Evaluation Board for High Voltage ATLSXA216D Series Laser Drivers

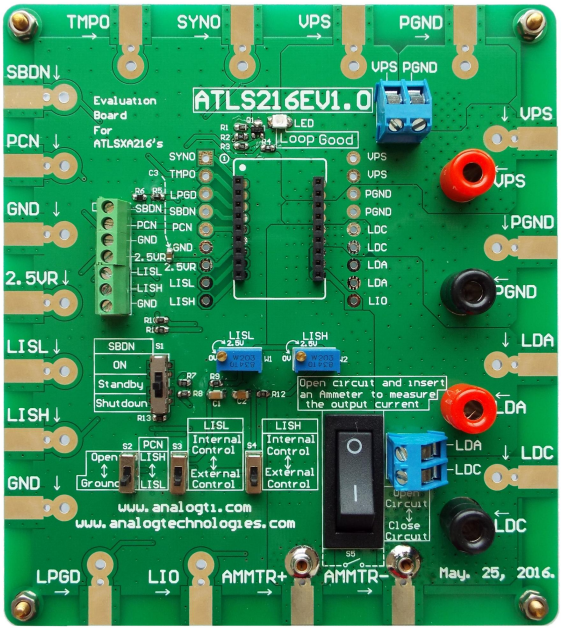


Figure 1. Physical Photo of ATLS216EV1.0

INTRODUCTION

The ATLSXA216D is a series of high efficiency constant current laser drivers for driving one or multiple laser diode arrays. It has high reliability, zero EMI (Electro-Magnetic Interference), and is packed in small DIP package. The laser driver series includes ATLS8A216D and ATLS10A216D.

The evaluation board introduced by this application note, ATLS216EV1.0, is designed for evaluating these laser drivers conveniently.

It is recommended to read this application note with the ATLS8A216D or ATLS10A216D datasheet which provides more detail information about the specifications and application guidelines for the laser drivers.

This evaluation board is shown in Figure 1. On the 4 edges of the board, it features solder pads for all the interface ports provided by the laser driver. The solder pads can be used by clips or soldered with wires for connecting to external circuits. The power supply input is connected on the upper edge of the board. The incoming wires can be soldered on the pads, or clipped by alligator clips, or use the terminal block and tight the wires by the screws. In the upper middle of the board, there is an LED. When the controller works properly, it will be lit up. On the left side of the controller, there is a terminal block. It can be used for connecting wires going into the ports of the laser driver. On the lower side of the laser driver, there are 2 POTs (Potentiometers) for setting the lower and upper values of the set-point current. When the laser driver uses these POTs for setting the current values, push down the 2 switches below the POTs, see Figure 1 and Figure 2; when using external signals to modulate the laser driver output current, leave the 2 switch knobs onto the upper position, as marked on the board. The lower left corner switch is for selection which of the control ports is used for setting the laser driver current: LISL or LISH. The output current can be measured by a current meter, which can be inserted between the 2 multi-meter lead sockets: AMMTR+ and AMMTR−, which is located on the lower edge of the board. When an Ammeter is inserted into the circuit, turn switch S5 onto the upper position, the open circuit the meter leads, so that the current will go through the meter, thus the current will be measured. When the Ammeter is absent, turn the switch S5 down, to short circuit the current meter terminals so that the current will go through the switch to close the circuit.

All the output ports are located on the right side of the board: LDA and LDC. These 2 ports can be used for connecting to a dummy laser diode, a real laser diode, or the dummy laser load assembly. The connections can be made by soldering wires, clipping by alligator clips, or inserting banana plug connector wires into the banana sockets. After making sure the driver works properly and all the features and the set-values meet the requirements of the application, the users can connect a real diode laser onto proper connections of the board. Simultaneously, the user can set and monitor the output current, using LISL/LISH, and LIO pins, and monitor the working status of the driver, using LPGD pin, on the lower side of the board.

On the middle right edge of the board, there is a switch S1, which sets the controller into one of the 3 modes: Shutdown, Standby and Operating. The corresponding positions are: lower, middle and upper, as all marked on the board. ATLSXA216D laser driver is located in the center of the ATLS216EV1.0 Evaluation Board. The voltages of all its pins can be measured directly by probing the testing holes on the left and right sides of the laser driver which are connected directly with the laser driver pins. Some of the pins are also connected to the connectors of the terminal blocks, and/or the soldering pads on the edges of the board. The names of all these nodes are marked on the board.

The silkscreen layer of the evaluation board is shown in Figure 2 with other top layers, including top silkscreen, top copper, top solder mask, and multilayer (vias). Figure 3 shows the image of top silkscreen layer only.

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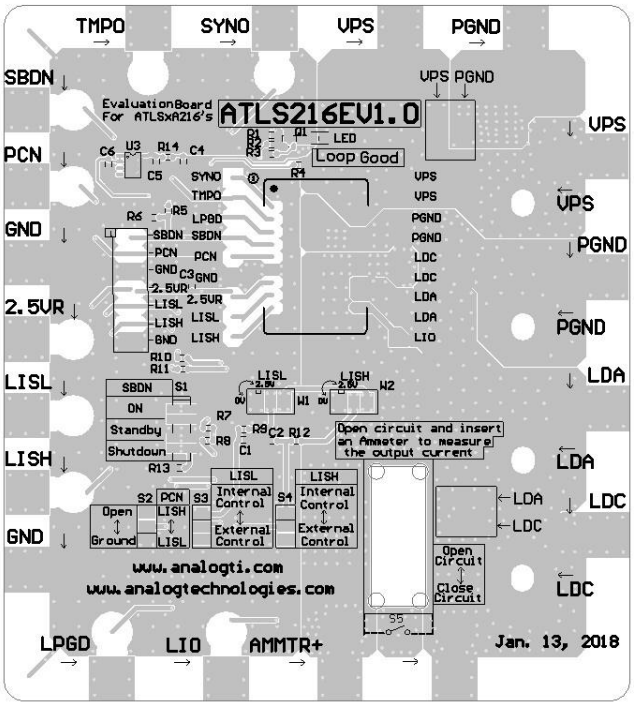


Figure 2. Top Silkscreen Layer with Other Top Layers

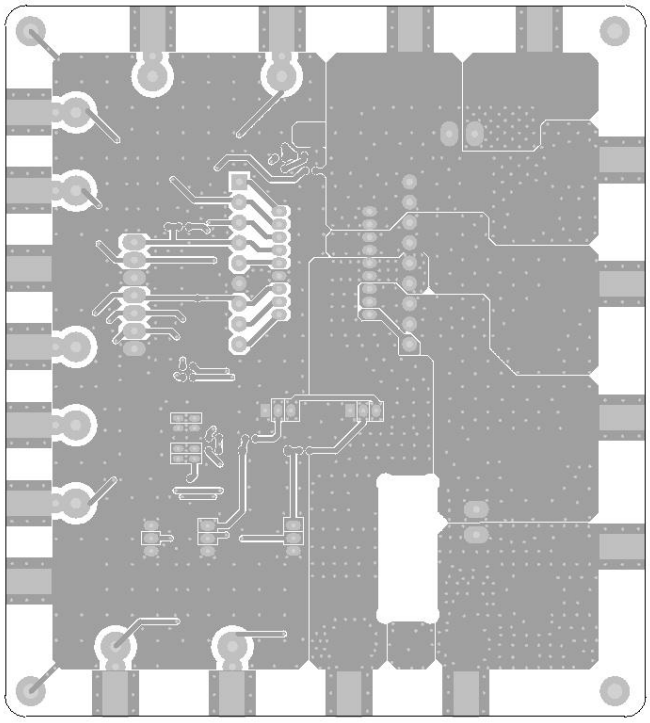


Figure 4. Top Layers without Top Silkscreen Layer

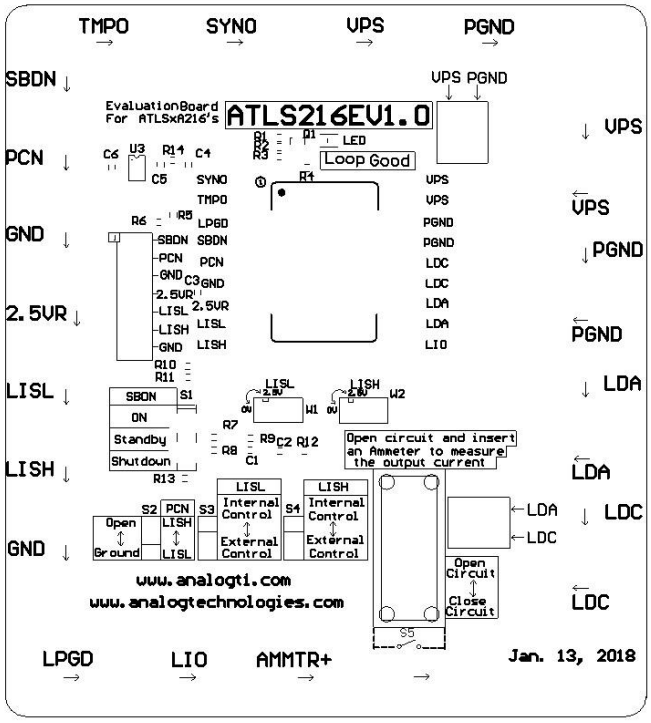


Figure 3. Top Silkscreen

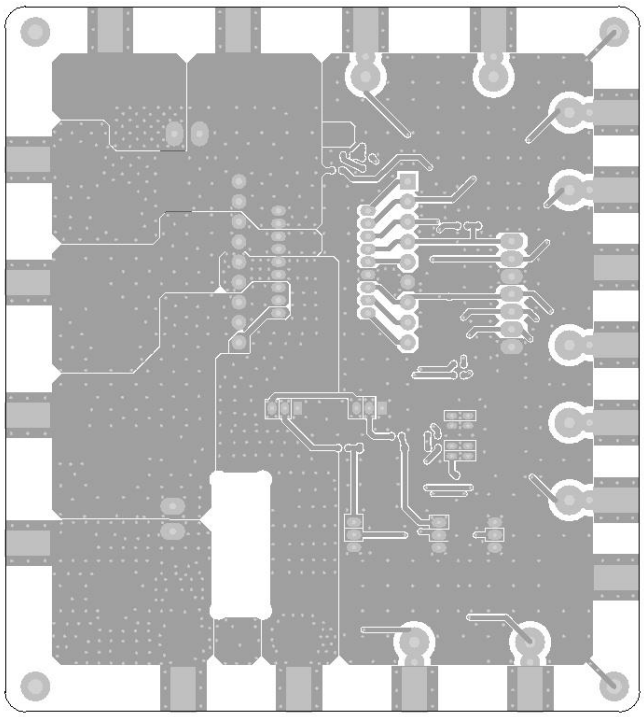


Figure 5. Bottom Layers

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There is no component in the bottom side of the board, so that there is no bottom silkscreen layer image. Figure 4 shows the top layers without the silkscreen layer. Figure 5 shows the bottom layers, including bottom copper, bottom solder mask, and multilayer (vias and holes). Please notice that it is a "see through" image from the top side.

The schematic is shown in Figure 6 below.

Please notice that when the laser driver works well, the LPGD pin goes up, which drives the R1 pin2 high, the voltage is divided by the 2 resistor voltage divider, Q1 base getting this voltage, R3 gets a constant voltage, generate a constant current, which is injected to the emitter pin of Q1. Since the collector current is equal to the emitter current, thus, Q1 outputs a constant current which is independent of the input voltage V_{VPS}. Therefore, the LED, D1, gets a constant current all the time, its brightness remains the same.

The switch S3 and S4 disconnect the POTs on the board when using external sources to modulate the laser driver output currents.

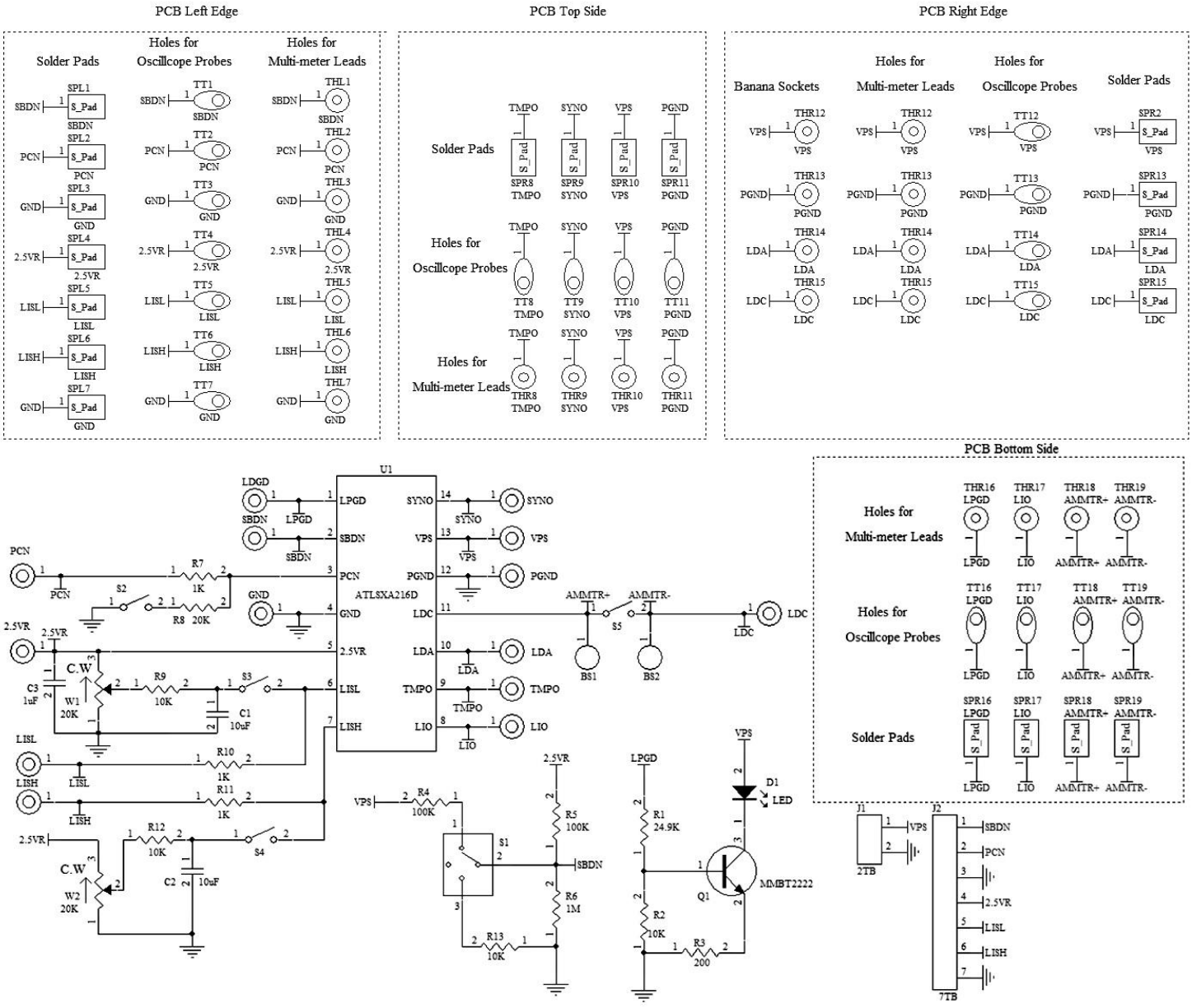


Figure 6. Schematic of Laser Driver ATLSXA216D Evaluation Board ATLS216EV1.0

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GETTING STARTED

1. Hook up the power supply. There are 2 solder pads in the upper right area on the edge for connecting the power supply. The connection can be done by clipping or soldering on the pads, or locking in 2 wires through the terminal block 2TB by tightening the 2 screws, see Figure 1. The power supply can set to between 4.5V and 16V. When using a lower voltage power supply, the power consumption of the driver will get smaller, thus, the driver will be working at higher efficiency. But the voltage has to be at least 1V higher than the laser diode forward voltage value, otherwise, the output current is out of control by the laser driver.
2. Use the dummy laser load assembly, ATLS216DLD1.0, to emulate the laser diodes, to avoid costly losses due to the real laser diode damages caused by any mistakes during the evaluation process. By using the dummy load assembly, the load voltage can be adjusted from 1V to 14V, see the application note about how to use the laser load assembly.
3. Set the switch S1 to Standby position, turn on the power supply. Check the voltage reference. Use a voltmeter to check the voltage reference pin 2.5VR having an accurate 2.5V. Set the LISL and LISH pin voltages by turning the POT W1 and W2, according to the desired output current values.
4. Set the load assembly output voltage by setting the diode switches, the voltage value should be close to the laser diode voltage value.
5. Turn the control switch S1 to on position. The laser driver should output LISL or LISH current, depending on the switch S2 position on the PCN pin input voltage.
6. If using external signals to modulate LISL or LISH, keep switch S3 and S4 to open (upper) position, otherwise, turn these switches to lower position so that the LISL and LISH values are set by the POT W1 and W2.
7. The output current can be monitored real time by using a voltage meter or an oscilloscope to measure the LIO pin voltage. 0.1V to 2.5V indicates the laser current being from 0 to XA linearly, where X is the laser driver's maximum current, it is determined by the laser drive under the evaluation. The relationship between the LIO voltage and the output current is linear:

   I_{OUT} (A) = X (A) × V_{LIO} (V)/2.5 (V),

   where I_{OUT} is the output current in Ampere;

   X is maximum output current of the laser driver, it can be 4A or 6A, depending on the laser driver evaluated.

   V_{LIO} stands for the voltage at the LIO pin.
8. Monitoring the output current directly by using an Ammeter. Switch S5 can be set to the open circuit position (upper) and insert an ammeter to measure the output current. This approach measures the current more directly, but it increases the output load loop inductance and cannot "see" the current waveform, since V_{LIO} voltage can be seen by the oscilloscope. Warning: measuring the output current directly by using an Ammeter is not recommended when a real laser is connected, because of these potential problems:

   A. The Ammeter brings in EMI (Electro-Magnetic Interference) noise.

   B. The Ammeter has voltage drop, which decreases the maximum output voltage and increases the load loop inductance which may cause oscillation and decreases the loop response speed.

   C. If the Ammeter is not connected well or there is an intermittent disconnection, the real laser may be damaged permanently.

   Cautions:

   A. Only insert the Ammeter or adjust the S5 position when the laser driver is set to Standby or Off mode. In other words, do not insert the Ammeter or change the S5 position when the laser driver is working.

   B. Connected the Ammeter's high current value port, such as 10A or 20A. The high current port is usually between a Common socket and a dedicated output socket marked as 10A or 20A. Do not connect the Ammeter's automatic range port.
9. Monitor the output voltage. This can be done by measuring the voltage between LDA and ground with a volt meter. This node is available at the edge pad on the right side of the evaluation board.
10. Loop good indication. When the driver works properly, i.e., the output current equals the set-point current set by LISL or LISH pin, the LED on the top of the board will be lit up.
11. After making sure that the laser driver on the evaluation board works properly, a real laser can be used to replace the dummy laser load assembly. It can be connected by using wires and solder the wires onto the LDA and LDC solder pads on the right side of the board.

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MECHANICAL DIMENSIONS

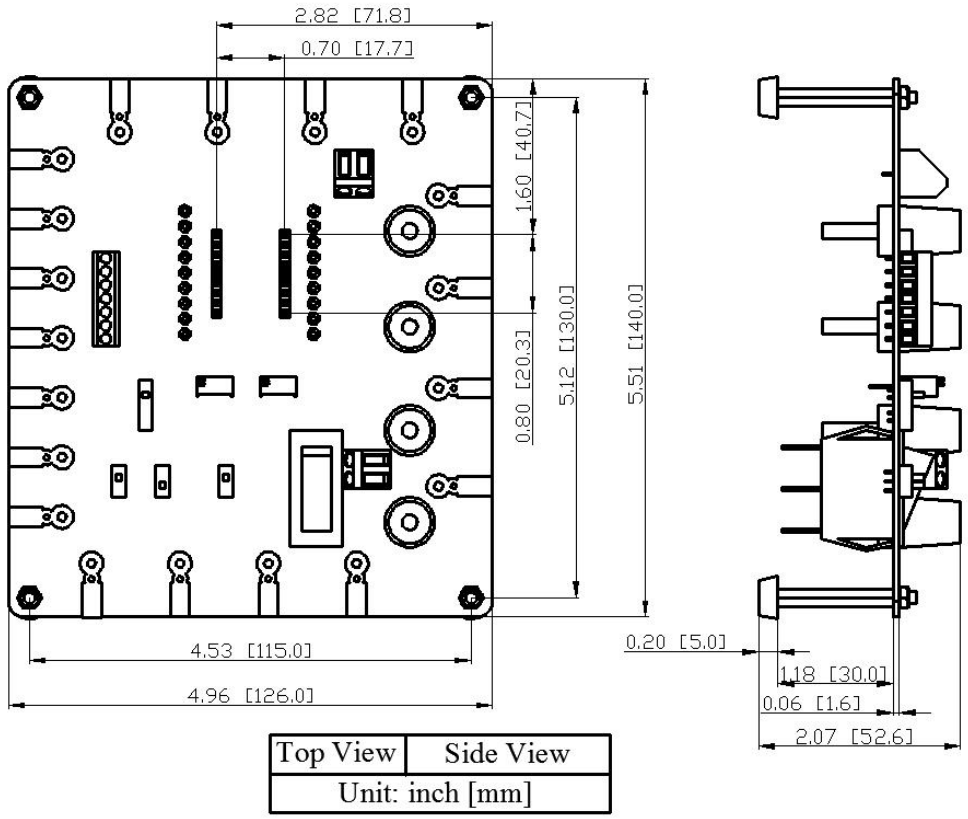


Figure 7. Mechanical Dimensions

ORDERING INFORMATION

Part #	Description	1 – 4	5-9	≥10
ATLS216EV1.0	Evaluation board for laser driver ATLS8A216D or ATLS10A216D.	$25.0	$21.0	$15.0

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