

# D2-105

## Laser Controller

The D2-105 is a precision diode laser current source, based on the Libbrecht-Hall circuit. With a current noise density  $<100$  pA/ $\sqrt{\text{Hz}}$ , the D2-105 is ideally suited for precision spectroscopy and metrology applications. Furthermore, two stages of temperature control provide sub-mK stability, ensuring long-term frequency stability.

A front panel current servo BNC input enables high-speed ( $>10$  MHz) servo control of the laser frequency. Additionally, extremely high-speed modulation is enabled by a front panel RF port, which is connected directly to the laser current output SMA. This enables the user to directly write sidebands onto the laser via injection current, which can save the use of expensive AOMs and EOMs. To keep 60 Hz harmonics off the output current, the D2-105 is powered with either the linear D2-005 power supply or user-provided power via a breakout board like the D2-001.

The D2-105 features two independent PID loop filters for controlling the temperature of your diode laser. The range of parameters for one of these loops is expanded to make it especially easy to temperature-control low thermal mass lasers such as the Photodigm TOSA. It is possible to have the other loop modified to control fast loops also; ask for the -FL option.



**D2-105 Laser Controller**



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D2-105 Front Panel



D2-105 Back Panel

## Features

- PID for temperature control over low thermal mass lasers
- Lowest-noise laser controller commercially available
- Two-stage PID temperature control
- High-speed servo and RF inputs
- Current limit and safe turn-on
- High-modulation bandwidth



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# D2-105 Specifications

Parameter	D2-105-200 Value	D2-105-500 Value
<b>Current Source<sup>1</sup></b>		
Current Range	0-200 mA	0-500 mA
Current Noise Density	<100 pA/√Hz	<200 pA/√Hz
RMS Noise (10 Hz to 100 kHz)	<50 nA	<100 nA
RMS Noise (10 Hz to 1 MHz)	<100 nA	<150 nA
RMS Noise (10 Hz to 10MHz)	< 300 nA	< 500 nA
Monitor Resolution (Display)	0.1 mA	1 mA
Absolute Accuracy		2%
Temperature Coefficient	<1 µA/°C	<5 µA/°C
<b>Current Servo Input</b>		
Input Impedance		1 MΩ
Bandwidth		>10 MHz
Modulation Coefficient		1 mA/V
Input Modulation Range		±10 V
RF Input Bandwidth		400 kHz to >1 GHz
<b>Temperature Control</b>		
Temperature Setpoint Range		1-50 °C
Long Term Stability (T2)		~1 mK/day
Max TEC Current		1 A
Max TEC Voltage		4 V
Temperature Servo Input Impedance		100 kΩ
Temp. Modulation Coeff: Low Gain		95 mK/V
Temp. Modulation Coeff: High Gain		9 K/V

<sup>1</sup> Specifications defined for use with a D2-005 power supply.



# D2-105 Specifications Continued...

Parameter	Value
<b>Power Supply</b>	
Voltage Input	+5 VDC, ±15 VDC
Power Supply	D2-005
<b>Environmental</b>	
Operating Temperature	>15 °C and <30 °C
Humidity	<60%
Dew Point	<15 °C