Pololu MP6500 Motor Driver
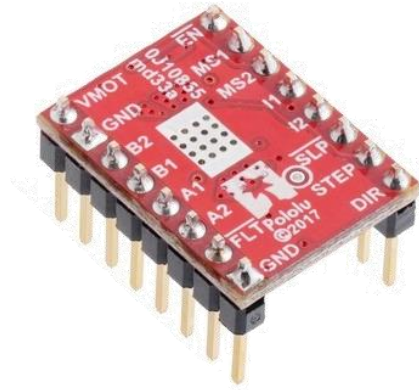
Specs

Motor Voltage: 2.5-35V
Logic Voltage: 2.1-6V
Current Limiting: 0-2A
Micro-stepping: Full – 1/8th step

Basic Operation

To use this motor driver, you will need a stepper motor, a DC power supply, and a PWM signal. If you are using a microcontroller (or Arduino), recognize that neither of these can supply enough current to run a stepper motor, and you will need an additional power source.

A stepper motor has a set number of "steps" per full rotation. A common motor has 200 steps per rotation. Therefore, each step is 1/200th of a full rotation. When more precision is needed, micro-stepping can be used, where a stepper motor will move by 1/2th, 1/4th, or 1/8th of a step (1/400th, 1/800th, or 1/1600th of a full rotation) instead of a full step.

The motor speed is proportional to the frequency of the signal on the STEP pin. The motor will make one "step" for every "high" pulse it receives. When using a PWM signal on the STEP pin, set the duty cycle to 50% and vary the frequency of the signal to control the motor speed. For example, if the frequency of the PWM is 200Hz and your motor has 200 steps per rotation, then the motor will move 1 step every 1/200th of a second, or 1 full revolution per second (with micro-stepping, the motor will take 1/2th, 1/4th, or 1/8th of a step as explained above per pulse, and will completely rotate every 2, 4, and 8 seconds respectively).

Wiring Diagram
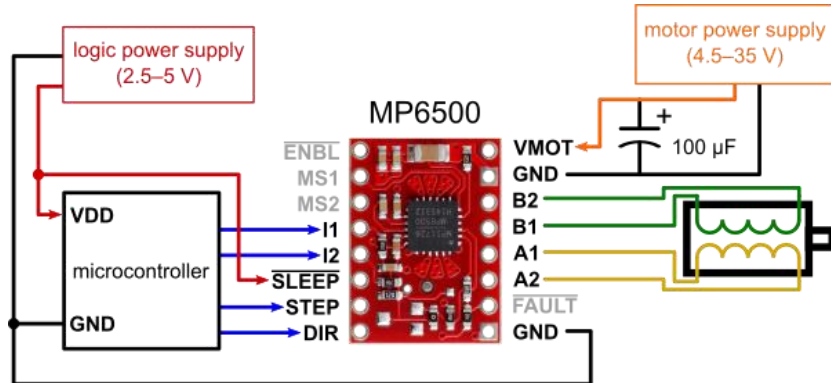
Micro-stepping

To select the step size, wire MS1 and MS2 according to the following table.

MS1	MS2	Microstep Resolution
Low	Low	Full step
High	Low	Half (1/2) step
Low	High	Quarter (1/4) step
High	High	Eighth (1/8) step

Current Regulation
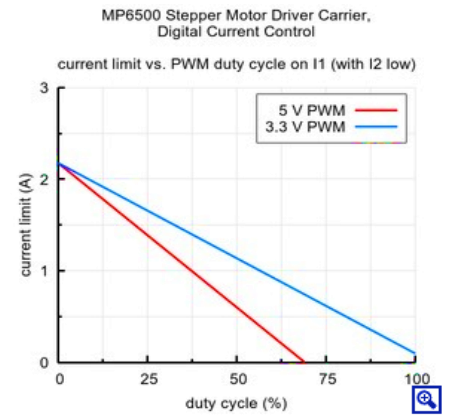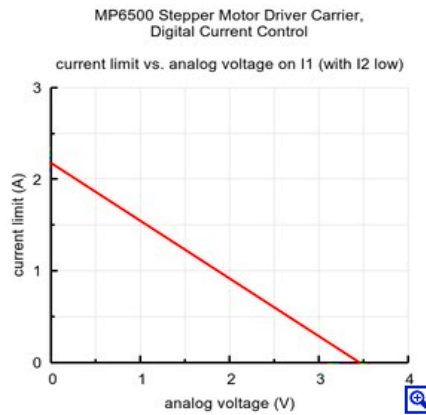
Do not exceed the current limit of your motor. Wire I1 and I2 according to the following table.

I1	I2	Current Limit
Z	Z	0.5 A
Low	Z	1 A
Z	Low	1.5 A
Low	Low	2 A

('Z' represents an unconnected pin)

For more precise current control, connect I2 to ground, and connect I1 to an analog or PWM signal, as indicated below.

$$A_{limit} = 2.2A - 0.63\frac{A}{V} \times (voltage\ on\ I1)$$

MP6500 Stepper Motor Driver Carrier, Digital Current Control

current limit vs. analog voltage on I1 (with I2 low)

MP6500 Stepper Motor Driver Carrier, Digital Current Control

current limit vs. PWM duty cycle on I1 (with I2 low)

Tips and Tricks

- There are some driving frequencies (in full step mode) where these driver/motor combinations experience jitter and the motor will perform erratically.

Model Number: SY42STH38	
Current	Jitter Range
1 A	180-220 Hz
1.5 A	120-130, 215-260 Hz
2 A	250-270 Hz

Model Number: 17HS19	
Current	Jitter Range
1 A	none
1.5 A	155-185
2 A	180-220

- When you solder the pins to the board, do so with the pins oriented as shown on the previous page, so you can see the labels.
- Stepper motors can only ramp up so quickly. While the 17HS19 can only reach about 400 rpm from rest, it can reach almost double that speed by ramping up slowly.
- Slightly higher speeds can be reached while using a smaller step size, albeit while sacrificing torque.
- If you do everything according to this guide and the stepper motor will not respond at all, it is likely that your MP6500 motor driver board is fried. Bring to the PSC to test.

MP6500 Carrier Board

The PSC also provides carrier boards for the MP6500 stepper motor driver. These carrier boards make it easier to use the motor driver and help protect it.

- To use, insert the red driver board. Make sure that the markings on the driver board pins align with the markings on the carrier board
- Now use four jumpers on the pins in the blue box to control micro-stepping and current regulation, as shown in the tables above. The middle pins are connected to the control pins, the left pins are ground pins, and the right pins (for MS1 and MS2) are high (+5V). If "Low", connect middle pin to the pin on left, if "High" connect to pin on the right. If "Z", remove jumper completely
- Connect motor, power supply, PWM and GND as shown
- A high or low signal to the DIR pin will change motor direction
- A high signal to the $\overline{EN}$ pin will disable the motor
- Note: The carrier board uses 2 voltage divider resistors to step down the supplied input voltage to the pin labeled "5V" used with the MS1/2 jumpers. To keep the voltage on this pin between the specified 2.1-6V, you must keep the supplied input voltage to the carrier board between 7-18V.

For more information, come to the Project Support Center or visit the Pololu webpage.