SLICE-DLC Dual Laser Controller

The SLICE-DLC is a dual-channel precision diode laser controller. Each channel offers an ultra-low-noise current source and two temperature control loops. With a current noise density less than 100 pA/√Hz, the SLICE-DLC is ideally suited to precision spectroscopy and metrology applications.

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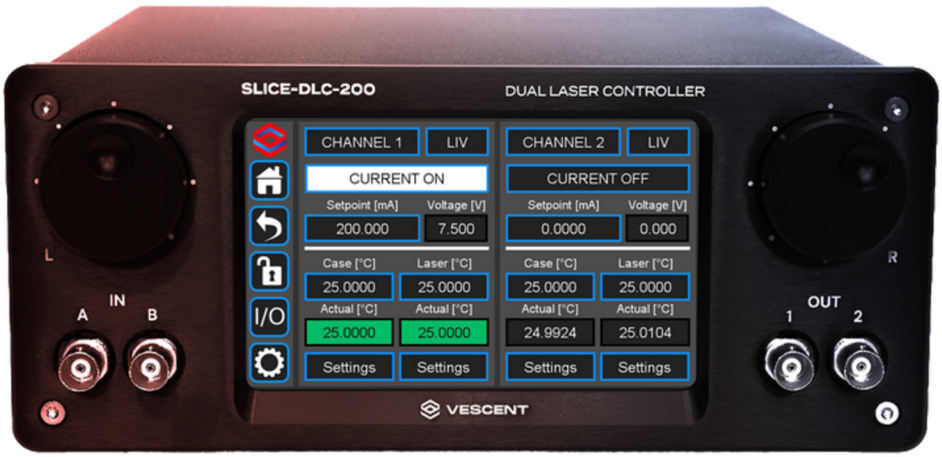
Dual-stage temperature control for each channel enables sub-millikelvin stability of the diode resulting in minimal frequency fluctuations and drift. A current servo input enables high-speed (≥10 MHz) control of the laser frequency. High-speed RF modulation enables the user to easily write sidebands onto the laser via injection current, and facilitates a PDH-style peak lock without the use of expensive lock-in amplifiers and modulator.

The SLICE-DLC employs Vescent's proprietary hybrid switching / linear power supply technology to deliver unsurpassed current noise performance.

SLICE-DLC Dual Laser Controller



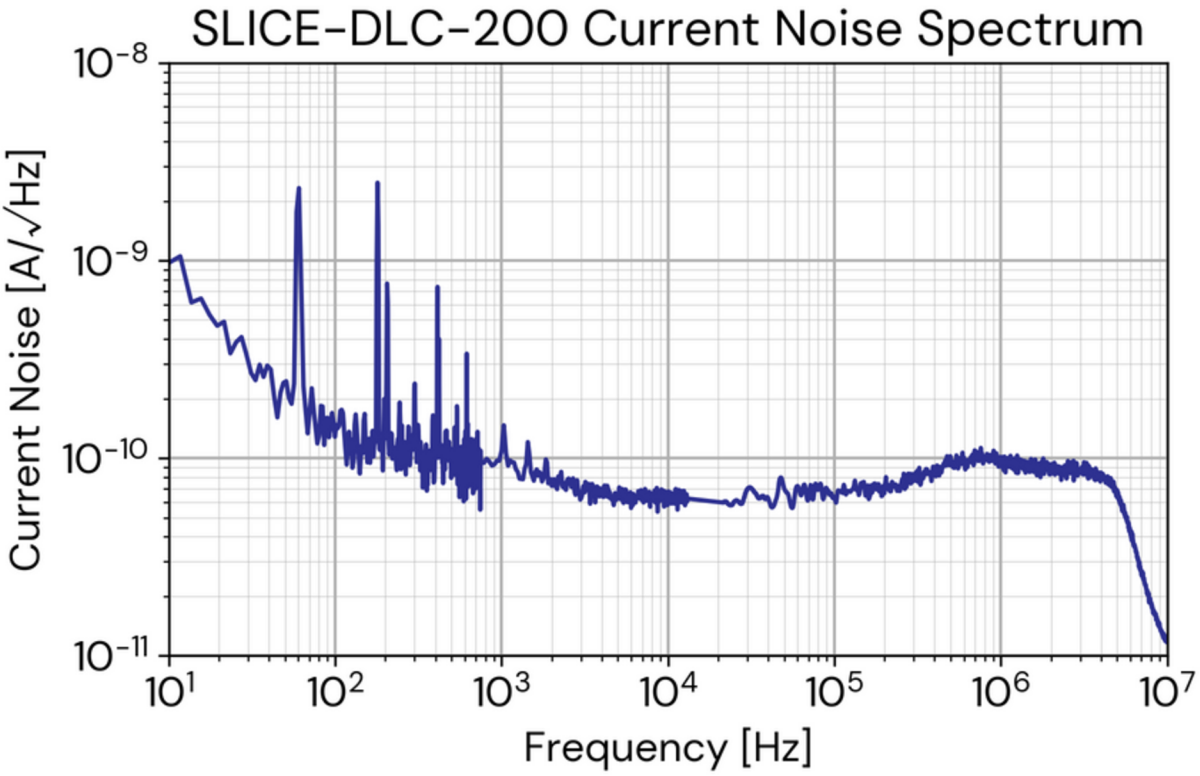
SLICE-DLC Touchscreen GUI

SLICE-DLC Back Panel

Features

- Two channels of current control, each with two channels of temperature control
- Lowest-noise laser controller commercially available
- Automatic LIV curve capture
- Sub-millikelvin temperature stability with properly designed plant
- Hybrid switching / linear power supply accepts all AC line voltages
- High-speed servo and RF modulation inputs
- Current limit and safe turn-on
- Fully controllable with external computer via API

Super-low-noise Validation



SLICE-DLC-200: Setting the Standard for Ultralow Noise Current Control

This plot showcases the power spectral density (PSD) of the SLICE-DLC-200 current noise, demonstrating its industry-leading performance with noise levels below 100 pA/√Hz across a wide frequency range. The log-log axes highlight low noise over 6 decades of frequency and the exceptionally low noise floor. The SLICE-DLC-200 delivers an order of magnitude lower noise than controllers described in leading references (e.g., Seck et al, 2016). This performance translates directly to better stability and lower noise in applications like atomic physics and laser system control.

SLICE-DLC Specifications

Parameter	DLC-200 Value	DLC-500 Value
Current Driver Performance		
Current Channels per Unit	2	
Current Capacity per Channel	200 mA	500 mA
Minimum Deliverable Current	0 mA	
Polarity	Cathode ground only	
Current Noise Density[1]	≤100 pA/√Hz	≤200 pA/√Hz
Integrated Current Noise (rms) from 10 Hz to 100 kHz from 10 Hz to 1 MHz from 10 Hz to 10 MHz	 ≤50 nA ≤100 nA ≤300 nA	 ≤100 nA ≤150 nA ≤500 nA
Current Setpoint Resolution	≤0.0002 mA	≤0.0005 mA
Temperature Drift	≤1 µA/°C	
Compliance Voltage[2]	≥6 V	
Servo Input Bandwidth	≥10 MHz	
RF Input Modulation Bandwidth	1 GHz	
LIV Acquisition Range	0 to Imax mA	
LIV Acquisition Time	1 to 100 s	

[1] At > 1 kHz

[2] At max current

Elliot Scientific Limited
Unit 11 Sandridge Park, Porters Wood, St Albans, AL3 6PH, United Kingdom
Tel: +44 (0)1582 766300 Fax: +44 (0)1582 766340
www.elliotscientific.com sales@elliotscientific.com

SLICE-DLC Specifications Continued...

Parameter	Value
Temperature Controller Performance	
Total Temp. Channels [3]	4
Compatible Transducer	TEC or resistive heater
Compatible Sensor	NTC thermistor
Temperature Stability [4]	±0.2 mK
Precision	±0.2 mK
Control Capacity	40 W total, 20 W max per channel
Current Capacity [5]	5 A
Compliance Voltage [6]	≤18 V
Front Panel Connections	
Input Impedance [7]	50 Ω, 1M Ω
Input Voltage Limit	±10 V
Output Voltage Range	±10 V
Input Voltage	
Input Line Voltage	100-240 VAC
Frequency	50-60 Hz
Phase	1 phase
User-serviceable Fuse	T 2.0 A L 250V
Environmental	
Operating Temperature	>15 and <30 °C
Humidity	<60%
Dew Point	<15 °C

[3] Two per current channel

[4] W/ properly designed temperature plant

[5] Per temperature plant

[6] Automatically adjusted

[7] Configurable

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