Koheron CTL300E is a rugged laser diode controller with the following features:
- High-efficiency current driver up to 1600 mA.
- ±4.5 V / 2 A TEC controller.
- Wide input supply voltage range: 6 V to 33 V.
- -40 °C to 85 °C operating temperature range.
- On-board monitoring and diagnostics.
- Modulation input port with 5 MHz bandwidth.
- Fast switching between two independent current setpoints via digital input.
- Mates with the TB300 breakout board sold separately.

Specifications

CTL300E laser controller is available for type 1 lasers (CTL300E-1-), type 2 lasers (CTL300E-2-) and in a screw terminal version (CTL300E-0-).

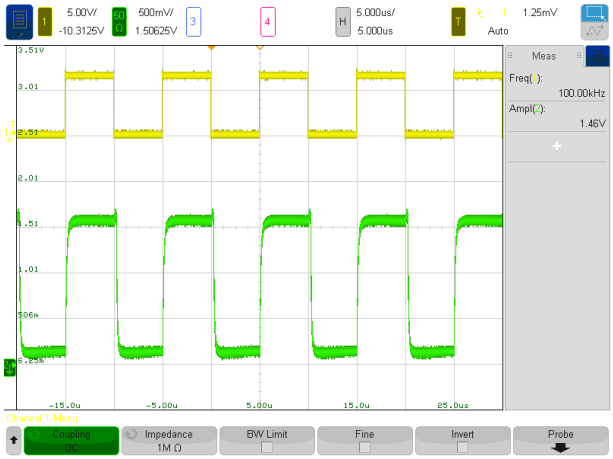
	400	800	1200	1600
Current driver				
Laser current	10 mA to 425 mA	15 mA to 850 mA	15 mA to 1275 mA	15 mA to 1700 mA
Laser current resolution	7 µA	14 µA	21 µA	28 µA
Compliance voltage	3.8 V	3.8 V	3.7 V	3.7 V
RMS noise 10 Hz to 1 MHz	0.85 μA_{rms}	1.7 μA_{rms}	2.5 μA_{rms}	3.5 μA_{rms}
Current noise density 10 kHz	0.8 nA/√Hz	1.7 nA/√Hz	2.7 nA/√Hz	3.4 nA/√Hz
Temperature coefficient	15 ppm/°C	15 ppm/°C	15 ppm/°C	25 ppm/°C
Modulation gain	40 mA/V	80 mA/V	120 mA/V	160 mA/V
3 dB modulation bandwidth	5 MHz	5 MHz	5 MHz	4 MHz
TEC controller				
Maximum current	2 A	2 A	2 A	2 A
Compliance voltage	-4.5 V to 4.5 V	-4.5 V to 4.5 V	-4.5 V to 4.5 V	-4.5 V to 4.5 V
Temperature stability	0.002 °C/°C	0.002 °C/°C	0.002 °C/°C	0.002 °C/°C
Laser power monitor				
Photodiode current	0 mA to 2.5 mA	0 mA to 2.5 mA	0 mA to 2.5 mA	0 mA to 2.5 mA
Other				
Outside dimensions	131 mm x 42 mm x 28 mm	131 mm x 42 mm x 28 mm	131 mm x 42 mm x 28 mm	131 mm x 42 mm x 28 mm
Weight	95 g	95 g	95 g	95 g
Supply voltage	6 V to 33 V	6 V to 33 V	6 V to 33 V	6 V to 33 V
Operating temperature	-40 °C to 85 °C	-40 °C to 85 °C	-40 °C to 85 °C	-40 °C to 85 °C
Compatible lasers	Floating diodes	Floating diodes	Floating diodes	Floating diodes

Current driver

Bias switching

The CTL300E offers fast switching between two independent current setpoints. The two setpoints are defined using the UART interface and the BSEL logic input is used to select the desired setpoint channel. Transition time is about 400 ns.

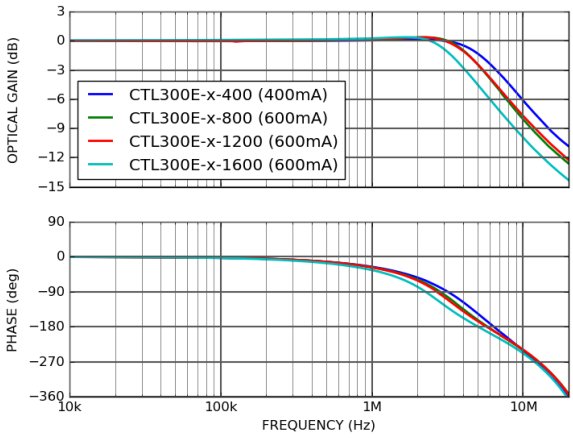
Example of switching between 100 mA and 600 mA using a Thorlabs BL976-SAG300 pump laser diode with 400 mV laser driver voltage drop (yellow: BSEL signal 3.3 V 100 kHz, green: laser diode output power):



CTL300E bias switching

Modulation frequency response

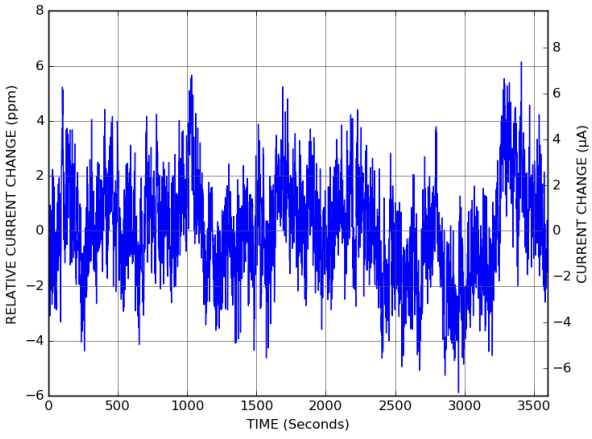
The figure below shows the modulation frequency response of the CTL300E controller measured with 1 V_{pp} input modulation voltage amplitude and 400 mV laser driver voltage drop.



CTL300E modulation frequency response

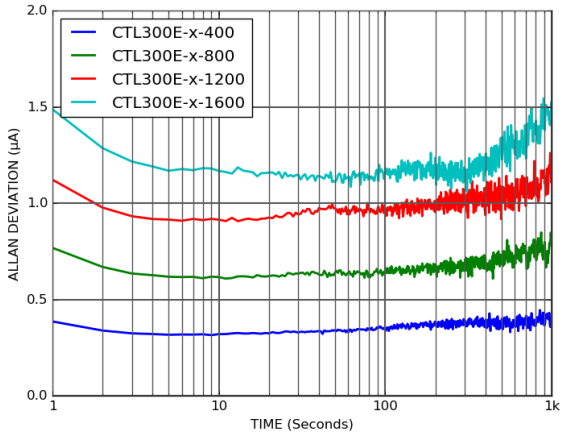
Stability

The figure below shows the current stability of the CTL300-1-1200 controller operated at 1200 mA.



CTL300E-1-1200 one hour current stability

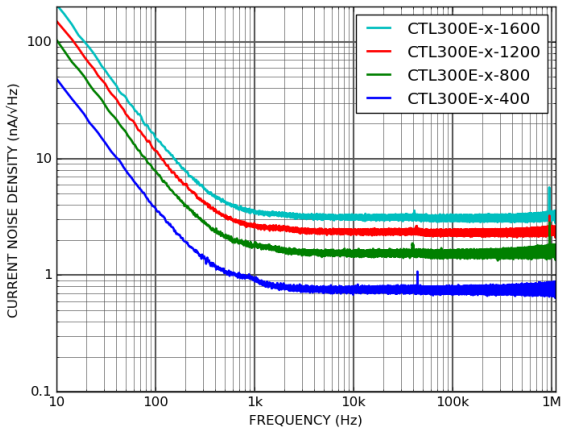
The figure below shows the Allan deviation of the CTL300E controller operating at rated current.



CTL300E allan deviation

Current noise density

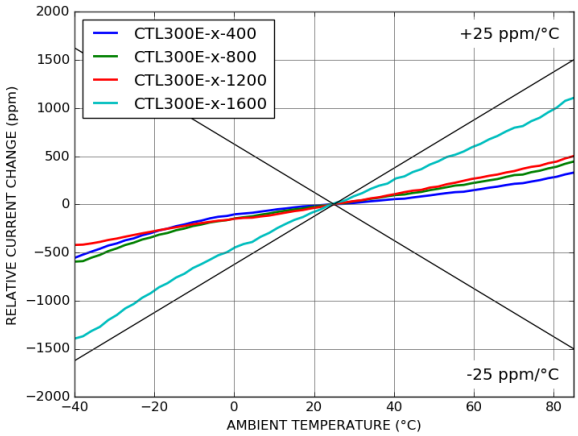
The figure below shows the current noise density of the CTL300E controller operating at rated current with 600 mV laser driver voltage drop.



CTL300E current noise density

Temperature stability

The figure below shows the variation of the output current against the ambient temperature of the CTL300E controller operating at rated current.

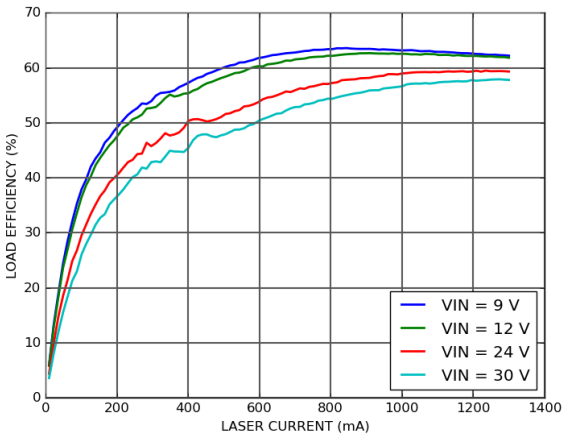


CTL300E temperature coefficient

Energy efficiency

The CTL300E controller's laser driver is designed to offer a high energy conversion efficiency together with a low current noise. The CTL300E controller maintains high efficiency over a wide range of laser currents and input voltages.

The figure below shows the overall load efficiency (= laser electrical power / input power) of a CTL300E-1-1200 controller with 200 mV laser driver voltage drop.



CTL300E-1-1200 overall load efficiency

Ordering codes

PRODUCT NUMBER	ATTRIBUTE
CTL300E-1-400	Laser mount Butterfly ZIF socket / Laser type 1 / Laser current 400 mA
CTL300E-1-800	Laser mount Butterfly ZIF socket / Laser type 1 / Laser current 800 mA
CTL300E-1-1200	Laser mount Butterfly ZIF socket / Laser type 1 / Laser current 1200 mA
CTL300E-1-1600	Laser mount Butterfly ZIF socket / Laser type 1 / Laser current 1600 mA
CTL300E-2-400	Laser mount Butterfly ZIF socket / Laser type 2 / Laser current 400 mA
CTL300E-2-800	Laser mount Butterfly ZIF socket / Laser type 2 / Laser current 800 mA
CTL300E-2-1200	Laser mount Butterfly ZIF socket / Laser type 2 / Laser current 1200 mA
CTL300E-2-1600	Laser mount Butterfly ZIF socket / Laser type 2 / Laser current 1600 mA
CTL300E-1-400-NOZIF	Laser mount Butterfly no socket / Laser type 1 / Laser current 400 mA
CTL300E-1-800-NOZIF	Laser mount Butterfly no socket / Laser type 1 / Laser current 800 mA
CTL300E-1-1200-NOZIF	Laser mount Butterfly no socket / Laser type 1 / Laser current 1200 mA
CTL300E-1-1600-NOZIF	Laser mount Butterfly no socket / Laser type 1 / Laser current 1600 mA
CTL300E-2-400-NOZIF	Laser mount Butterfly no socket / Laser type 2 / Laser current 400 mA
CTL300E-2-800-NOZIF	Laser mount Butterfly no socket / Laser type 2 / Laser current 800 mA
CTL300E-2-1200-NOZIF	Laser mount Butterfly no socket / Laser type 2 / Laser current 1200 mA
CTL300E-2-1600-NOZIF	Laser mount Butterfly no socket / Laser type 2 / Laser current 1600 mA
CTL300E-0-400	Laser mount Screw terminal / Laser current 400 mA
CTL300E-0-800	Laser mount Screw terminal / Laser current 800 mA
CTL300E-0-1200	Laser mount Screw terminal / Laser current 1200 mA
CTL300E-0-1600	Laser mount Screw terminal / Laser current 1600 mA