LDCM 4371

Laser Diode Controller Mount

FEATURES

- Compact laser diode mount with integrated controller
- Low noise, high stability laser driver operating in constant current or constant power modes
- Analog modulation capability up to 1.5 MHz with configurable amplitude
- High stability, dual temperature control
- Case temperature control ensuring an ultra stable thermal reference
- Advanced laser diode protection features
- Easy insertion and removal of butterfly style laser packages
- Configurable laser pin-out
- USB remote interface

The highly integrated LDCM-4371 Laser Diode Controller Mount incorporates the industries first precision programmable high-bandwidth modulation laser driver combined with two stages of high power temperature control into a compact laser diode butterfly mount. Don't let the compact size fool you, the instrument includes a multitude of features that have been designed to ensure absolute wavelength stability and precise sub-picometer adjustability and control. The LDCM-4371 offers a high-value solution for many demanding applications. For example, it is the ideal controller to meet the challenging wavelength precision required for Tunable Diode Laser Absorption Spectroscopy (TDLAS).

Another distincitive feature of this product is the ability to independently attenuate a single modulation signal being delivered to multiple LDCM-4371 instruments. This is crucial in applications such as multiplexed spectroscopy, where multiple lasers are scanned synchronously (from a single function generator). The ability to independently tune the modulation signal ensures that the user can tweak each of the individual laser scan widths to exactly fit the unique absorption feature of interest.

Compact, UltraStable, Precision Control

PSE TECHNOLOGY

Assisting in the Science of Innovation

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High Stability, Low Noise Laser Drive

The LDCM-4371 introduces the most advance laser driver current source topology. It incorporates an innovative, proprietary control loop that is designed utilizing the newest low noise, low tempco, and ratio-metric matched electronic components. These modern advances ensure unbeatable stability and noise performance while delivering a full 250 milliamps of drive current. We have engineered this laser driver to meet the demands of the most challenging applications.

Comprehensive Laser Diode Protection Features

In addition to the leading performance elements, we have incorporated numerous protection features to safeguard your expensive lasers. Unlike some competing products, this instrument provides an absolute current limit. This will guard against both over-current due to the traditional set point errors, but more importantly preventing damage due to transients or excessive amplitudes on the external modulation signal. The design also provides an adjustable compliance voltage with automatic shutoff, helping prevent dangerous "reconnect" transients that may occur from intermittent connections between the controller and your laser diode.

Augmenting these two advanced protection features are the more typical safety measures such as output off ESD shorting circuits, slow-start turn-on, and automatic output off on temperature control errors.

Flexible Laser Drive

The laser driver is highly adaptable; to ensure broad support of various applications two independent modes of operation are offered, constant current and constant power. This new current source design supports modulation bandwidths of up to 1.5 MHz (small signal), achieving the highest direct modulation levels available today. In addition to the leading bandwidth capability, the amplitude can be easily tuned by the instrument to provide precise laser scan ranges. The LDCM-4371 offers reverse photodiode bias capability, especially important for telecom wavelength devices. In addition, the instrument provides precise measurements of the laser drive current, laser diode forward voltage, and back-facet monitor diode converted optical power.

High Stability, Temperature Control

The two fully-independent low-noise temperature controllers achieve unparalleled temperature stabilities through the use of modern matched ratio-metric, low-tempco components and a proprietary design topology. Both utilize automatic thermistor current ranging, and a novel smart integrator control loop to drive the bi-polar output stage.

Temperature Controller Protection Features

To help further protect your investment both controllers contain high-speed temperature fault detection and controller error signal detection circuits. These can be independently configured to disable the controller (including laser drive) when a fault condition is detected. The temperature controller dedicated to the laser diode's internal Peltier affords an additional level of protection through a programmable voltage limit and measurement of the Peltier operating voltage and current.

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Flexible, Cascaded Dual Temperature Control

The laser diode's internal temperature controller is equipped with a programmable gain setting, this provides the flexibility to optimize the settling time for a specific device. The case temperature controller presents an ultra low-drift precision thermal reference to the laser diode package; this extra level of control helps ensure unmatched sub-picometer wavelength stability. In addition, the dual stage temperature controller provides a cascaded configuration that allows a much wider temperature range, > ±60°C from ambient. Case temperature control is ideal for applications requiring tight temperature stability, different case temperatures, or for testing laser diodes at a wider temperature range than can be accomplished with the internal TEC.

Ease of Operation

Zero insertion force (ZIF) sockets and spring-loaded clamps facilitate ease of mounting your butterfly laser package into the mount. Simple laser pin-out configuration is accessible through the USB remote interface.

In addition to the essential operational buttons located on both the front and rear panels, the instrument is easy to setup and operate using the industry standard USB interface. The user has two options for configuring and operating the LDCM-4371 through this remote interface, the most straight forward is by using the standard configuration program provided with the instrument. The secondary method is more flexible, the user can create their own custom application program tailored to meet their specific needs. To help facilitate the custom programming task, the full compliment of instrument commands are provided in the user manual.

Put Our Expertise To Work

At PSE Technologies, our experienced technical staff has been working in the area of laser diode instrumentation for many years. Our people are recognized as experts in the field, if you have any questions or suggestions please don't hesitate to contact us. Every customer service contact is an opportunity for us to enhance a vital relationship; we welcome new ideas and feedback, and strive to enhance our products and services to exceed your needs. Our entire staff is dedicated to ensuring your satisfaction. For more information about the LDCM-4371 Laser Diode Controller Mount call us today or visit us at www.psetech.com.

Customer Philosophy

As a leading-edge innovator of products and services, we are committed to deliver advanced technology instruments that provide greater options than ever before. We are continuously looking for more ways to improve your experience as our customer, and we promise to strive for the highest levels of service.

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Specifications[1]

Laser Current Source

Drive Current Output

- Output Current Range: 0.0 – 250 mA
- Setpoint
  - Resolution: 4 µA
  - Accuracy: ± 0.05% FS
- Compliance Voltage: 0.0 – 3.75 V
- Temperature Coefficient: ≤ 10 ppm/°C
- Short-Term Stability:[2] ≤ 3 ppm
- Long-Term Stability:[3] ≤ 8 ppm
- Noise and Ripple (rms):[4] 10 µA
- Transients
  - Operational:[5] < 1 mA
  - 1 kV EFT: < 2 mA
  - Surge:[6] < 4 mA

Compliance Voltage Adjust

- Range: 0.0 – 3.75 V
- Resolution: 0.53 µV
- Accuracy: ± 0.2 V

Drive Current Limit Settings

- Range: 0.0 – 250.0 mA
- Resolution: 4 µA
- Accuracy: ± 0.7 mA

Photodiode Feedback

- Reverse Bias: 0 or 5 V
- Photodiode Current Range: 250 – 50,000 µA
- Output Stability: ± 0.01%
- Output Accuracy: ± 0.05% FS

External Modulation

- Bandwidth (3dB):[7] 1.5 MHz
- Input Voltage: ± 15 V
- Programmable Transfer Function
  - Maximum: 200 mA/V
  - Minimum: 1 µA/V

Measurements

- Laser Drive Current
  - Range: 0.0 – 250.0 mA
  - Resolution: 4 µA
  - Accuracy: ± 0.05% FS
- Laser Forward Voltage
  - Range: 0.0 – 3.75 V
  - Resolution: 53 µV
  - Accuracy: ± 7 mV
- Optical Power
  - Range: 0.0 – 100.0 mW
  - Resolution: 2.0 µW

Temperature Control

Temperature Control

- Control Range:[8] -100.0 – 100.0 °C
- Resolution: 0.01 °C
- Accuracy:[9] ± 0.1 °C
- Temperature Coefficient: < 5 ppm/°C
- Short-Term Stability:[10] ± 0.003 °C
- Long-Term Stability:[11] ± 0.004 °C

TEC Output[12]

- Output Type: Bipolar, voltage
- Maximum Voltage: 5.0 V
- Maximum Power: 7.5 W
- Noise and Ripple (rms):[13] < 0.5 mA
- Voltage Limit
  - Range: 0.0 – 5.0 V
  - Resolution: 8.0 µV
  - Setpoint Accuracy: ± 0.05 V

Temperature Sensor

- Type: Thermistor, NTC
- Thermistor Sensing: Auto-ranging
- Usable Range: 25 – 450,000 Ω
- User Calibration: Steinhart – Hart

Measurements

- Temperature
  - Range:[14] -100.0 – 100.0 °C
  - Resolution: 0.01 °C
  - Accuracy: ± 0.5 °C
- Voltage
  - Range:[15] 5.0 V
  - Resolution: 61 µV
  - Accuracy: ± 10 mV
- Current
  - Range: 1.5 A
  - Resolution: 23 µA
  - Accuracy: ± 0.01 A

1. All values are measured after a 1-hour warmup period at 25 °C
2. Over any one hour period, full scale output
3. Over any 24-hour period, full scale output
4. Measured optically, evaluating noise intensity of a laser diode into a photodetector with 150 kHz bandwidth
5. Maximum output current transient resulting from accidental power line plug removal
6. Maximum output current transient resulting from 1kV power-line transient
7. 50% modulation at mid-scale output. Higher bandwidth possible with smaller signal
8. Software limits the range, actual range depends on load, thermistor, and TE
9. Accuracy depends upon sensor, calibration standard, and user defined instrument configuration
10. Over any one hour period, half scale output, with 10 kΩ thermistor
11. Over any 24-hour period, half scale output, with 10 kΩ thermistor
12. Into 1 Ω load
13. Measured at 1 A over a bandwidth of 10Hz to 10MHz
14. 10 kΩ thermistor over 0ºC to 90ºC
15. Voltage measurement accuracy while driving calibration load, accuracy is dependent on load used

Contact

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