Dual Mode Laser Driver

Main features: high power, high precision, high stability, high efficiency, and small package.

Applications: DPSS, EDFA, and instrumentations.

Part number:	LDA1-CP1
Maximum output current: 2A	
Maximum output voltage on LDA:	0.9×Vps
Laser current and power indication voltage:	0 to 2.5V
Laser current indication absolute accuracy:	±0.5%
Laser current set-point voltage:	0 to 2.5V
Laser power set-point voltage:	0 to 2.5V
Current output noise:	0.05% (RMS)@2A
Power supply input voltage:	3.2V to 5.5V
Operation mode:	ACC (Automatic Current Control) and APC (Automatic Power Control)
Operating temperature:	0°C to +85°C
Module dimension (approximately):	25.4mm × 20 mm × 4.6mm

Pin Descriptions

Figure 2 illustrates the pin assignment on the module and basic application schematics.

Pin 1 **SDNG**, shut down, digital input. Negative logic, >2.3V = enable, <0.5V = shut down, norminal threshold voltage = 1V. Its internal circuit is shown in Figure 2. The diode is for shortening the shut down time.

Pin 2 **CLPGD**, control loop good indication, digital output. A HI level indicates control loop locked. This pin is an open drain output and pulled up by a 20K resistor to VPS.

Pin 3 **P/CM,** power/current mode indication, analog output. HI = power mode, LO = current mode. Low output impedance, capable of driving 20mA load.

Pin 4 **GND**, signal ground pin. Connect ADC and DAC grounds to here.

Pin 5 **2.5V**, reference voltage, analog output. It is used by the internal DACs as the reference voltage. It can source and sink 5mA current with 20ppm/°C stability max.

Pin 6 **LIS**, laser current set-point voltage, analog input. 0V to 2.5V sets the output current from 0 to 2A linearly. The input impedance of this pin is 100KΩ. This pin can be set by an external analog signal source, such as the output of a closed-looped op-amp, POT, or DAC.

Pin 7 **LIO**, laser current output indication, analog output. 0V to 2.5V indicates the laser current of from 0 to 2A linearly.

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Pin 8 **LPS**, laser power set-point voltage, analog input. 0V to 2.5V sets the laser output power from 0 to the maximum value linearly. The input impedance of this pin is 100KΩ. This pin can be set by an external analog signal source, such as the output of a closed-looped op-amp, POT, or DAC.

Pin 9 **GND**, signal ground pin. Connect ADC and DAC grounds to here.

Pin 10 **LPO**, laser power output voltage, analog output. Low impedance output. The (positive-going) output of a TIA (Trans-Impedance Amplifier) for the photodiode in the laser. The trans-impedance is set by an external resister between **LPO** pin and **PDCT** (pin 11).

Pin 11 **PDCT,** photodiode cathode, analog input. The TIA's input. Drawing current out from this pin will bring the **LPO** pin voltage going up-ward.

Pin 12 **LDA**, laser diode anode, analog output. This pin is used to drive a laser of which the cathode is connected to the case and the case is connected to the ground. See Figure 1.

Pin 13 **LDC**, laser diode cathode, analog output. **This pin is internally connected to ground.** Connect it directly to the laser's cathode which is also the case of the laser. See Figure 1.

Pin 14 **GND**, ground. Connect power supply return rail to here.

Pin 15 **VPS**, power supply, analog power input. The driver works from 3.2V to 5.5V.

Pin 16 **SYNCO**, sync output, digital output. This pin can be used to synchronize another switch mode driver such as for TEC or power supply so that the other drivers will not interfere with this laser driver. The switching frequency is set at 700 KHz. There is a 10K resistor before this pin to the switcher output. This pin can also be used to see the switcher's output voltage.

Mode Setting

A. Set the driver to constant current mode without over power protection

In this mode, the laser is always operating at constant current mode.

1. Set LIS = 2.5V × I_{laser} ÷ 2.0A, where I_{laser} is the set-point laser current.
2. Make sure LPS is greater than LPO, for example by connecting LPS to 2.5V reference and making photodiode transimpedance amp resistor = 0 ohms.

B. Set the driver to constant current mode with over power protection

In this mode, the laser is operating at the constant current mode unless the laser output power reaches the preset maximum power. When the laser output power reaches the protection power, the laser will be operating in constant power mode.

1. Set LIS = 2.5V × I_{set} ÷ 2.0A, where I_{laser} is a laser set-point current.
2. Set LPS to the voltage generated at the LPO pin by the internal TIA (Trans-Impedance Amplifier) when the laser is outputting the protection power level. The TIA converts the current of the power-sensing PD (Photo Diode) into a voltage, with the gain set by an external resistor connected between the PDCT and LPO pins. Make sure that the set-point laser current is at least 5% less than the current needed to generate the protection laser power level.

C. Set the driver to constant power mode without over current protection

In this mode, the laser is always operating in the constant power mode (up to the maximum rated current of 2.0A).

1. Connect LIS to 2.5V reference pin.
2. Set LPS to the voltage value which is generated at the LPO pin by the internal TIA (Trans-Impedance Amplifier) when the laser is outputting the set-point power. The TIA converts the current of the power-sensing PD (Photo Diode) into a voltage, with the gain set by an external resistor connected between the PDCT and LPO pins. Make sure that the laser can output the set-point power by a current of less than 1.90A.

D. Set the driver to constant power mode with over current protection

In this mode, the laser is operating in the constant power mode unless the laser current reaches a predetermined protection current. When the laser reaches the protection current, the laser will be operating in constant current mode.

1. Set LIS = 2.5V $\times$ $I_{protect}$ $\div$ 2.0A, where $I_{protect}$ is the predetermined protection current.
2. Set LPS to the voltage value which is generated at the LPO pin by the internal TIA (Trans-Impedance Amplifier) when the laser is outputting the set-point power. The TIA converts the current of the power-sensing PD (Photo Diode) into a voltage, with the gain set by an external resistor connected between the PDCT and LPO pins. Make sure that the laser can output the set-point power by a current of less than 95% of the protection current.

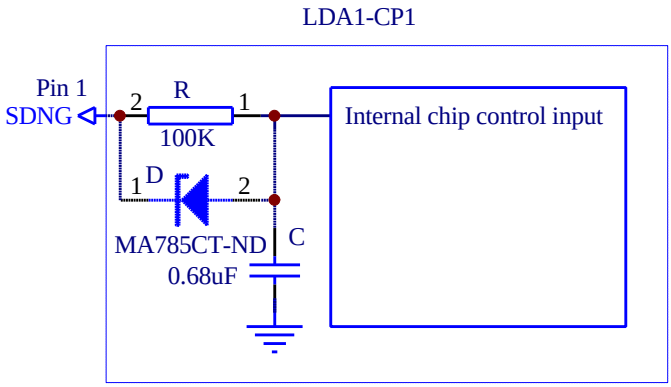

Figure 1

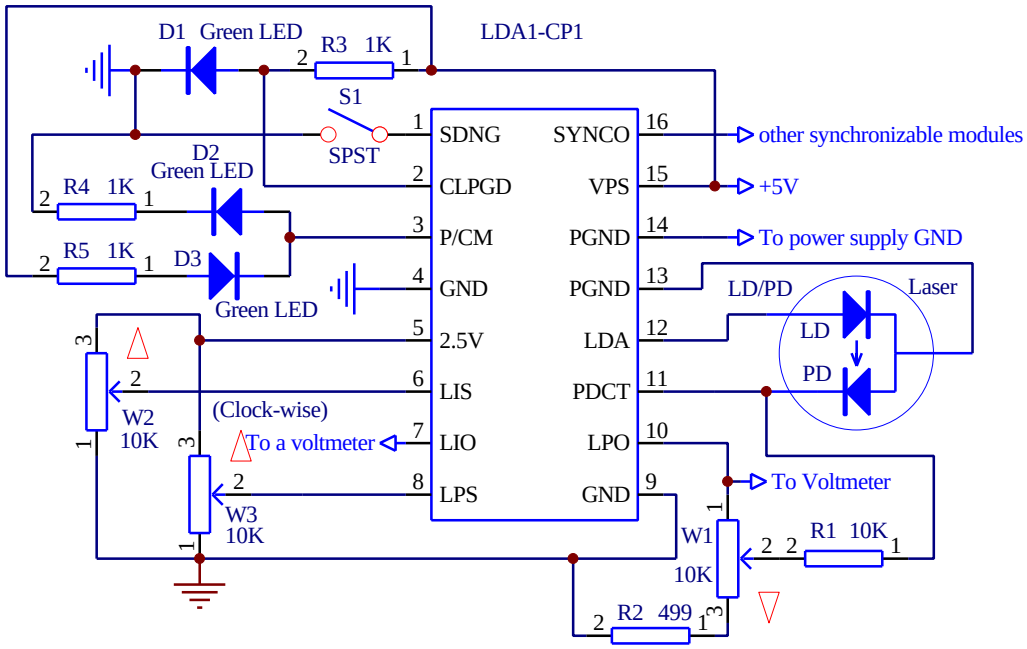

Figure 2A Self-contained

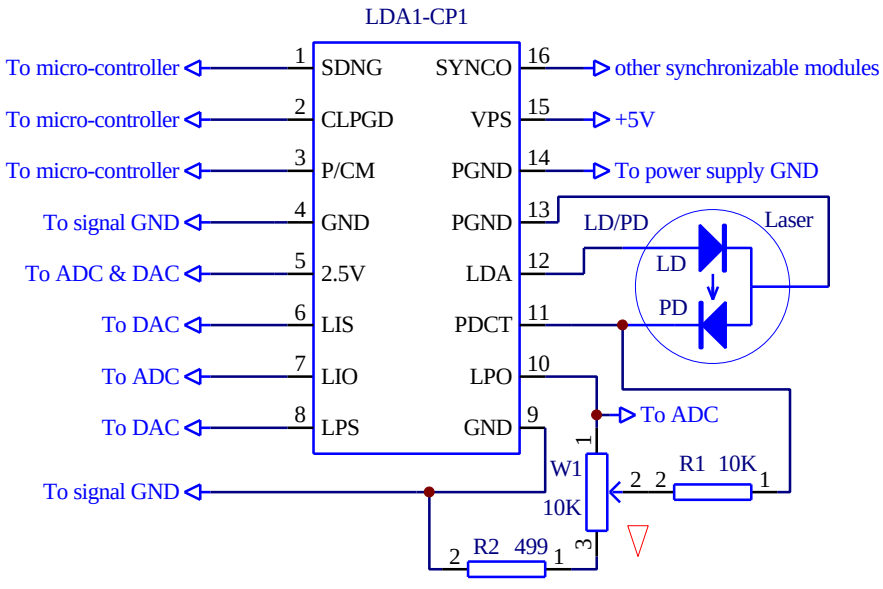

Figure 2B Micro-processor Based

Pin Configurations and Mechanical Dimensions

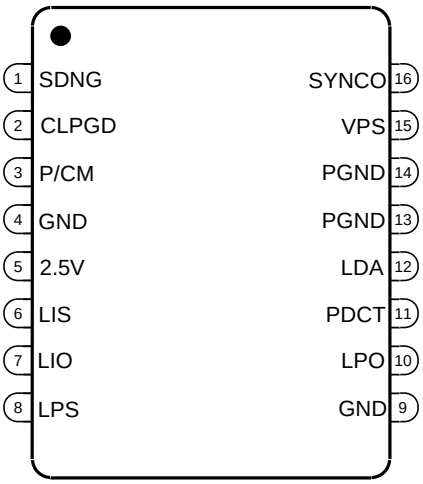

Figure 3 Top View of LDA1-CP1-S

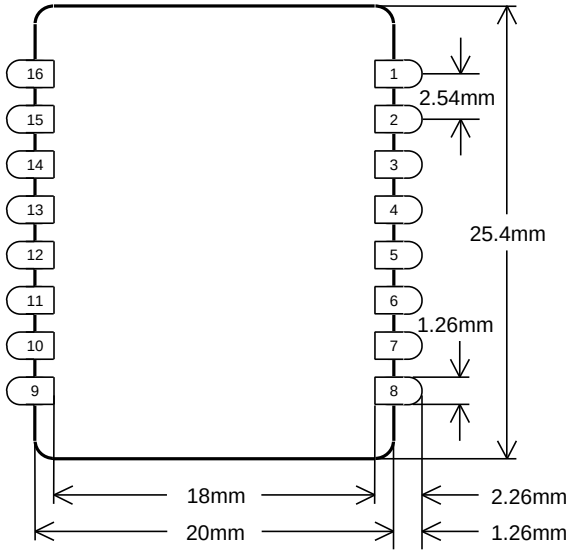

Figure 4 Bottom View of LDA1-CP1-S

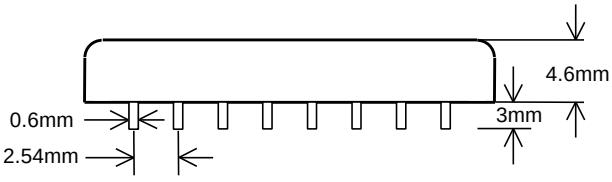

Figure 5 Side View of LDA1-CP1-D

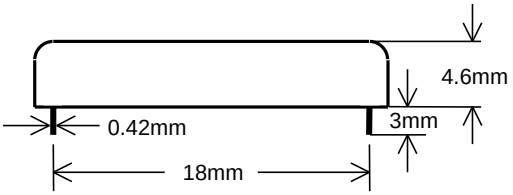

Figure 6 End View of LDA1-CP1-D

Note: The Dual Mode Laser Drivers come in two types of packages: surface mount and through hole. The surface mount package has to be soldered manually, not by reflow oven. The through hole package can be mounted in a socket, soldered manually, or by wave soldering machine. Package type is designated by suffixing D (through hole) or S (surface mount) to the part number.