



High Efficiency AC input 40A 6V Laser Driver

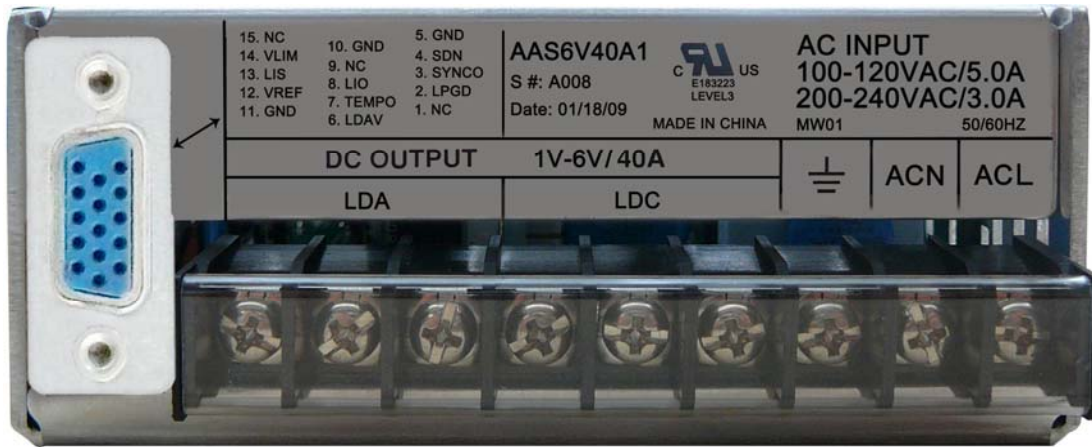


Figure 1. Front View Photo of the AAS6V40A1



Figure 2. Top View Photo of the AAS6V40A1

**FEATURES**

High Efficiency:  $\geq 86\%$

Low Temperature Rise:  $35^{\circ}\text{C}$

No Cooling Fan Required

Maximum Output Current: 40A

Current Accuracy:  $\pm 1\%$

Wide Input Voltage: 88VAC ~ 132VAC &  
176VAC ~ 264VAC

Wide Output Voltage: 1V ~ 6V

Configurable Output Current and Maximum Output Voltage

Short Circuit Protection

Over-current Protection

Over-temperature Protection

Operating Temperature:  $-20^{\circ}\text{C} \sim 50^{\circ}\text{C}$

Low Cost



#### APPLICATIONS

Driving diode lasers with low noise and high stability, including fiber lasers, diode laser bars, etc.

#### DESCRIPTION

The AAS6V40A1 is an electronic module designed for driving diode lasers with up to 40A low noise current. The output current can be set by an analog voltage of 0 to 5V, or a potentiometer, to between 0 and 40A.

Figure 1 and 2 show photos of the AAS6V40A1.

The input voltage range can be selected to one of these 2 ranges by a mechanical switch: 88VAC to 132VAC or 176VAC to 264VAC, the frequency can be from 47Hz to 63Hz.

A high stability low noise 5V reference voltage is provided internally for setting the output current and maximum output voltage. This reference can also be used as the voltage reference for external ADCs (Analog to Digital Converters) and DACs (Digital to Analog Converters), which might be used for monitoring and/or setting the laser current and maximum output voltage, the so-called compliance voltage.

This laser driver module is highly efficiency, its efficiency is > 86% efficiency. It saves energy and has low temperature

rise. The module also conducts all its heat to its external chases which serves as the heat-sink and heat conducting plate, therefore, no cooling fan is needed. Thus, there are no problems usually associated with the fan: noise, air turbulence, limited life time, etc. Mounting the module on a larger metal plate would reduce its temperature rise. Leaving the module on a free air environment is also ok.

There is an over-temperature protection circuit, in case the module's temperature gets too high, the circuit will reduce the output current and the module will be working under constant temperature mode.

There is a soft-start and soft-cut circuit in the module, which gives smooth current transactions during power-up and power-down periods.

In case there is a short-circuit at the output, the internal protection circuit will cut off the output.

The output voltage is automatically set from 1V to 6V while keeping the output current at a pre-set value.

The control loop is monitored in real time by an internal circuit, to make sure that it works properly. The monitoring result is sent to the LPGD node. When this pin is pulled up internally, it indicates that the loop works fine.

#### SPECIFICATIONS

Table 1 Characteristics ( $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Efficiency	$\eta$	$V_{IN} = 110\text{V AC}, V_{OUT} = 6\text{V}, I_{OUT} = 40\text{A}$	--	86	--	%
Output Current	$I_{out}$		0	Adjustable	40	A
Current Accuracy	$\Delta_I$	$-20^\circ\text{C} \sim 50^\circ\text{C}$		$\pm 1$		%
Input Voltage	$V_{in}$		88	110	132	VAC
			176	220	264	VAC
Input Frequency	$f$		47	50	63	Hz
Output Voltage	$V_{out}$		1	Adjustable	6	V
Operating Temperature	$T_A$		-20	25	50	$^\circ\text{C}$



MECHANICAL DIMENSIONS

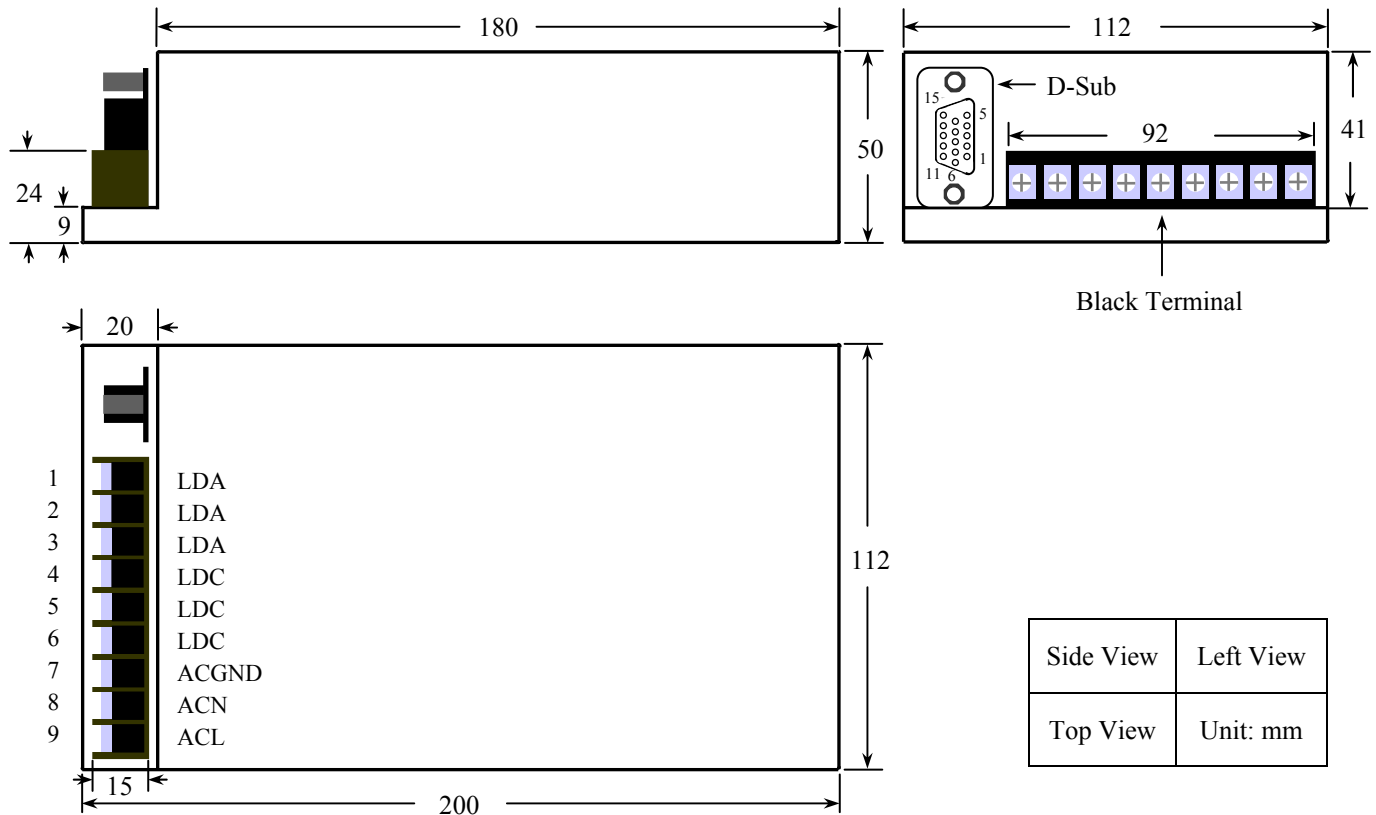


Figure 3. Pin Names and Locations

TERMINAL DESCRIPTIONS

Table 2 Terminal introduction

#	Name	Meaning	Type	Description	
Black terminal	1, 2, 3	LDA	Laser diode anode	Power output	Connect it to the anode of the laser diode.
	4, 5, 6	LDC	Laser diode cathode	Power output	Connect it to the cathode of the laser diode.
	7	ACGND	AC ground	AC ground	Connect it to AC ground.
	8	ACN	Neutral wire	AC input	Connect it to AC power supply.
	9	ACL	Live wire	AC input	Connect it to AC power supply.
D-Sub	1, 9, 15	NC	No connection	Float	These pins are float.
	2	LPGD	Loop good indication	Digital output	0V to 5V indicates the laser current of from 0A to 40A linearly.
	3	SYNCO	Synchronization output	Digital output	This pin can be used as a clock signal for synchronizing other switch mode electronics.
	4	SDN	Shut-down	Analog/Digital Input	Negative logic. It is internally pulled up by a 100K resistor to 5V, 50μA.
	5, 10, 11	GND	Ground	Signal ground	Connect ADC and DAC grounds to here.
	6	LDAV	Laser diode anode output voltages	Analog output	Laser diode anode output voltages.
	7	TEMPO	Driver temperature indication output	Analog output	Operating internally temperature.



8	LIO	Laser current indication output	Analog output	An output voltage of 0 to 5V at this pin indicates the output current being 0 to 40A linearly.
12	VREF	Reference voltage	Analog output	5V reference voltage. To be used for setting the output current and the output voltage limit. It can also be used by external ADCs and DACs if they are used for monitoring and/or setting the output parameters.
13	LIS	Laser current set	Analog input	0V to 5V sets the output current from 0 to 40A linearly. This pin can be set by an external analog signal source, such as the output of a closed-looped op-amp, POT, or DAC.
14	VLIM	Laser voltage limit set	Analog input	0V to 5V sets the laser output voltage from 0 to 6V linearly.

**APPLICATION INFORMATION**

Figure 4 shows a typical application circuit.

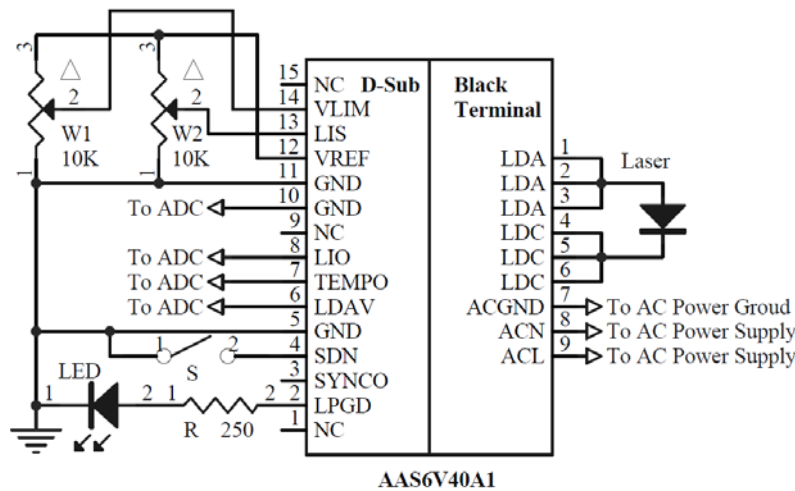


Figure 4. A Typical Application Schematic

The maximum output voltage can be set by the W1 in the schematic shown in Figure 4, output current can be set by the potentiometer W2. When VLIM voltage changes from 0V to 5V, the maximum output voltage is set to 1V to 6V linearly. The relationship is:

$$V_{max} = VLIM + 1 (V)$$

The output current formula is:

$$I_{OUT} = 8 \times LIS (A)$$

VREF pin can be used as a 5V power supply, the maximum output current is 20mA.

LIO pin indicates the output current:

$$\text{Output current} = 8 \times LIS (A)$$

The module's temperature equation is:

$$\text{Temperature} = 36 \times TEMPO - 40 (^\circ C)$$

When the TEMPO voltage changes from 0 to 5V, the temperature indicated is -40 °C to 140°C.

SYNCO provides pulses for synchronizing other switch-mode power supplies. The frequency is about 100KHz and the duty cycle is about 50%.

The shut-down pin, SDN, is used for shutting down the power supply. The logic threshold voltage is about 2V. When this pin is pulled down, the laser drivers shuts down. There is a 100K pull-up resistor tied to a 5V power supply internally. Leaving this pin unconnected or driving it to above the 2V threshold voltage will enable the laser driver.

The LPGD pin indicates the laser drivers works properly under constant current mode when this pin is pulled high. It can be used for driving an LED directly and the maximum output current is 5mA.

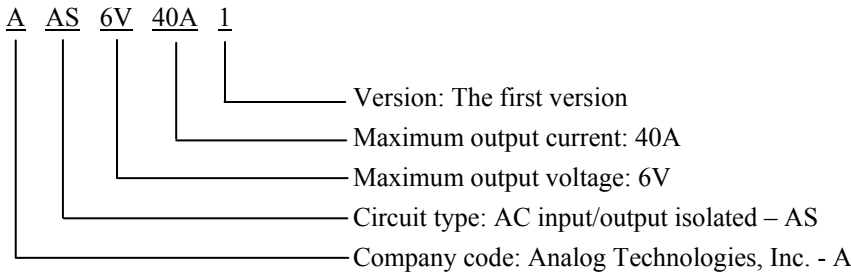
**Warning Note**

1. Please take the anti-static measures, such as wrist straps, when handling the module so as not to damage the module.
2. Always connect the module's AC input with a proper cable in series with a switch and a plug, do not use



- stripped wires as the plug for connecting to the AC main socket. Make sure that the cable wires are firmly tighten by screw drivers onto the terminals to have reliable connections.
- When making modifications on the connections, always turn off the power first.
- Make sure that the polarity of the laser diode matches the polarity of the power supply's output.
- Carefully and patiently check the application circuit. When you sure it is absolutely correct, you can turn on power supply. When the LED indicator light is lit up, it indicates that control loop is already stable.
- To be on the safe side, we recommend using a dummy laser diode to replace the real laser diode first. The dummy diode can be composed of a serial of 2 to 3 regular high current diodes, such as 10A to 20A, and immerse the diodes into a cup of water. Use oscilloscope to look at the output waveform for checking the soft-start and soft-cut circuit. The output current can be measured by measuring the voltage across a low resistance value current sense resistor inserted into the circuit, and maximum output voltage can be measured by a volt meter by adjusting its value while keeping the output circuit open.

### NAMING



### ORDERING INFORMATION

Quantity (pcs)	1 – 9	10 – 49	50 – 249	250 – 499	500 – 999	≥1000
AAS6V40A1	\$228	\$198	\$178	\$158	\$138	\$118

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