | 0–5000µA          |
| Resolution:             | 0.1µA             |
| Accuracy:               | ±2µA (at 25°C)    |
| Photodiode Responsivity |                   |
| Range: <sup>11</sup>    | 0.00–1000.00µA/mW |
| Resolution:             | 0.01µA/mW         |
| Optical Power           |                   |
| Range:                  | 0.00–5000.0mW     |
| Resolution:             | 100µW             |
| Forward Voltage         |                   |
| Range:                  | 0.00–7.5V         |
| Resolution:             | 10mV              |
| Accuracy: <sup>12</sup> | ±7mV              |

|   |  |
|---|--|
| <b>TEMPERATURE CONTROL<sup>1</sup></b>      | <b>3916371</b><br>500mA/9W                                 |
| <b>TEMPERATURE CONTROL OUTPUT</b>           |  |
| Temperature Control Range: <sup>2</sup>     | -5°C to 50°C   |
| Thermistor Setpoint                         |  |
| Resolution:                                 | 0.01°C   |
| Accuracy: <sup>3</sup>                      | ±0.2°C   |
| Short-Term Stability (1 hr.): <sup>4</sup>  | <±0.007°C  |
| Long-Term Stability (24 hrs.): <sup>5</sup> | <±0.01°C   |
| Output Type:                                | Bipolar current source                                     |
| Compliance Voltage:                         | >7V DC   |
| Maximum Output Current:                     | 1.5A   |
| Maximum Output Power:                       | 9W   |
| Current Noise and Ripple: <sup>6</sup>      | <1mA rms   |
| Current Limit                               |  |
| Range:                                      | 0–1.5A   |
| Set Accuracy:                               | ±0.05A   |
| Control Algorithm:                          | Smart Integrator, Hybrid PI,<br>Gain adjustable from 1–127 |

### TEMPERATURE SENSOR

|                             |                             |
|-----------------------------|-----------------------------|
| Types:                      | Thermistor (2-wire NTC)     |
| Thermistor Sensing Current: | 100µA                       |
| Usable Thermistor Range:    | 5100–13,000Ω, typical       |
| User Calibration:           | Steinhart-Hart, 3 constants |

### TEC MEASUREMENT (DISPLAY)

|                        |                       |
|------------------------|-----------------------|
| Temperature            |                       |
| Range: <sup>7</sup>    | -99.9°C to 199.9°C    |
| Accuracy: <sup>3</sup> | ±0.5°C                |
| Thermistor Resistance  |                       |
| Range:                 | 5100–13,000Ω          |
| Accuracy:              | ±5Ω                   |
| TEC Current            |                       |
| Range:                 | -1.50 to 1.50A        |
| Accuracy:              | ±0.04A                |
| Voltage                |                       |
| Range:                 | -9.999 to 9.999V      |
| Resolution:            | 100mV (1mV in GPIB)   |
| Accuracy: <sup>8</sup> | ±70mV (±20mV in GPIB) |

### NOTES

The 3916371 Laser Current Source specifications are the same as the 3916372 Controller Module specifications.

Current Source Notes and Temperature Control Notes are on the following pages.

# LDC 3908

## 8 Channel Laser Diode Controller

### Specifications<sup>1</sup>

### 3 Amp Current Source Module

**CURRENT SOURCE** 3916338  
Single 3A

#### LASER CURRENT OUTPUT

|   |                                 |
|---|---------------------------------|
| Output Current Range:                         | 0–3000mA                        |
| Setpoint                                      |                                 |
| Resolution:                                   | 80µA                            |
| Accuracy: <sup>2</sup>                        | ±0.1% of FS                     |
| Compliance Voltage:                           | 4.5V (adjustable voltage limit) |
| Temperature Coefficient:                      | ≤100ppm/°C                      |
| Short-Term Stability (one-hour): <sup>3</sup> | ≤50ppm                          |
| Long-Term Stability (24-hour): <sup>4</sup>   | ≤75ppm                          |
| Noise and Ripple <sup>5</sup>                 |                                 |
| High bandwidth:                               | <36µA rms                       |
| Low bandwidth:                                | <24µA rms                       |
| Transients                                    |                                 |
| Operational: <sup>6</sup>                     | <5mA                            |
| 1kV EFT/Surge: <sup>7</sup>                   | <5mA/<10 mA                     |

#### LASER DRIVE LIMIT SETTINGS

|               |          |
|---------------|----------|
| Current Limit |          |
| Range:        | 0–3000mA |
| Resolution:   | 1.025mA  |
| Accuracy:     | ±9mA     |
| Voltage Limit |          |
| Range:        | 0–7.5V   |
| Resolution:   | 0.2V     |
| Accuracy:     | ±0.2V    |

#### PHOTODIODE FEEDBACK

|                                |  |
|--------------------------------|--|
| Type:                          | Differential 10Ω<br>Input. Selectable<br>Zero Bias or 5V<br>Reverse Bias |
| Photodiode Current Range:      | 0–5000µA   |
| Output Stability: <sup>8</sup> | ±0.01%   |
| Accuracy, Setpoint:            | ±0.1% of FS  |

#### EXTERNAL ANALOG MODULATION

|                                       |              |
|---------------------------------------|--------------|
| Input: <sup>9</sup>                   | 0–8.0V, 50Ω  |
| Transfer Function:                    | 375mA/V ±10% |
| High Bandwidth Mode                   |              |
| Small Signal Bandwidth: <sup>10</sup> | DC to 0.6MHz |
| Large Signal Bandwidth: <sup>11</sup> | DC to 0.6MHz |
| Low Bandwidth Mode:                   | DC to 30kHz  |

#### LASER CURRENT MEASUREMENT (DISPLAY)

|                         |                   |
|-------------------------|-------------------|
| Output Current          |                   |
| Range:                  | 0–3000.0mA        |
| Resolution:             | 0.01mA            |
| Accuracy (at 25°C):     | ±0.07% of FS      |
| Photodiode Current      |                   |
| Range:                  | 0–5000µA          |
| Resolution:             | 0.1µA             |
| Accuracy (at 25°C):     | ±2µA              |
| Photodiode Responsivity |                   |
| Range: <sup>12</sup>    | 0.00–1000.00µA/mW |
| Resolution:             | 0.01µA/mW         |
| Optical Power           |                   |
| Range:                  | 0.0–5000.0mW      |
| Resolution:             | 100µW             |
| Forward Voltage         |                   |
| Range:                  | 0.00–7.5V         |
| Resolution:             | 10 mV (1mV GPIB)  |
| Accuracy: <sup>13</sup> | ±7mV (±2mV GPIB)  |

#### CURRENT SOURCE NOTES

- 1 All values relate to a one-hour warm-up period.
- 2 Accuracy is 0.15% above 2.5A after one-hour warm-up period.
- 3 Over any one-hour period, half-scale output.
- 4 Over any 24-hour period, half-scale output.
- 5 Measured optically, evaluating noise intensity of a laser diode into a photodetector with 150kHz bandwidth.
- 6 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).
- 7 Maximum output current transient resulting from a 1000V power-line transient spike. Tested to ILX Lightwave Technical Standard #LDC-00196. Request ILX Application Note #3, "Protecting Your Laser Diode".
- 8 Maximum monitor photodiode current drift over any 30-minute period. Assumes zero drift in responsivity of photodiode.
- 9 Modulation input is 50Ω terminated inside the mainframe.
- 10 250mA setpoint, 50mA modulation current, 1Ω load. High bandwidth mode.
- 11 50% modulation at mid-scale output, 1Ω load. High bandwidth mode.
- 12 Responsivity value is user-defined and is used to calculate the optical power.
- 13 Four-wire voltage measurement while driving calibration load. Specification valid for values above 10mV.

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**  
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# Specifications

# LDC 3908

## Controller Modules (Laser and TE Control)

|   | 3916372<br>500mA/9W  | 3916374<br>1A/9W              | 3916376<br>1.5A/9W               |
|---|--|-------------------------------|----------------------------------|
| <b>CURRENT SOURCE<sup>1</sup></b>             |  |                               |                                  |
| <b>LASER CURRENT OUTPUT</b>                   |  |                               |                                  |
| Output Current Range:                         | 0–500mA  | 0–1000mA                      | 0–1500mA                         |
| Setpoint                                      |  |                               |                                  |
| Resolution:                                   | 10µA   | 20µA                          | 40µA                             |
| Accuracy:                                     | ±0.1% of FS  | ±0.1% of FS                   | ±0.1% of FS                      |
| Compliance Voltage:                           | 6V (adjustable voltage limit)  | 6V (adjustable voltage limit) | 4.75V (adjustable voltage limit) |
| Temperature Coefficient:                      | ≤50ppm/°C  | ≤50ppm/°C                     | ≤50ppm/°C                        |
| Short-Term Stability (one-hour): <sup>2</sup> | ≤20ppm   | ≤20ppm                        | ≤20ppm                           |
| Long-Term Stability (24-hour): <sup>3</sup>   | ≤50ppm   | ≤50ppm                        | ≤50ppm                           |
| Noise and Ripple <sup>4</sup>                 |  |                               |                                  |
| High Bandwidth:                               | <10µA rms  | <10µA rms                     | <12µA rms                        |
| Low Bandwidth:                                | <5µA rms   | <5µA rms                      | <8µA rms                         |
| Transients                                    |  |                               |                                  |
| Operational: <sup>5</sup>                     | <3mA   | <3mA                          | <3mA                             |
| 1kV EFT:                                      | <4mA   | <5mA                          | <5mA                             |
| Surge: <sup>6</sup>                           | <8mA   | <10mA                         | <10mA                            |
| <b>LASER DRIVE LIMIT SETTINGS</b>             |  |                               |                                  |
| Current Limit                                 |  |                               |                                  |
| Range:  | 0–500mA  | 0–1000mA                      | 0–1500mA                         |
| Resolution:                                   | 0.2mA  | 0.4mA                         | 0.6mA                            |
| Accuracy:                                     | ±0.7mA   | ±1.4mA                        | ±4.5mA                           |
| Voltage Limit                                 |  |                               |                                  |
| Range:  | 0–7.5V   | 0–7.5V                        | 0–7.5V                           |
| Resolution:                                   | 0.1V   | 0.1V                          | 0.1V                             |
| Accuracy:                                     | ±0.2V  | ±0.2V                         | ±0.2V                            |
| <b>PHOTODIODE FEEDBACK</b>                    |  |                               |                                  |
| Type:   | Differential 10Ω Input, Selectable Zero Bias or 5V Reverse Bias on all modules |                               |                                  |
| Photodiode Current Range:                     | 0–5000µA   | 0–5000µA                      | 0–5000µA                         |
| Output Stability: <sup>7</sup>                | ±0.01%   | ±0.01%                        | ±0.01%                           |
| Setpoint Accuracy:                            | ±0.1% of FS  | ±0.1% of FS                   | ±0.1% of FS                      |
| <b>EXTERNAL ANALOG MODULATION</b>             |  |                               |                                  |
| Input: <sup>8</sup>                           | 0–10V, 50Ω   | 0–10V, 50Ω                    | 0–7.5V, 50Ω                      |
| Transfer Function:                            | 50mA/V   | 100mA/V                       | 200mA/V                          |
| High Bandwidth Mode                           |  |                               |                                  |
| Small Signal Bandwidth: <sup>9</sup>          | DC to 1.2 MHz  | DC to 1.0MHz                  | DC to 0.9MHz                     |
| Large Signal Bandwidth: <sup>10</sup>         | DC to 1.0MHz   | DC to 1.0MHz                  | DC to 0.9MHz                     |
| Low Bandwidth Mode:                           | DC to 30kHz  | DC to 30kHz                   | DC to 30kHz                      |
| <b>LASER CURRENT MEASUREMENT (DISPLAY)</b>    |  |                               |                                  |
| Output Current                                |  |                               |                                  |
| Range:  | 0–500.00mA   | 0–1000.0mA                    | 0–1500.0mA                       |
| Resolution:                                   | 0.01mA   | 0.01mA                        | 0.03mA                           |
| Accuracy (@25°C):                             | ±0.05% of FS   | ±0.05% of FS                  | ±0.07% of FS                     |
| Photodiode Current                            |  |                               |                                  |
| Range:  | 0–5000µA   | 0–5000µA                      | 0–5000µA                         |
| Resolution:                                   | 0.1µA  | 0.1µA                         | 0.1µA                            |
| Accuracy (@25°C):                             | ±2µA   | ±2µA                          | ±2µA                             |
| Photodiode Responsivity                       |  |                               |                                  |
| Range: <sup>11</sup>                          | 0.0–1000.00µA/mW   | 0.0–1000.00µA/mW              | 0.0–1000.00µA/mW                 |
| Resolution:                                   | 0.01µA/mW  | 0.01µA/mW                     | 0.01µA/mW                        |
| Optical Power                                 |  |                               |                                  |
| Range:  | 0.0–5000.00mW  | 0.0–5000.00mW                 | 0.0–5000.00mW                    |
| Resolution:                                   | 100µW  | 100µW                         | 100µW                            |
| Forward Voltage                               |  |                               |                                  |
| Range:  | 0.00–7.5V  | 0.00–7.5V                     | 0.00–5V                          |
| Resolution:                                   | 10mV (1mV through GPIB)  | 10mV (1mV through GPIB)       | 10mV (1mV through GPIB)          |
| Accuracy: <sup>12</sup>                       | ±7mV (±2mV through GPIB)   | ±7mV (±2mV through GPIB)      | ±7mV (±2mV through GPIB)         |

### CURRENT SOURCE NOTES

- All values relate to a one-hour warm-up period.
- Over any one-hour period, half-scale output.
- Over any 24-hour period, half-scale output.
- Measured optically, evaluating noise intensity of a laser diode into a photodetector with 150kHz bandwidth.
- 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).
- Maximum output current transient resulting from a 1000V power-line transient spike. Tested to ILX Lightwave Technical Standard #LDC-00196. Request ILX Application Note #3.
- Maximum monitor photodiode current drift over any 30-minute period. Assumes zero drift in responsivity of photodiode.
- Modulation input is 50Ω terminated inside the mainframe.
- 250mA setpoint, 50mA modulation current, 1Ω load.
- 50% modulation at mid-scale output, 1Ω load.
- Responsivity value is user-defined and is used to calculate the optical power.
- Four-wire voltage measurement while driving calibration load. Specification valid for values above 10mV.

## 8 Channel Laser Diode Controller

# LDC 3908

## 8 Channel Laser Diode Controller

### Specifications

### Controller Modules (Laser and TE Control) continued

| TEMPERATURE CONTROL <sup>1</sup>              | 3916372<br>500mA/9W                           | 3916374<br>1A/9W                              | 3916376<br>1.5A/9W                            |
|---|---|---|---|
| <b>OUTPUT</b>                                 |   |   |   |
| Temperature Control Range: <sup>2</sup>       | -99°C to 150°C                                | -99°C to 150°C                                | -99°C to 150°C                                |
| Temperature Setpoint                          |   |   |   |
| Resolution and Accuracy:                      | <b>Resolution</b> <b>Accuracy<sup>3</sup></b> | <b>Resolution</b> <b>Accuracy<sup>3</sup></b> | <b>Resolution</b> <b>Accuracy<sup>3</sup></b> |
| -20°C to 20°C:                                | 0.1°C    ±0.2°C                               | 0.1°C    ±0.2°C                               | 0.1°C    ±0.2°C                               |
| 20°C-50°C:                                    | 0.2°C    ±0.2°C                               | 0.2°C    ±0.2°C                               | 0.2°C    ±0.2°C                               |
| Short-Term Stability (one-hour): <sup>4</sup> | <±0.007°C                                     | <±0.007°C                                     | <±0.007°C                                     |
| Long-Term Stability (24 hours): <sup>5</sup>  | <±0.01°C                                      | <±0.01°C                                      | <±0.01°C                                      |
| Output Type:                                  | Bipolar current source                        | Bipolar current source                        | Bipolar current source                        |
| Compliance Voltage:                           | >7V DC  | >7V DC  | >7V DC  |
| Short Circuit Output Current:                 | 1.5A  | 1.5A  | 1.5A  |
| Maximum Output Power:                         | 9W  | 9W  | 9W  |
| Current Noise and Ripple: <sup>6</sup>        | <1mA rms                                      | <1mA rms                                      | <1mA rms                                      |
| Current Limit                                 |   |   |   |
| Range:  | 0-1.5A  | 0-1.5A  | 0-1.5A  |
| Set Accuracy:                                 | ±0.05A  | ±0.05A  | ±0.05A  |
| Control Algorithm:                            | Smart Integrator,<br>Hybrid PI                | Smart Integrator,<br>Hybrid PI                | Smart Integrator,<br>Hybrid PI                |
|   | Gain adjustable<br>from 1-127                 | Gain adjustable<br>from 1-127                 | Gain adjustable<br>from 1-127                 |
| <b>TEMPERATURE SENSOR</b>                     |   |   |   |
| Types:  | Thermistor (2-wire NTC)                       | Thermistor (2-wire NTC)                       | Thermistor (2-wire NTC)                       |
| Thermistor Sensing Current: <sup>7</sup>      | 10/100µA                                      | 10/100µA                                      | 10/100µA                                      |
| Usable Thermistor Range:                      | 25-450,000Ω, typical                          | 25-450,000Ω, typical                          | 25-450,000Ω, typical                          |
| User Calibration:                             | Steinhart-Hart, 3 constants                   | Steinhart-Hart, 3 constants                   | Steinhart-Hart, 3 constants                   |
| <b>TEC MEASUREMENT (DISPLAY)</b>              |   |   |   |
| Temperature:                                  |   |   |   |
| Range: <sup>8</sup>                           | -99.9°C to 199.9°C                            | -99.9°C to 199.9°C                            | -99.9°C to 199.9°C                            |
| Accuracy:                                     | ±0.5°C  | ±0.5°C  | ±0.5°C  |
| Thermistor Resistance                         |   |   |   |
| 10µA Setting                                  |   |   |   |
| Range:  | 0.01-450.00kΩ                                 | 0.01-450.00kΩ                                 | 0.01-450.00kΩ                                 |
| Accuracy: <sup>9</sup>                        | ±0.05kΩ                                       | ±0.05kΩ                                       | ±0.05kΩ                                       |
| 100µA Setting                                 |   |   |   |
| Range:  | 0.001-45.000kΩ                                | 0.001-45.000kΩ                                | 0.001-45.000kΩ                                |
| Accuracy: <sup>10</sup>                       | ±0.005kΩ                                      | ±0.005kΩ                                      | ±0.005kΩ                                      |
| TEC Current                                   |   |   |   |
| Range:  | -1.50 to 1.50A                                | -1.50 to 1.50A                                | -1.50 to 1.50A                                |
| Accuracy:                                     | ±0.04A  | ±0.04A  | ±0.04A  |
| Current Resolution:                           | ±0.01A  | ±0.01A  | ±0.01A  |
| Voltage                                       |   |   |   |
| Range:  | -9.999 to 9.999V                              | -9.999 to 9.999V                              | -9.999 to 9.999V                              |
| Resolution:                                   | 100mV (1mV in GPIB)                           | 100mV (1mV in GPIB)                           | 100mV (1mV in GPIB)                           |
| Accuracy: <sup>11</sup>                       | ±70mV (±20mV in GPIB)                         | ±70mV (±20mV in GPIB)                         | ±70mV (±20mV in GPIB)                         |



*When coupled with the LDM-4616 Modular Laser Diode Mount, the LDC-3916 Multi-Channel Controllers provide a configurable, cost-effective solution for multi-channel DWDM signal sources. The mount can also support many popular 980nm and 1480nm pump laser diodes for EDFA test applications.*

### TEMPERATURE CONTROL NOTES

- All values relate to a one-hour warm-up period.
- Software limits of range. Actual range possible depends on the physical load, thermistor type, and TEC module used.
- Accuracy figures are quoted for a typical 10kΩ thermistor and 100µA current setting for -5°C to 50°C and typical 100kΩ thermistor and 10µA current setting for -20°C to -5°C. Accuracy figures are relative to the calibration standard. Both resolution and accuracy are dependent upon the user-defined configuration of the instrument.
- Over any one-hour period, half-scale output, controlling an LDM-4412 mount at 25°C with 10kΩ thermistor on 100µA setting.
- Over any 24-hour period, half-scale output, controlling an LDM-4412 Mount at 25°C with 10kΩ thermistor on 100µA setting.
- Measured at 1A output over a bandwidth of 10Hz to 10MHz.
- Thermistor current range software selectable by front panel or GPIB.
- Software limits of display range.
- Using a 10kΩ thermistor, controlling an LDM-4412 mount over -30°C to 65°C (~200-2kΩ) or a 100kΩ thermistor controlling an LDM-4412 mount over 10°C-85°C (~200-10kΩ).
- Using a 10kΩ thermistor, controlling an LDM-4412 mount over -5°C to 90°C (~45-1kΩ).
- Voltage measurement accuracy while driving calibration load. Accuracy is dependent upon load used.
- Measured at 2A output over a bandwidth of DC to 25MHz.

# LDC 3908

## 8 Channel Laser Diode Controller

### Specifications

#### Dual Current Source Modules\*

| CURRENT SOURCE | 3916332<br>Dual 500mA | 3916334<br>Dual 1A |
|----------------|-----------------------|--------------------|
|----------------|-----------------------|--------------------|

#### LASER CURRENT OUTPUT

|   |                            |            |
|---|----------------------------|------------|
| Output Current Range:                         | 0–500mA                    | 0–1000mA   |
| Setpoint                                      |                            |            |
| Resolution:                                   | 10µA                       | 20µA       |
| Accuracy:                                     | 0.1% of FS                 | 0.1% of FS |
| Compliance Voltage:                           | 6V                         | 6V         |
|   | (adjustable voltage limit) |            |
| Temperature Coefficient:                      | <50ppm/°C                  | <50ppm/°C  |
| Short-Term Stability (one-hour): <sup>2</sup> | ≤20ppm                     | ≤20ppm     |
| Long-Term Stability (24-hours): <sup>3</sup>  | ≤50ppm                     | ≤50ppm     |
| Noise and Ripple <sup>4</sup>                 |                            |            |
| High Bandwidth:                               | <10µA rms                  | <12µA rms  |
| Low Bandwidth:                                | <5µA rms                   | <8µA rms   |
| Transients                                    |                            |            |
| Operational: <sup>5</sup>                     | <3mA                       | <3mA       |
| 1kV EFT:                                      | <4mA                       | <5mA       |
| Surge: <sup>6</sup>                           | <8mA                       | <10mA      |

#### LASER DRIVE LIMIT SETTINGS

|               |         |          |
|---------------|---------|----------|
| Current Limit |         |          |
| Range:        | 0–500mA | 0–1000mA |
| Resolution:   | 0.2mA   | 0.4mA    |
| Accuracy:     | ±0.7mA  | ±1.4mA   |
| Voltage Limit |         |          |
| Range:        | 0–7.5V  | 0–7.5V   |
| Resolution:   | 0.1V    | 0.1V     |

#### PHOTODIODE FEEDBACK

|                                |   |   |
|--------------------------------|---|---|
| Type:                          | Differential 10Ω Input.                 | Differential 10Ω Input.                 |
|                                | Selectable Zero Bias or 5V Reverse Bias | Selectable Zero Bias or 5V Reverse Bias |
| Photodiode Current Range:      | 0–5000µA                                | 0–5000µA                                |
| Output Stability: <sup>7</sup> | 0.01%                                   | 0.01%                                   |
| Setpoint Accuracy:             | ±0.1% of FS                             | ±0.1% of FS                             |

#### EXTERNAL ANALOG MODULATION

|                     |            |            |
|---------------------|------------|------------|
| Input: <sup>8</sup> | 0–10V, 50W | 0–10V, 50W |
| Transfer Function:  | 50mA/V     | 100mA/V    |

|                                       | 3916332<br>Dual 500mA | 3916334<br>Dual 1A |
|---------------------------------------|-----------------------|--------------------|
| High Bandwidth Mode                   |                       |                    |
| Small Signal Bandwidth: <sup>9</sup>  | DC to 1.2MHz          | DC to 1.0MHz       |
| Large Signal Bandwidth: <sup>10</sup> | DC to 1.0MHz          | DC to 1.0MHz       |
| Low Bandwidth Mode:                   | DC to 30kHz           | DC to 30kHz        |

#### LASER CURRENT MEASUREMENT (DISPLAY)

|                           |                   |                   |
|---------------------------|-------------------|-------------------|
| Output Current            |                   |                   |
| Range:                    | 0–500.0mA         | 0–1000.0mA        |
| Resolution:               | 0.01mA            | 0.01mA            |
| Accuracy (at 25°C):       | ±0.05% of FS      | ±0.05% of FS      |
| Photodiode Current        |                   |                   |
| Range:                    | 0–5000µA          | 0–5000µA          |
| Resolution:               | 0.1µA             | 0.1µA             |
| Accuracy (at 25°C):       | ±2µA              | ±2µA              |
| Photodiode Responsivity   |                   |                   |
| Range: <sup>11</sup>      | 0.00–1000.00µA/mW | 0.00–1000.00µA/mW |
| Resolution:               | 0.01µA/mW         | 0.01µA/mW         |
| Optical Power             |                   |                   |
| Range:                    | 0.0–5000.00mW     | 0.0–5000.00mW     |
| Resolution:               | 100µW             | 100µW             |
| Forward Voltage           |                   |                   |
| Range:                    | 0.00–7.5V         | 0.0–7.5V          |
| Forward Voltage           |                   |                   |
| Resolution: <sup>12</sup> | 10mV              | 10mV              |
| Accuracy: <sup>13</sup>   | ±7mV              | ±7mV              |

#### DUAL CURRENT SOURCE NOTES

- \*Two isolated laser sources in each module.
- All values after a one-hour warm-up period.
  - Over any one-hour period, half-scale output.
  - Over any 24-hour period, half-scale output.
  - Measured optically, evaluating noise intensity of a laser diode into a photodetector with 150kHz bandwidth.
  - 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).
  - Maximum output current transient resulting from a 1000V power-line transient spike. Tested to ILX Lightwave Technical Standard #LDC-00196. Request ILX Application Note #3.
  - Maximum monitor photodiode current drift over any 30-minute period. Assumes zero drift in responsivity of photodiode.
  - Modulation input is 50Ω terminated inside the mainframe.
  - 250mA setpoint, 50mA modulation current, 1Ω load.
  - 50% modulation at mid-scale output, 1Ω load, high bandwidth mode.
  - Responsivity value is user-defined and is used to calculate the optical power.
  - 1mV through GPIB.
  - Four-wire voltage measurement while driving calibration load. Specifications valid for values above 10mV. Accuracy is ±2mV through GPIB.

#### TEC Modules

| TEMPERATURE CONTROL | 3916550<br>Dual 9W | 3916558<br>Single 24W (3A) | 3916550<br>Dual 9W | 3916558<br>Single 24W (3A) |
|---------------------|--------------------|----------------------------|--------------------|----------------------------|
|---------------------|--------------------|----------------------------|--------------------|----------------------------|

#### TEMPERATURE CONTROL OUTPUT

|   |  |  |
|---|--|--|
| Temperature Control Range: <sup>2</sup>       | –99.9°C to 150°C                                       | –99.9°C to 150°C                                       |
| Temperature Setpoint                          |  |  |
| Resolution and Accuracy:                      | <b>Resolution</b> <b>Accuracy</b> <sup>3</sup>         | <b>Resolution</b> <b>Accuracy</b> <sup>3</sup>         |
| –20°C to 20°C:                                | 0.1°C ±0.2°C   | 0.1°C ±0.2°C   |
| 20°C–50°C:                                    | 0.2°C ±0.2°C   | 0.2°C ±0.2°C   |
| Short-Term Stability (one-hour): <sup>4</sup> | ±0.007°C   | ±0.007°C   |
| Long-Term Stability (24-hours): <sup>5</sup>  | ±0.01°C  | ±0.01°C  |
| Output Type:                                  | Bipolar current source                                 | Bipolar current source                                 |
| Compliance Voltage:                           | >6V DC   | >8V DC   |
| Maximum Output Current:                       | 1.5A   | 3A   |
| Maximum Output Power:                         | 9W   | 24W  |
| Current Noise and Ripple:                     | <1mA rms <sup>6</sup>                                  | <2mA rms <sup>12</sup>                                 |
| Current Limit                                 |  |  |
| Range:  | 0.1–1.6A   | 0.1–3.10A  |
| Set Accuracy:                                 | ±0.05A   | ±0.05A   |
| Control Algorithm:                            | Smart Integrator, Hybrid PI Gain adjustable from 1–127 | Smart Integrator, Hybrid PI Gain adjustable from 1–127 |

#### TEMPERATURE SENSOR

|  |                             |                             |
|--|-----------------------------|-----------------------------|
| Types:                                   | Thermistor (2-wire NTC)     | Thermistor (2-wire NTC)     |
| Thermistor Sensing Current: <sup>7</sup> | 10µA/100µA                  | 10µA/100µA                  |
| Usable Thermistor Range:                 | 25–450,000Ω, typical        | 25–450,000Ω, typical        |
| User Calibration:                        | Steinhart-Hart, 3 constants | Steinhart-Hart, 3 constants |

#### TEC MEASUREMENT (DISPLAY)

|                         |                        |                        |
|-------------------------|------------------------|------------------------|
| Temperature             |                        |                        |
| Range: <sup>8</sup>     | –99.9°C to 199.9°C     | –99.9°C to 199.9°C     |
| Accuracy:               | ±0.5°C                 | ±0.5°C                 |
| Thermistor Resistance   |                        |                        |
| 10 µA Setting           |                        |                        |
| Range:                  | 0.01–450.00kΩ          | 0.01–450.00kΩ          |
| Accuracy:               | ±0.05kΩ <sup>9</sup>   | ±0.05kΩ <sup>9</sup>   |
| 100 µA Setting          |                        |                        |
| Range:                  | 0.001–45.000kΩ         | 0.001–45.000kΩ         |
| Accuracy:               | ±0.005kΩ <sup>10</sup> | ±0.005kΩ <sup>10</sup> |
| TEC Current             |                        |                        |
| Range:                  | –1.50 to 1.50A         | –3.00 to 3.00A         |
| Accuracy:               | ±0.04A                 | ±0.04A                 |
| Voltage                 |                        |                        |
| Range:                  | –9.999 to 9.999V       | –10.75 to 10.75V       |
| Resolution:             | 100mV (1mV in GPIB)    | 100mV (1mV in GPIB)    |
| Accuracy: <sup>11</sup> | ±70mV (±20mV in GPIB)  | ±70mV (±20mV in GPIB)  |

#### NOTES

See Current Source Notes and Temperature Control Notes under Controller Modules Specifications.



# LDC 3908

## 8 Channel Laser Diode Controller

### Specifications

#### GENERAL

|                        | 3908  | 3916  |
|------------------------|---|---|
| Chassis Ground:        | 4mm Banana Jack   | 4mm Banana Jack   |
| GPIB Connector:        | 24-pin IEEE-488   | 24-pin IEEE-488   |
| RS-232 Connector:      | 9-pin D-sub   | 9-pin D-sub   |
| Power Requirements:    | 50–60Hz; selectable voltage<br>100V, 120V, 220V, 240V,<br>(+6%, –10%) | 50–60Hz; selectable voltage<br>120V, 220V, 240V,<br>(+6%, –10%) |
| Size (HxWxD):          | 133mm x 482mm x 389mm<br>5.25" x 18.98" x 15.3"                       | 133mm x 482mm x 653mm<br>5.25" x 18.98" x 25.7"                 |
| Weight (typical)       |   |   |
| Mainframe Only:        | 20 kg (44lbs)   | 34.4kg (76lbs)  |
| With Modules:          | 24kg (52lbs)  | 41kg (91lbs)  |
| Operating Temperature: | 0°C to 40°C   | 0°C to 40°C   |
| Storage Temperature:   | –40°C to 70°C   | –40°C to 70°C   |
| Humidity: <sup>1</sup> | 20–85%, noncondensing   | 20–85%, noncondensing   |
| Laser Safety Features: | Keypad, Interlock, Output Delay:<br>(Meets 21CFR1040.10)              | Keypad, Interlock, Output Delay:<br>(Meets 21CFR1040.10)        |
| Display:               | Vacuum fluorescent, 64 x 128 pixels<br>83 mm x 41 mm                  | Vacuum fluorescent, 64 x 128 pixels<br>83mm x 41mm              |

#### NOTES

<sup>1</sup> Based on the vacuum fluorescent display specification.

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This product has passed all CE requirements and bears the CE mark.

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

#### ORDERING INFORMATION

|             |   |                            |  |
|-------------|---|----------------------------|--|
| LDC-3908    | 8-Channel Laser Diode Controller<br>Mainframe     | CC-305S                    | Current Source/Laser Diode Mount<br>Interconnect Cable |
| LDC-3916    | 16-Channel Laser Diode<br>Controller Mainframe    | CC-306S                    | Current Source/Unterminated<br>Interconnect Cable      |
| LDC-3916371 | High TEC Resolution<br>500mA/9W Controller Module | CC-316M                    | Laser Current Cables (bundle of 8)                     |
| LDC-3916372 | 500mA/9W Controller Module                        | CC-501S                    | TE Controller/Unterminated<br>Interconnect Cable       |
| LDC-3916374 | 1A/9W Controller Module                           | CC-505S                    | TE Controller/Laser Diode Mount<br>Interconnect Cable  |
| LDC-3916376 | 1.5A/9W Controller Module                         | CC-516M                    | TE Controller Cables (bundle of 8)                     |
| LDC-3916332 | 500mA/ 500mA Dual Current<br>Source Module        | LNF-320                    | Low Noise Filter                                       |
| LDC-3916334 | 1A /1A Dual Current Source<br>Module              | LDM-4616                   | 16-Channel Laser Diode Mount                           |
| LDC-3916338 | 3A Current Source Module                          | LDM-4604/xBFY              | Butterfly Module for LDM-4616 Mount                    |
| LDC-3916550 | 9W/9W Dual Temperature (TEC)<br>Controller Module | LDM-4604/xDFB              | DFB Butterfly Module for LDM-4616 Mount                |
| LDC-3916558 | 3A (24W) Temperature (TEC)<br>Controller Module   | LDM-4604/xDIL              | DIL Module for LDM-4616 Mount                          |
| RM-137      | Rack Mount Kit, 20.5" hole<br>spacing             | UCA-350                    | Unipolar Heater Control Adapter                        |
| RM-138      | Rack Mount Kit, 25" hole spacing                  | LabVIEW® Instrument Driver |  |

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