# HIGH POWER APC LASER DIODE DRIVER

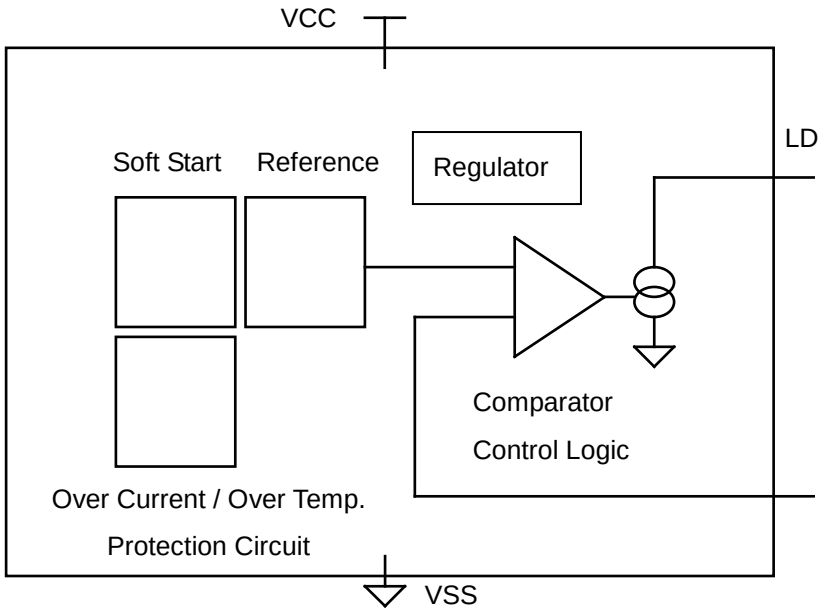
## FEATURES

- CW operation up to 350mA from 2.8..6V supply voltage
- TTL modulation frequency up to 10KHz, with adjustable duty cycle
- Rapid soft start after power-on
- Simple power adjustment via the external resistor
- Control loop accuracy better than 5% with changes in temperature, supply voltage
- Permanent shutdown with excessive temperature and overcurrent
- Wide monitor current range from 10µA to 0.5mA
- Worldwide laser safety regulations compliant, including TUV and JQA
- Variable package type available, including Known Good Die, SOT26 and SOP8
- No external capacitor is required on output

## APPLICATIONS

- Industrial Laser Diode Module
- Laser Leveling
- Bar Code Reader
- Laser Measuring Equipment
- Laser Medical Equipment
- Diode Pumping Laser Driver

## BLOCK DIAGRAM

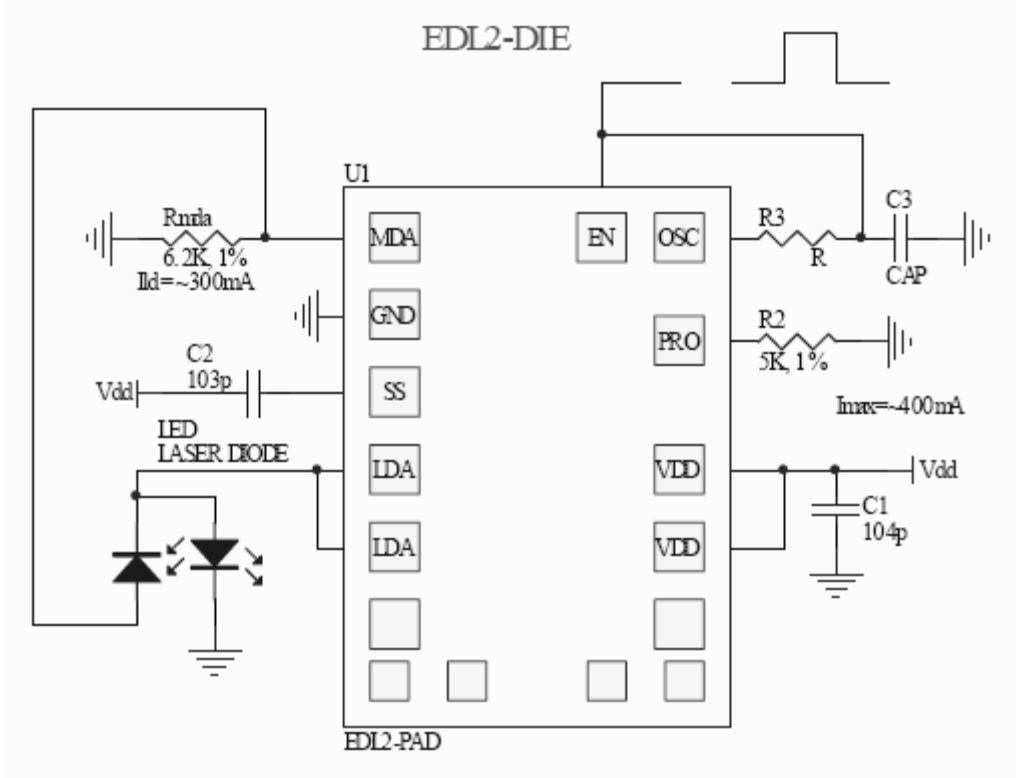


## PIN CONFIGURATION (For SOP8, applicable to KGD and SOT26)

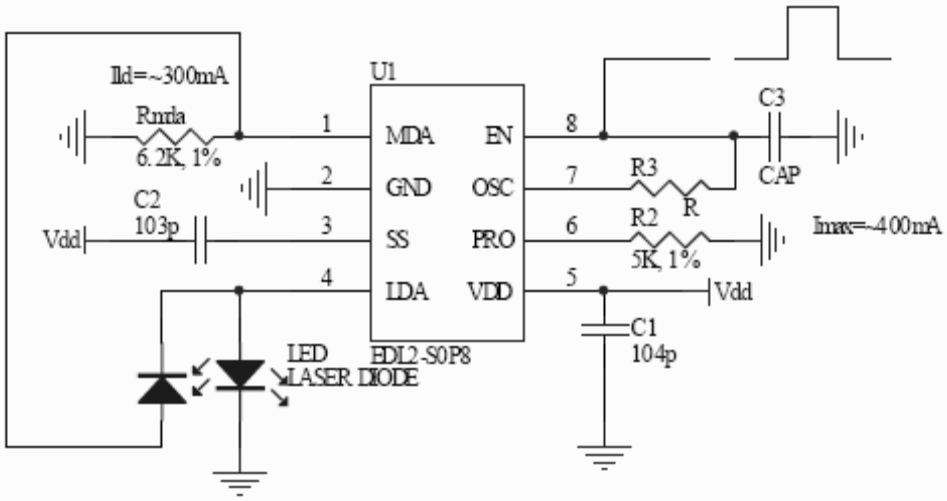
| *No.* | *Name* | *Function* |
|---|---|---|
| 1 | MDA | Photo Diode (PD or MD) Anode |
| 2 | GND | Ground |
| 3 | SS | Soft Start Ramping Control |
| 4 | LDA | Driver Output (LD Anode) |
| 5 | VDD | +2.8-6V Supply Voltage |
| 6 | PRO | Max Driving Current Control |
| 7 | OSC | Oscillation Input |
| 8 | EN | Enable or External RC Input |

## APPLICATION CONNECTION

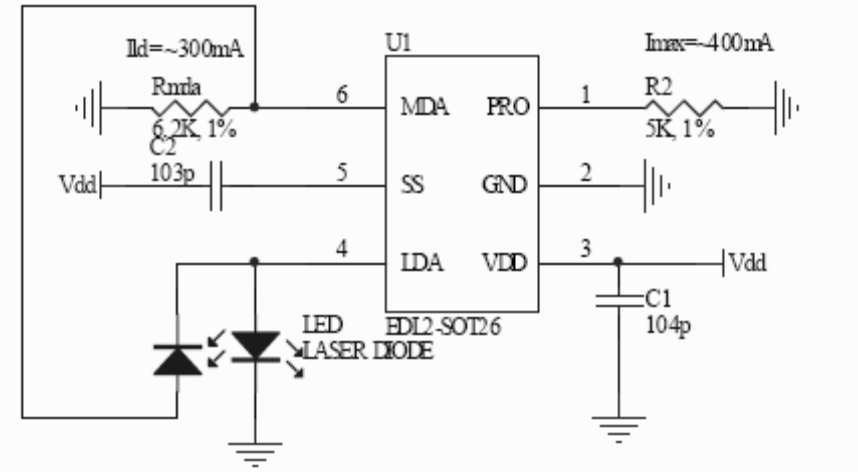
- KGD Pinout
- SOT26
- SOP8



EDL2-SOP8




EDL2-SOT26




## DESCRIPTION

The EDL2 High Power APC Laser Diode Driver device is a driver and controller for laser diodes in both continuous wave and up to 10KHz TTL modulation operation which requires only few external components. The broad power supply range of 2.8V to 6V and the integrated reverse battery protection allow for battery operation with a minimum of two cells.

The driver includes integrated circuitry protecting against destruction by ESD, excessive temperature and over current and a soft start which regulates the power and protects the laser diode when the power supply is switched on. The driver also filters the laser diode power supply for transients.

The power supply is regulated and adapted for the laser diode used by an external resistor at PD. The monitor current acts as a reference and is regulated independent of the influence of temperature and supply voltage (range: 10µA to 0.5mA). It is designed to meet the stringent worldwide laser safety regulation, TUV, JQA, CE and FDA etc, requirement and the harsh industrial operation environment.

In the event of failure, such as over current in the laser path with a lack of feedback, for example, a quick power lockout is activated. The shutdown continues until power is reapplied, permitting a restart. The strain on power packs and batteries is relieved and the laser class is retained even in the event of a disturbance.

## ABSOLUTE MAXIMUM RATINGS

Beyond these values damage may occur; device operation is not guaranteed.

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| VDD | Voltage at VDD | | -0.5 | | 7 | V |
| I(VCC) | Current in VDD | | -100 | | 600 | mA |
| I(LDA) | Current in LD | | | | 500 | mA |
| I(MDA) | Current in PD | | | | 6 | mA |
| VR | Reverse Voltage | | | | -4 | V |
| VD | ESD Susceptibility at all pins | MIL-STD-883, Method 3015, HBM 100pF discharged through 1.5kS | | | 1 | kV |
| Tsoldering | Soldering Temperature | 260℃ for 10 seconds (SOIC)* | | | | |
| Tj | Operating Junction Temperature | | -40 | | 150 | ℃ |
| Ts | Storage Temperature Range | | -55 | | 125 | ℃ |

*See IPC/JEDEC Standard J-STD-020A for Surface Mount Devices.

## THERMAL DATA

Operating Conditions: VDD= 2.8..6V

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Ta | Operating Ambient Temperature Range | | -20 | | 80 | ℃ |
| Rthja | Thermal Resistance Chip / Ambient | SOT26 package, soldered on PCB, no additional cooling areas | | | 140 | K/W |

All voltages are referenced to ground unless otherwise noted.

All currents into the device pins are positive; all currents out of the device pins are negative.

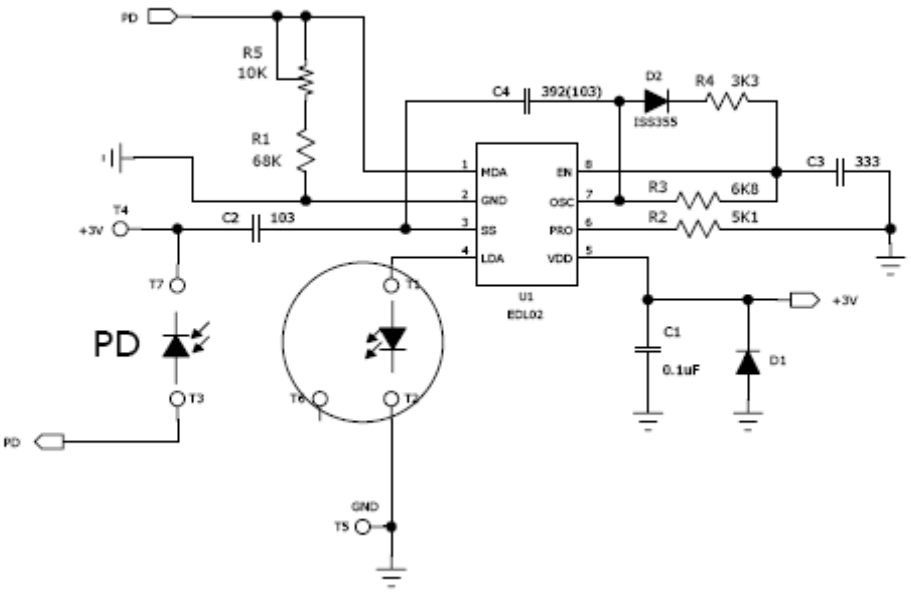
## ELECTRICAL CHARACTERISTICS

Operating Conditions: VDD= 5V, VR= 2KΩ..100KΩ, Ta= 0-70℃ unless otherwise noted

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| VDD | Permissible Supply Voltage | | 2.8 | | 6 | V |
| I(LDA) | Permissible Laser Diode Current | power control range | 5 | | 350 | mA |
| I(MDA) | Permissible Photo Diode Current | IMDA drive current = VMDA/RMDA | 10 | | 500 | μA |
| V(MDA) | Photo diode monitor Voltage | power control range | | 1.2 | | V |
| V(PRO) | Laser Diode Protection Monitor Voltage | LDA output protect current = (VPRO*1600/RPRO) | | 1.2 | | V |
| Tss | Soft start turn on delay | @Css=1nF | | 30 | | uS |
| R(PRO) | Max Driving Current Adjustment Resistor | I(LDA) from 78mA to 360mA | 3.9 | | 27 | KΩ |

## LASER MODULE LAYOUT EXAMPLE

Reference schematic design:



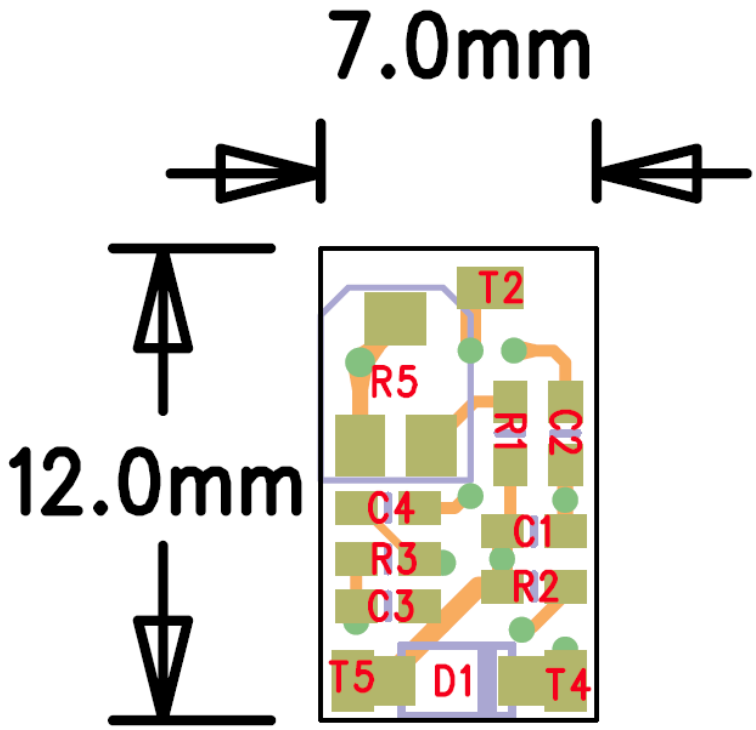

NOTE:

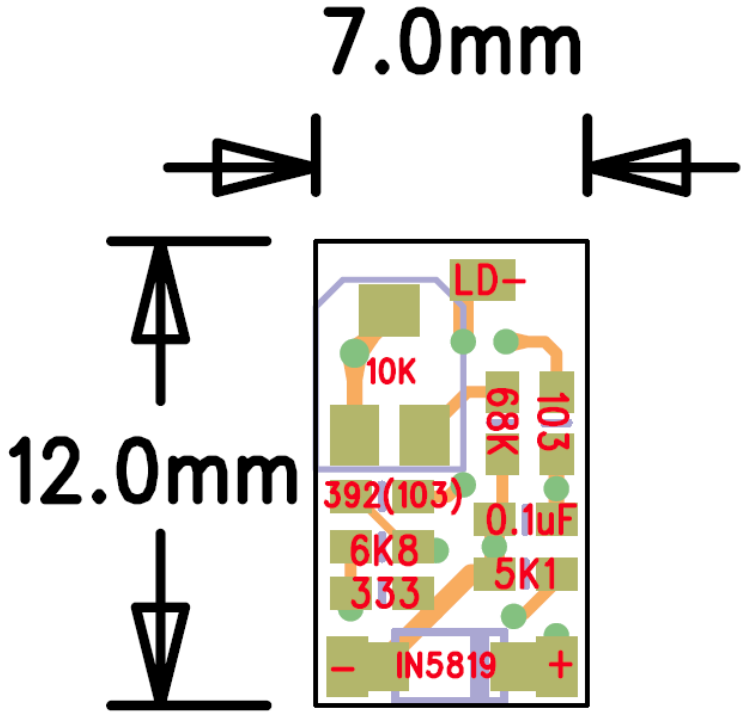
PRO PIN preferences (R2)

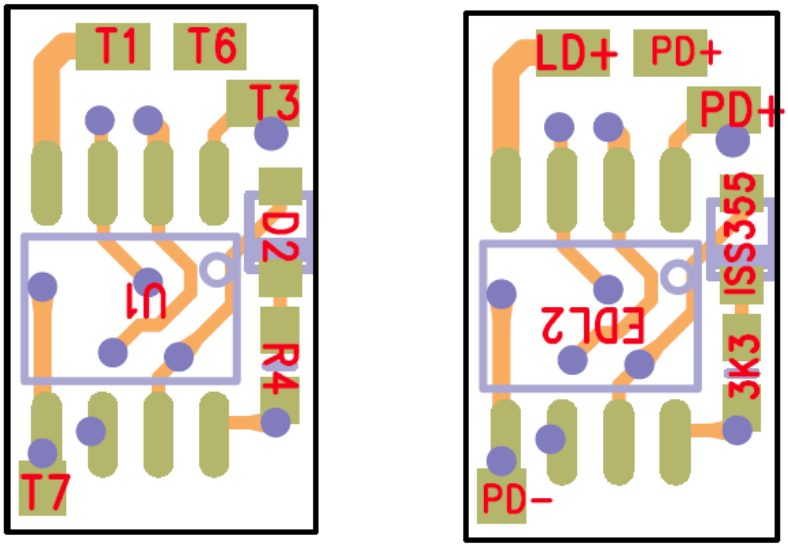
| | | | |
|---|---|---|---|
| 3K9 | 360mA | 16K | 125mA |
| 4K7 | 320mA | 17K | 120mA |
| 5K1 | 290mA | 18K | 144mA |
| 6K2 | 270mA | 20K | 103mA |
| 6K8 | 250mA | 22K | 92mA |
| 7K2 | 240mA | 24K | 86mA |
| 8K2 | 215mA | 27K | 78mA |
| 9K1 | 199mA | 33K | 72mA |
| 10K | 183mA | 51K | 40mA |
| 12K | 160mA | 100K | 24mA |
| 14K | 140mA | | |
| 15K | 133mA | | |

1. Laser output power adjustment: RS
2. Max laser diode driving current limit: R2
3. TTL modulation frequency adjustment: R3, C3
4. TTL modulation duty cycle adjustment: R4, C4
5. Soft start turn-on delay control: C2

Reference layout design (for two layers PCB):



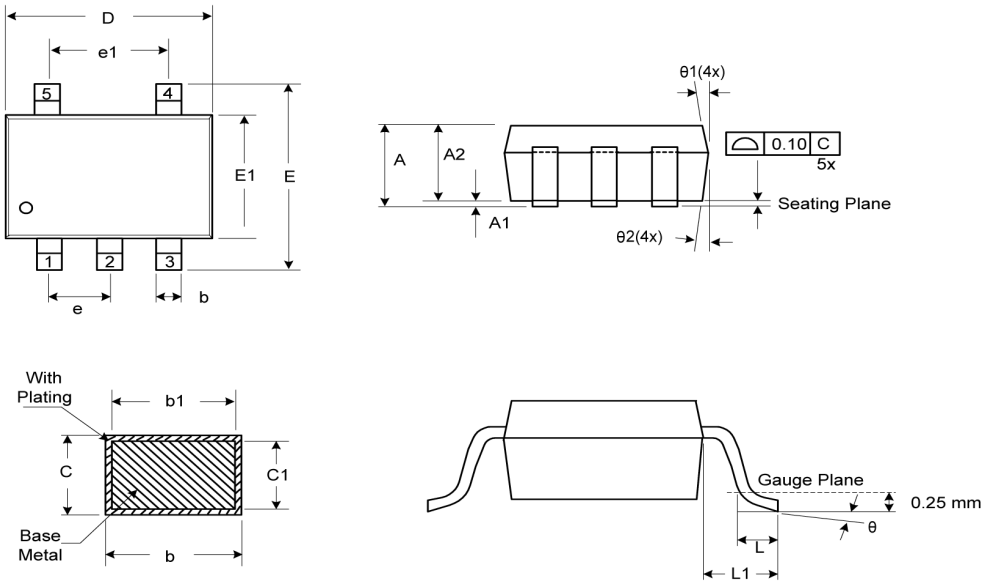






Demo board operation procedure:

1. Adjust RS to max value, e.g., 10K ohm in this example **<- VERY IMPORTANT!**
2. Set max. driving current limit for overcurrent protection by adjusting R2
3. Set soft start delay time by adjusting C2
4. For continuous wave operation, set EN and OSC pins to LOW
5. For TTL modulation operation, adjusting R3, C3, R4, and C4 for desired modulation frequency and duty cycle
6. Adjusting RS to obtain desired laser power output

## SOT26 Package Drawing




| Symbol | Dimensions In Millimeters | | | Dimensions In Inches | | |
|---|---|---|---|---|---|---|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 1.05 | 1.20 | 1.35 | 0.041 | 0.047 | 0.053 |
| A1 | 0.05 | 0.10 | 0.15 | 0.002 | 0.004 | 0.006 |
| A2 | 1.00 | 1.10 | 1.20 | 0.039 | 0.043 | 0.047 |
| b | 0.25 | - | 0.55 | 0.010 | - | 0.022 |
| b1 | 0.25 | 0.40 | 0.45 | 0.010 | 0.016 | 0.018 |
| c | 0.08 | - | 0.20 | 0.003 | - | 0.008 |
| c1 | 0.08 | 0.11 | 0.15 | 0.003 | 0.004 | 0.006 |
| D | 2.70 | 2.85 | 3.00 | 0.106 | 0.112 | 0.118 |
| E | 2.60 | 2.80 | 3.00 | 0.102 | 0.110 | 0.118 |
| E1 | 1.50 | 1.60 | 1.70 | 0.059 | 0.063 | 0.067 |
| L | 0.35 | 0.45 | 0.55 | 0.014 | 0.018 | 0.022 |
| L1 | 0.60 Ref. | | | 0.024 Ref. | | |
| e | 0.95 Bsc. | | | 0.037 Bsc. | | |
| e1 | 1.90 Bsc. | | | 0.075 Bsc. | | |
| $\theta$ | 0° | 5° | 10° | 0° | 5° | 10° |
| $\theta$ 1 | 3° | 5° | 7° | 3° | 5° | 7° |
| $\theta$ 2 | 6° | 8° | 10° | 6° | 8° | 10° |