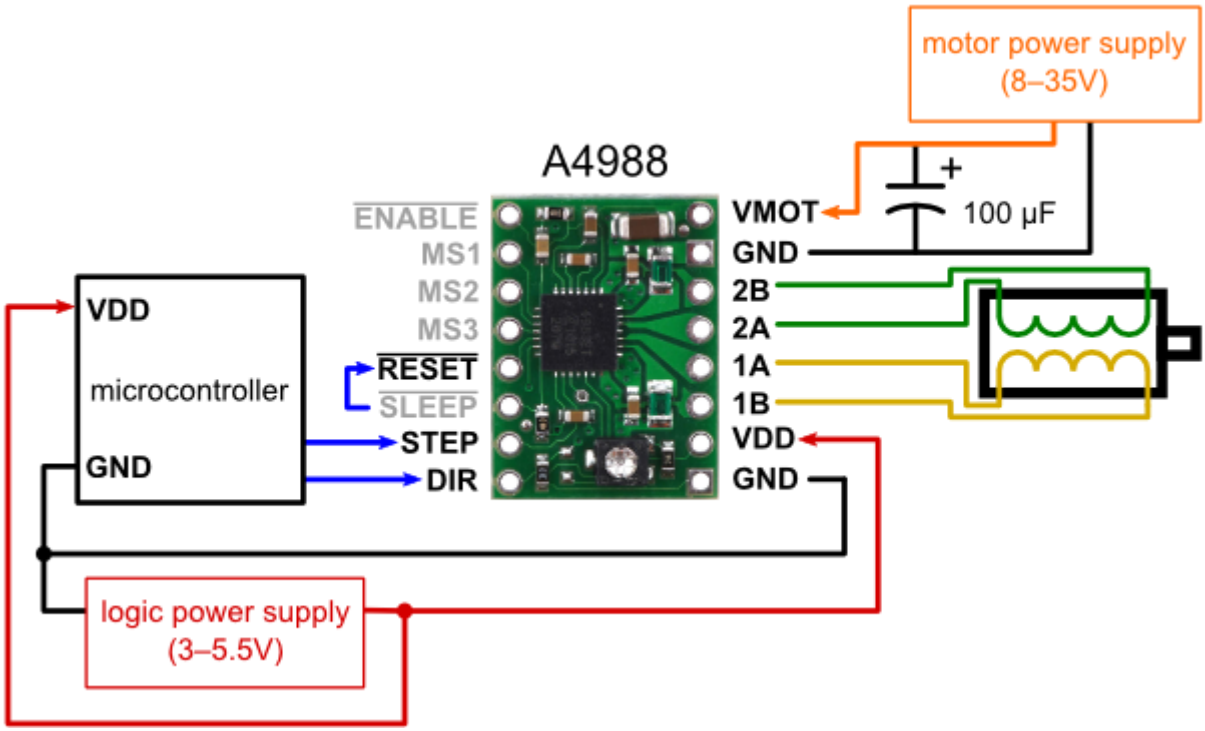

Minimal wiring diagram for connecting a microcontroller to an A4988 stepper motor driver carrier (full-step mode).

Power connections

The driver requires a logic supply voltage (3 – 5.5 V) to be connected across the VDD and GND pins and a motor supply voltage (8 – 35 V) to be connected across VMOT and GND. These supplies should have appropriate decoupling capacitors close to the board, and they should be capable of delivering the expected currents (peaks up to 4 A for the motor supply).

> **Warning:** This carrier board uses low-ESR ceramic capacitors, which makes it susceptible to destructive **LC voltage spikes**, especially when using power leads longer than a few inches. Under the right conditions, these spikes can exceed the 35 V maximum voltage rating for the A4988 and permanently damage the board, even when the motor supply voltage is as low as 12 V. One way to protect the driver from such spikes is to put a large (at least 47 µF) electrolytic capacitor across motor power (VMOT) and ground somewhere close to the board.

Motor connections

Four, six, and eight-wire stepper motors can be driven by the A4988 if they are properly connected; a **FAQ answer** explains the proper wirings in detail.

> **Warning:** Connecting or disconnecting a stepper motor while the driver is powered can destroy the driver. (More generally, rewiring anything while it is powered is asking for trouble.)

Step (and microstep) size

Stepper motors typically have a step size specification (e.g. 1.8° or 200 steps per revolution), which applies to full steps. A microstepping driver such as the A4988 allows higher resolutions by allowing intermediate step locations, which are achieved by energizing the coils with intermediate current levels. For instance, driving a motor in quarter-step mode will give the 200-step-per-revolution motor 800 microsteps per revolution by using four different current levels.

The resolution (step size) selector inputs (MS1, MS2, and MS3) enable selection from the five step resolutions according to the table below. MS1 and MS3 have internal 100kΩ pull-down resistors and MS2 has an internal 50kΩ pull-down resistor, so leaving these three microstep selection pins disconnected results in full-step mode. For the microstep modes to function correctly, the current limit must be set low enough (see below) so that current limiting gets engaged. Otherwise, the intermediate current levels will not be correctly maintained, and the motor will skip microsteps.

MS1	MS2	MS3	Microstep Resolution
Low	Low	Low	Full step
High	Low	Low	Half step
Low	High	Low	Quarter step
High	High	Low	Eighth step
High	High	High	Sixteenth step

Control inputs

Each pulse to the STEP input corresponds to one microstep of the stepper motor in the direction selected by the DIR pin. Note that the STEP and DIR pins are not pulled to any particular voltage internally, so you should not leave either of these pins floating in your application. If you just want rotation in a single direction, you can tie DIR directly to VCC or GND. The chip has three different inputs for controlling its many power states: $\overline{\text{RST}}$, $\overline{\text{SLP}}$, and $\overline{\text{EN}}$. For details about these power states, see the datasheet. Please note that the $\overline{\text{RST}}$ pin is floating; if you are not using the pin, you can connect it to the adjacent $\overline{\text{SLP}}$ pin on the PCB to bring it high and enable the board.

Current limiting