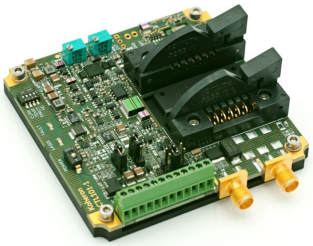


Koheron CTL101 is a low noise current driver with modulation combined with a temperature controller. It is designed to drive narrow-linewidth laser diodes in butterfly package. The CTL101 fits in a 75 mm x 75 mm square, uses a single 5 V supply, and can operate between 0 and 50°C. The CTL101 is conduction-cooled. It comes with an aluminum base plate and a zero insertion force socket for easy mounting.

Specifications

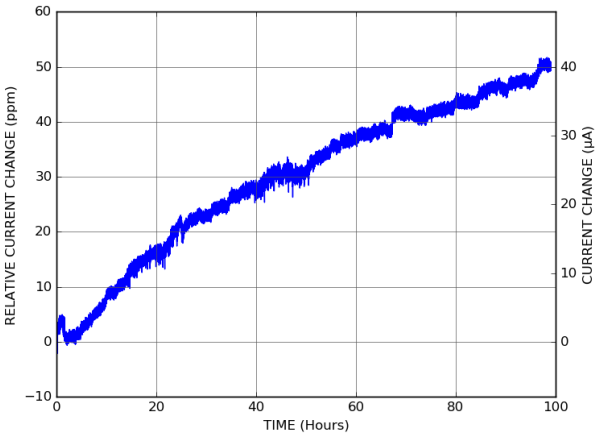
CTL101 laser controller is available for type 1 lasers (CTL101-1-) and type 2 lasers (CTL101-2-).

	B-100	B-200	B-400	B-800
Current driver				
Laser current	0 mA to 110 mA	0 mA to 220 mA	0 mA to 440 mA	0 mA to 880 mA
Compliance voltage 5 V power supply	2.2 V	2.2 V	2.2 V	2.2 V
Compliance voltage 6 V power supply	3.2 V	3.2 V	3.2 V	3.2 V
RMS noise 10 Hz to 1 MHz, L and M modulation gains	120 nA_{rms}	200 nA_{rms}	390 nA_{rms}	810 nA_{rms}
RMS noise 10 Hz to 1 MHz, H modulation gain	150 nA_{rms}	280 nA_{rms}	560 nA_{rms}	1160 nA_{rms}
Current noise density 1 kHz, M modulation gain	110 pA/√Hz	220 pA/√Hz	420 pA/√Hz	820 pA/√Hz
Current limit L setting	60 mA	150 mA	300 mA	600 mA
Current limit H setting	125 mA	250 mA	500 mA	1000 mA
Temperature coefficient	15 ppm/°C	15 ppm/°C	15 ppm/°C	15 ppm/°C
Slow start 90 % setpoint	250 ms	250 ms	250 ms	250 ms
AC modulation cutoff frequency	1.5 MHz	1.5 MHz	1.5 MHz	1.5 MHz
DC modulation				
Modulation gain L setting	0.5 mA/V	1 mA/V	2 mA/V	4 mA/V
Modulation gain M setting	5 mA/V	10 mA/V	20 mA/V	40 mA/V

Modulation gain H setting	50 mA/V	100 mA/V	200 mA/V	400 mA/V
3 dB modulation bandwidth	10 MHz	10 MHz	10 MHz	10 MHz
Modulation input impedance	50 Ω	50 Ω	50 Ω	50 Ω
Modulation input range	±1 V	±1 V	±1 V	±1 V
TEC controller				
Maximum current	0.8 A	1.2 A	1.2 A	1.2 A
Temperature range 10 K thermistor	10 °C to 35 °C	10 °C to 35 °C	10 °C to 35 °C	10 °C to 35 °C
Compliance voltage	-3 V to 3 V	-3 V to 3 V	-3 V to 3 V	-3 V to 3 V
Temperature stability	0.0015 °C/°C	0.0015 °C/°C	0.0015 °C/°C	0.0015 °C/°C
Laser power monitor				
Photodiode current	0 mA to 1 mA	0 mA to 1 mA	0 mA to 1 mA	0 mA to 1 mA
Gain	3.9 V/mA	3.9 V/mA	3.9 V/mA	3.9 V/mA
Bandwidth	20 MHz	20 MHz	20 MHz	20 MHz
Other				
Outside dimensions	75 mm x 85 mm x 27 mm	75 mm x 85 mm x 27 mm	75 mm x 85 mm x 27 mm	75 mm x 85 mm x 27 mm
Weight	103 g	103 g	103 g	103 g
Supply voltage	4.9 V to 6.5 V	4.9 V to 6.5 V	4.9 V to 6.5 V	4.9 V to 6.5 V
Operating temperature	0 °C to 60 °C	0 °C to 60 °C	0 °C to 60 °C	0 °C to 50 °C
Compatible lasers	Floating diodes	Floating diodes	Floating diodes	Floating diodes

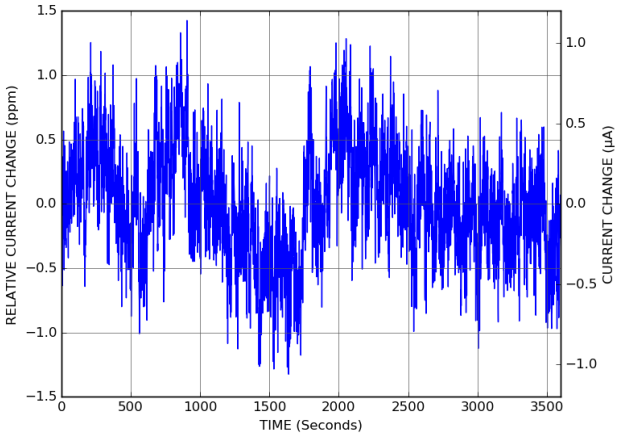
Current driver

The figure below shows the relative current change of the CTL101 laser controller set at 800 mA current (CTL101-2-B-800) during its first 100 hours of operation:



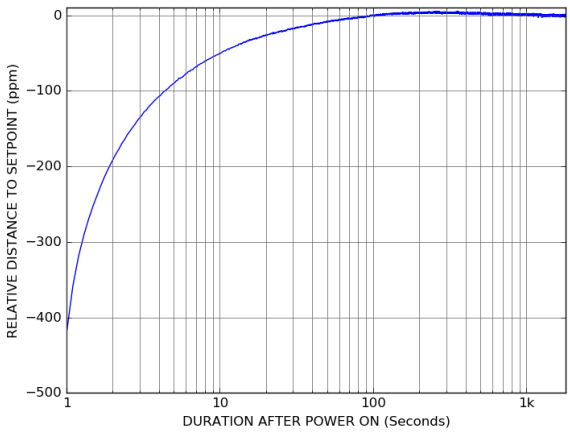
CTL101-2-B-800 early life drift

The current stability of the controller after 100 hours is shown below:



CTL101-2-B-800 one hour current stability

After a subsequent power-on, the CTL101 controller takes only one minute to settle the laser current within 10 ppm of the setpoint value:

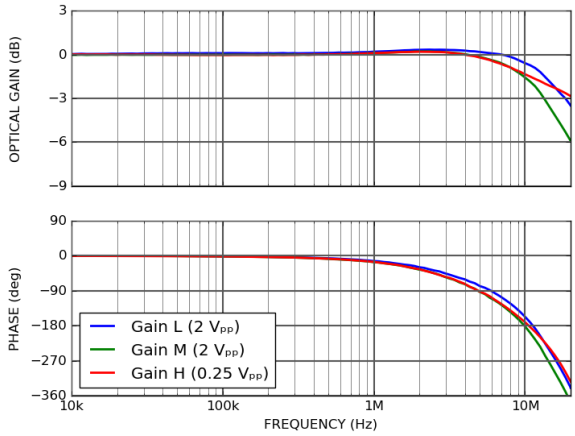


CTL101-2-B-800 settling time

Current modulation

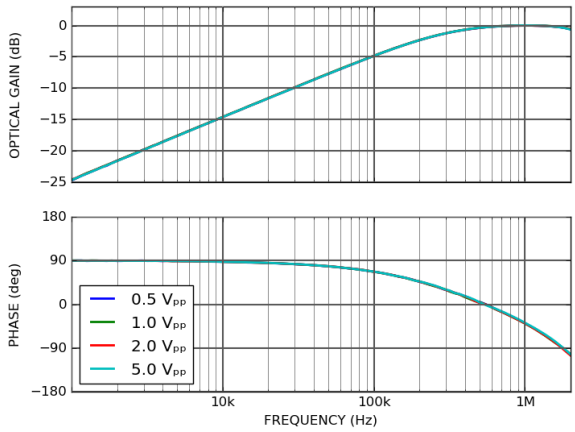
The CTL101 controller has two current modulation inputs available on SMA connectors. The DC modulation

input allows to modulate the current setpoint between DC and 10 MHz. A jumper allows to choose between 3 modulation gains (2 mA/V, 20 mA/V and 200 mA/V for the 400 mA version).



CTL101-2-B-600 DC modulation transfer function

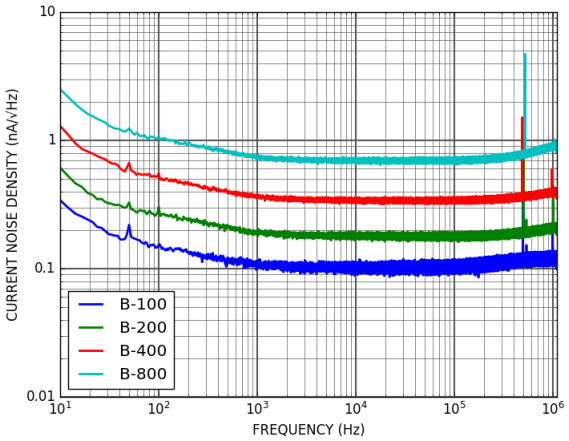
The AC modulation input can be used to modulate the laser above 1 MHz with a modulation gain of 20 mA/V:



CTL101-2-B-600 AC modulation transfer function

Current noise

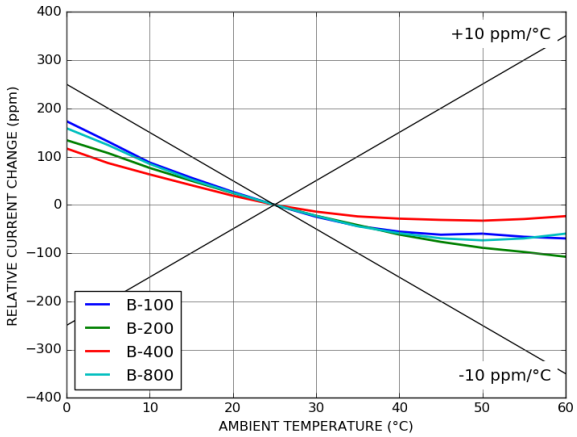
The figure below shows the current noise of the CTL101 controller operating at rated current with the modulation gain set to M:



CTL101 current noise

Temperature stability

The figure below shows the variation of the output current against the ambient temperature for controllers operating at rated current:



CTL101 temperature coefficient

Temperature controller

The temperature controller consists of a precision Wheatstone bridge, an analog PID controller and a linear current driving stage. PID gains are fixed and have been adjusted for a typical butterfly laser diode. Temperature setpoint is adjusted with a precision trimming potentiometer.

Ordering codes

PRODUCT NUMBER	ATTRIBUTE
CTL101-1-B-100	Laser type 1 / Laser current 100 mA
CTL101-1-B-200	Laser type 1 / Laser current 200 mA
CTL101-1-B-400	Laser type 1 / Laser current 400 mA
CTL101-1-B-800	Laser type 1 / Laser current 800 mA
CTL101-2-B-100	Laser type 2 / Laser current 100 mA
CTL101-2-B-200	Laser type 2 / Laser current 200 mA
CTL101-2-B-400	Laser type 2 / Laser current 400 mA
CTL101-2-B-800	Laser type 2 / Laser current 800 mA