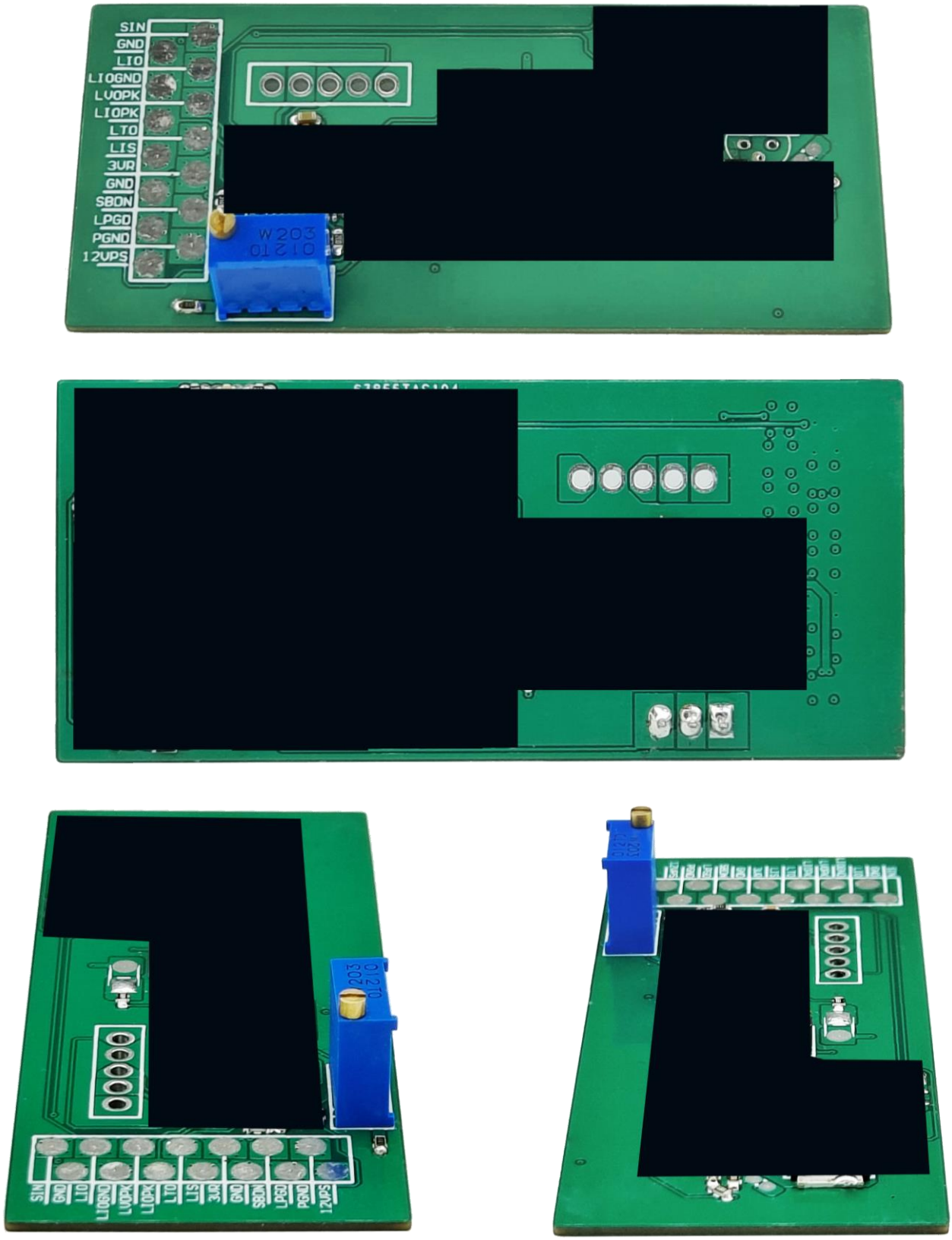

Figure 1. Physical Photo of ATLP10N30A301

FEATURES

- Single Power Supply Requirement: The device is designed to operate with just one 12V2A power supply, which makes it incredibly user-friendly and easy to set up.
- On-Board High Voltage Generation: The device generates the laser drive high voltage by itself, eliminating the need for an external high voltage power supply and significantly simplifying the system design.
- Adjustable Peak Output Current: Users can set the output current peak value linearly from 1A to 30A, giving them the ability to tailor the laser to their specific desired output power.
- Self-Adopting Algorithm for Pre-setting Output Voltage: Before receiving the trigger signal, this driver employs a self-adopting algorithm to pre-set the laser drive voltage according to the laser current desired, ensuring accurate and repeatable output current pulses.
- Laser Current Real-Time Monitoring: The device provides a real-time laser current monitor signal, enabling users to monitor the laser's actual current in real-time and make necessary adjustments for optimal performance. The algorithm takes the changes of ambient and laser temperatures into account.
- Laser Current Peak Value Indication: The device indicates the peak value of the laser current, which enables users to ensure that the laser is operating safely and within safe limits.
- Over-Temperature Protection: The device features over-temperature protection to prevent damage to the components and system in case of high temperatures, ensuring the longevity of the device and the safety of the user.

APPLICATIONS

- Material Processing
- Medical Procedures
- Scientific Research
- Laser Range Finding
- Fiber Optic Temperature Sensing

DESCRIPTION

This Pulse Mode Laser Driver, ATLP10N30A301, generates a 10ns pulse current of up to 30A. It is designed to drive a laser diode to generate a laser beam pulse down to 10 nanoseconds (10^{-9} seconds) or less, with an adjustable pulse current up to 30A. It is capable to output a pulse voltage up to 30V, thus peak electric output power is 900W. At this high peak power, the maximum repeating rate can be as high as 100kHz, making it a one of the best pulse mode laser driver on the market.

OPERATION PRINCIPLE

The pulse mode laser driver turns a high current switch on for a short time to apply a constant high voltage across the laser diode to generate a short pulse current. Because the time is short, usually in nano or tenth of nano seconds, the current can be as high as tens or hundreds of amps, while the average output power is really low, tenth or hundreds of miliwatt, usually no heat-sink is needed.

Since the pulse is so short, there is no way to have a close-loop control of the high voltage applied to the laser diode during the on period when the switch is turned on, regulating the high voltage is done at a much lower speed, therefore, the output value in the control loop is by using the peak value of the output current, as opposed to the real-time actual output current. The changing speed on the desired peak current is usual slow, the close-loop control for following the desired peak value can be implemented by either a pure analog circuit or a digital software based control loop. ATLP10N30A301 uses the latter.

For pure analog control loop based drivers, the first a few pulses may not have set the correct high voltage

before receiving the trigger signal, thus, the first a few, usually tens or hundreds of pulses sent to the laser diode do not have the current values.

For digital loop based pulse laser drivers, they can preset the value of the high voltage for driving the laser diode according to the current setting value, even before receiving the trigger signal. Thus, the laser driver can drive the laser with the correct peak value for all the current pulses generated. ATLP10N30A301 is the only pulse mode laser driver on the market having this advantage.

SPECIFICATIONS

Table 1. Pin Function Descriptions

Pin #	Name	Type	Description
1	SIN	Digital Input	Pulse trigger pin.
2	GND	Signal Ground	Pulse trigger ground pin.
3	LIO	Digital Output	Laser current output indication.
4	LIOGND	LIO Ground	Peak current output ground pin.
5	LVOPK	Analog Output	Output voltage pin.
6	LIOPK	Analog Output	Laser peak current output indication. 0.1V to 3V indicates the laser current of from 1A to 30A linearly.
7	LTO	Analog Output	Laser current good, control loop indication. When this pin is stabilized and the value is between 1V and 2.4V, the output voltage to the laser, Pin 9 LDA, will be 4.5V to 0V linearly, the laser current is stabilized, and the control loop is stable.
8	LIS	Analog Input	Laser peak current set-point voltage. Setting it from 0.1V to 3V will set the laser peak current from 1A to 30A linearly.
9	3VR	Analog Input	Reference voltage. It can source 3mA max, with 13μV_{P-P} noise @0.1 to 10Hz and 20ppm/°C stability max.
10	GND	Ground	Signal ground pin.
11	SBDN	Digital Input	Shut down control pin. SHUT DOWN: 0V < V_{SBDN} < 1V, the controller is set to non-working state. STANDBY: 1V < V_{SBDN} < 2V, all components are set to working state. OPERATION: 2.1V < V_{SBDN} < 3V,the whole controller is set to working state.
12	LPGD	Power Input	Laser diode good. When this pin is high, >5V, the control loop is working properly. When this pin is low, <0.3V, the laser diode is bad, or there is a short or open circuit at the laser diode.
13	PGND	Power Ground	Power ground pin. Connect this pin directly to power supply return pass.
14	VPS	Power Input	Power supply voltage pin. The driver will work from VPS = 11V to 13 V.

Table 2. Characteristics. T_A = 25°C, unless otherwise noted.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit/Note
Input Voltage	V_{IN}		11		13	V
Input Current	I_{IN}		20		2000	mA
Input Trigger Logic Low Threshold	V_{THL}		0.8			V
Input Trigger Logic High Threshold	V_{THH}				1.8	V
Input Trigger DC Current					1	nA
Input Trigger Maximum Voltage				10		V
Output Peak Current	I_{OUT_Peak}		1		30	A
Output Peak Voltage	V_{OUT_Peak}		0		30	V
Output Pulse Width			10		1000	ns
Pulse Rate	f				100	kHz
Output Current Setting Voltage Range on LIS Pin	V_{LIS}		0.1		3	V
Output Current Setting LIS Pin Input Equivalent Resistor	R_{SET}			100		kΩ
Output Current Indication LIO	V_{LIO}	I_{OUT} = 0~30A	0		3	V
Output Current Peak Value Indication		I_{OUT_Peak} = 0~30A	0		3	V
Shutdown Logic Low	$V_{SBDNSDL}$		0			V
Shutdown Logic High	$V_{SBDNSDH}$				1	V
Standby Logic Low	$V_{SBDNSBL}$		1			V
Standby Logic High	$V_{SBDNSBH}$				2	V
Operation Logic Low	$V_{SBDNOPL}$		2.1			V
Operation Logic High	$V_{SBDNOPH}$				3	V
Voltage Reference	V_{REF}		2.995	3	3.005	V
Voltage Reference Output Current Range	I_{REF}			±10		mA
Pulse Trigger Voltage	V_{PT}			5		V
Trigger Point			Rising-Edge			

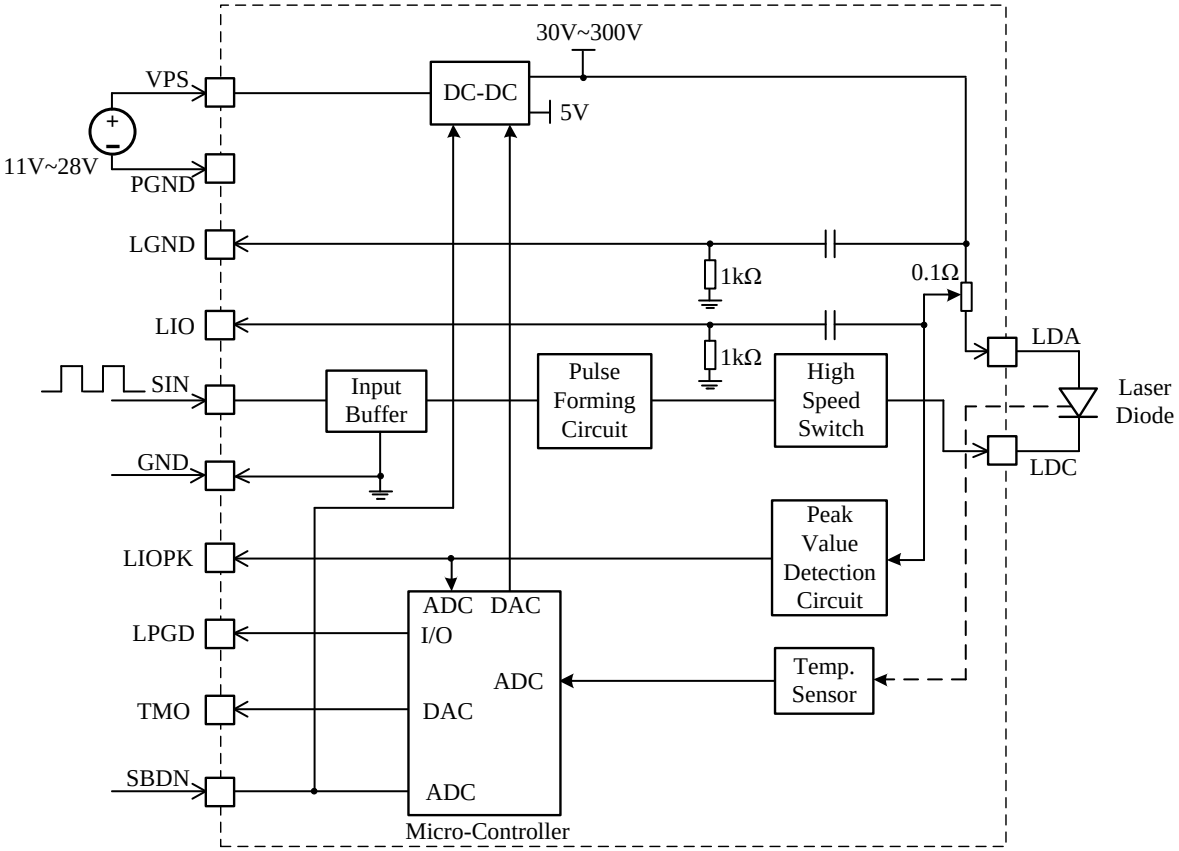

Figure 2. Block Diagram

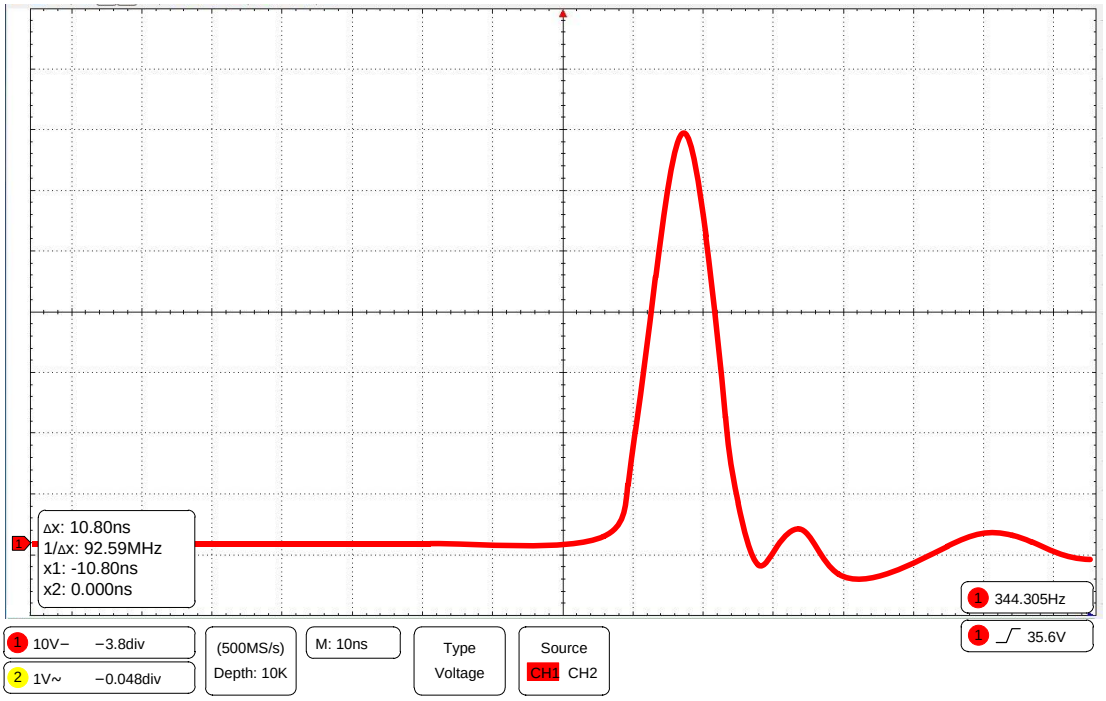

Figure 3. LDA-LDC Waveform

NAMING PRINCIPLE

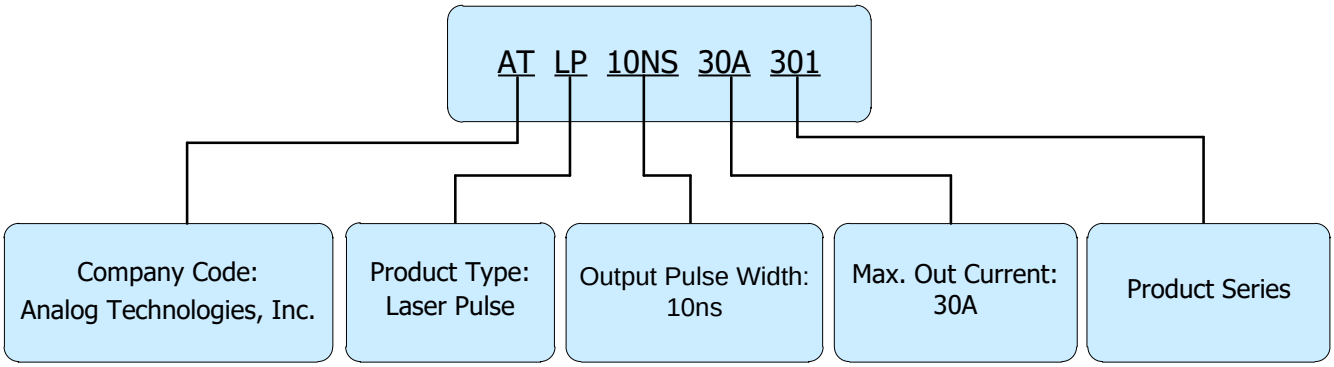

Figure 4. Naming Convention of ATLP10N30A301

DIMENSIONS

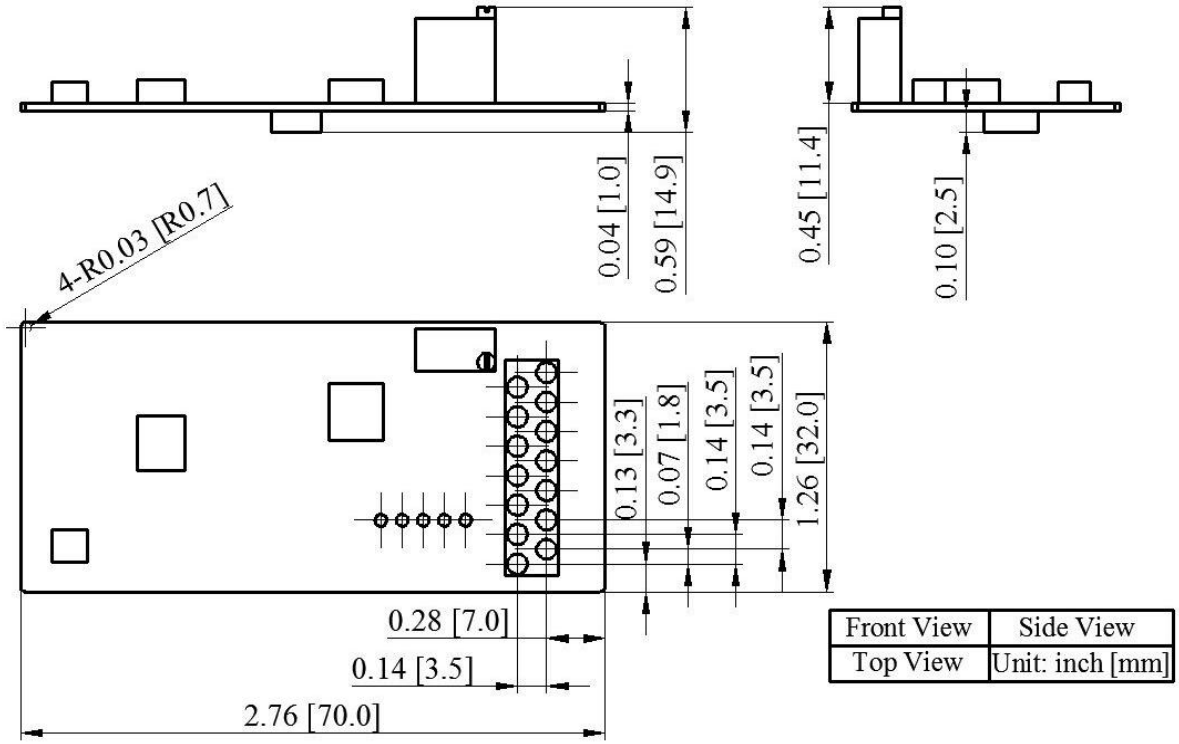

Figure 5. Outline Dimensions

ORDERING INFORMATION

Part Number	Buy Now
ATLP10N30A301	

NOTICE

1. It is important to carefully read and follow the warnings, cautions, and product-specific notes provided with electronic components. These instructions are designed to ensure the safe and proper use of the component and to prevent damage to the component or surrounding equipment. Failure to follow these instructions could result in malfunction or failure of the component, damage to surrounding equipment, or even injury or harm to individuals. Always take the necessary precautions and seek professional assistance if unsure about proper use or handling of electronic components.
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