

# ACM ARDUINO CNC GRBL SHIELD KIT

## Product Description

The Arduino CNC Shield makes it easy to get your CNC projects up and running in a few hours. It uses open source firmware on Arduino to control 4 stepper motors using 4 A4988 Stepper drivers,, with this shield and the Arduino you can build all kinds of robotics or CNC projects including CNC routers, laser cutters and even pick place machines.

## Features

- GRBL 0.8c compatible. (Open source firmware that runs on an Arduino UNO that turns G-code commands into stepper signals (<https://github.com/grbl/grbl>)
- 4-Axis support (X, Y, Z , A-Can duplicate X,Y,Z or do a full 4th axis with custom firmware using pins D12 and D13)
- 2 x End stops for each axis (6 in total)
- Spindle, Coolant enable and direction
- Uses removable Pololu A4988 compatible stepper drivers. (A4988, DRV8825 and others)
- Jumpers to set the Micro-Stepping for the stepper drivers. (Some drivers like the DRV8825 can do up to 1/32 micro-stepping )
- Compact design.
- Stepper Motors can be connected with 4 pin Molex connectors.
- Runs on 12-36V DC. (At the moment only the Pololu DRV8825 drivers can handle up to 36V so please consider the operation voltage when powering the board.)

This is a kit that requires you to solder all components on the board

## BOM

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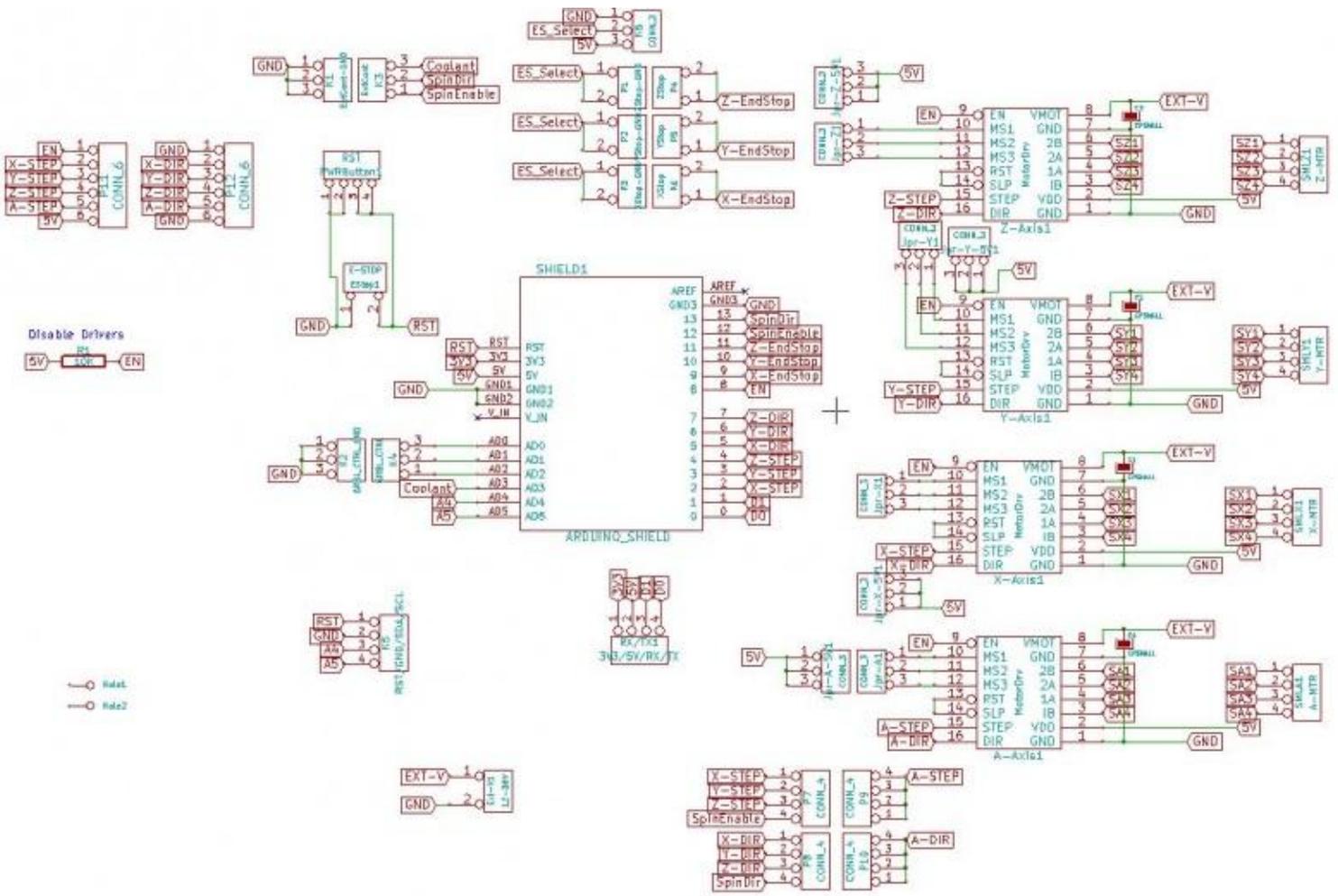
- Arduino CNC Shield PCB
- 100uF 50v 8mm High Capacitors (493-3289-ND)
- Jumpers (A26228-ND)
- 8-Pin Female Headers(S7006-ND)
- Male Headers(A26514-40-ND)
- Tactile Switch (450-1650-ND)
- Screw Terminal 5mm (A97996-ND)
- Pololu Stepper Drivers . (Please note that the shield was designed to work with A4988 Pololu compatible drivers)
- 10K pull-up resistors

## Schematic

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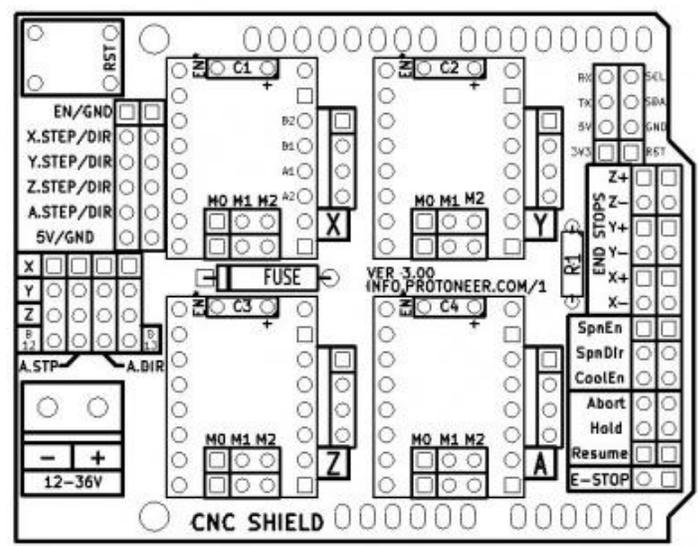
## Board Layout

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- Reset/Abort\* A0
- Feed Hold\* A1
- Cycle Start/Resume\* A2
- Coolant Enable (not used/reserved) A3
- (not used/reserved) A4
- (not used/reserved) A5

- Spindle Direction
- Spindle Enable
- Limit Z-Axis\*
- Limit Y-Axis\*
- Limit X-Axis\*
- Stepper Enable/Disable
- Direction Z-Axis
- Direction Y-Axis
- Direction X-Axis
- Step Pulse Z-Axis
- Step Pulse Y-Axis
- Step Pulse X-Axis



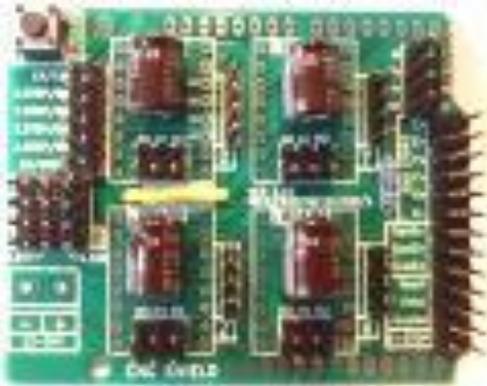
\* - Indicates input pins. Held high with internal pull-up resistors.

GRBL is opensource software that runs on an Arduino Uno that takes G-Code commands via Serial and turns the commands into motor signals.

The GRBL source Code is located [here](#).

## Assembly

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How it looks finally

- For the M0-M2 configuration, set is low when no jumper connected and high when jumper connected, check on A4988 board configuration for this.
- A.STP and A.DIR is to copy/clone the motor setting from X, Y or Z axis to the fourth motor if you have.

## First Run Debugging

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- Check all the soldering to make sure all soldered well
- Adjust A4988 breakout board when necessary, and carefully install the A4988 driver board
- Connect external power to power up
- upload Arduino firmware and test communication via serial port for gbrl, send demo G-code for testing all four axis.

## ACM RAMPS STEPPER DRIVER A4988

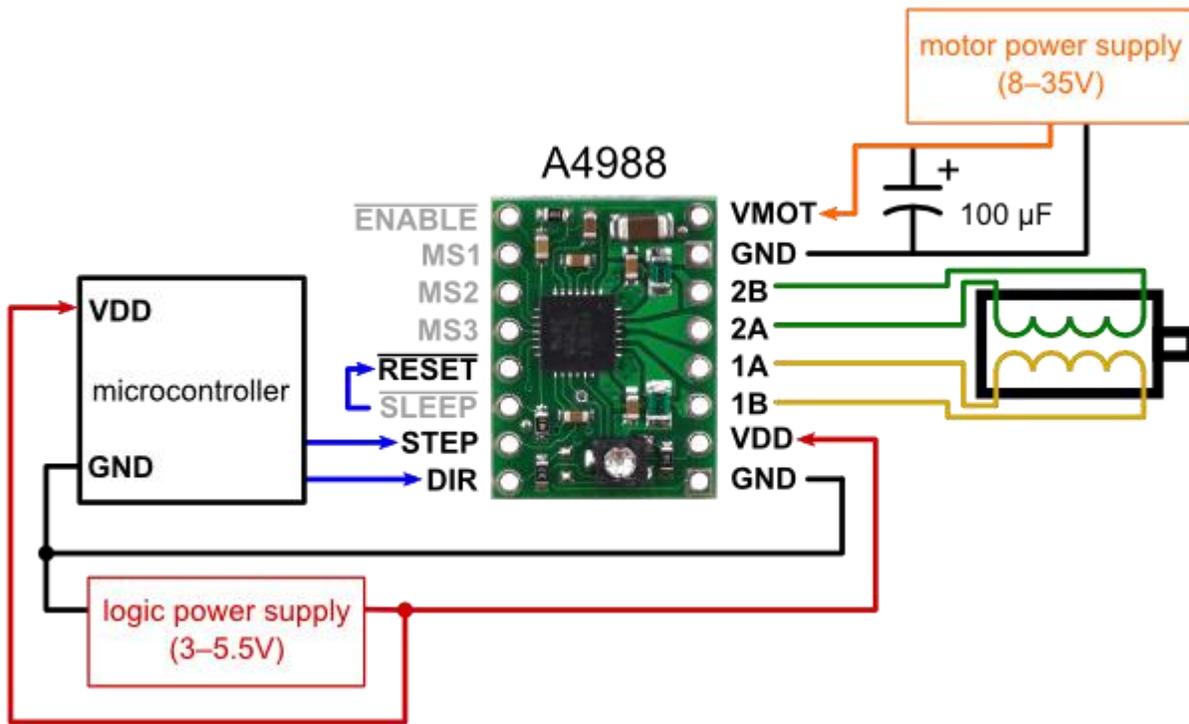
The driver unit that can attach on the Ramps 1.4 main board, to drive steppers is called raprep-mainly used on 3D printer system or CNC machines. Suitable for Mendel, Huxley etc. raprep systems.

A4988 IC can drive 2A per phase of the stepper, the new version V2 of this module has 2oz copper thickness (70um instead of normal 35um), and the higher copper thickness provides better heat dissipation- about 2A with heat sink. The three axis X Y Z of the machine will need three pieces of this unit, and the extra 3D printer head will need this unit too, one head will need one unit.

The A4988 stepper motor driver carrier is a breakout board for Allegro's A4988 micro stepping bipolar stepper motor driver. The driver features adjustable current limiting, overcurrent and over temperature protection, and five different micro step resolutions (down to 1/16-step). It operates from 8 – 35 V and can deliver up to approximately 1 A per phase without a heat sink or forced air flow (it is rated for 2 A per coil with sufficient additional cooling).

This product is a carrier board or breakout board for Allegro's A4988 DMOS Microstepping Driver with Translator and Overcurrent Protection; **we therefore recommend careful reading of the [A4988 datasheet \(380k pdf\)](#) before using this product.** This stepper motor driver lets you control one [bipolar stepper motor](#) at up to 2 A output current per coil (see the *Power Dissipation Considerations* section below for more information). Here are some of the driver's key features:

- Simple step and direction control interface
- Five different step resolutions: full-step, half-step, quarter-step, eighth-step, and sixteenth-step
- Adjustable current control lets you set the maximum current output with a potentiometer, which lets you use voltages above your stepper motor's rated voltage to achieve higher step rates
- Intelligent chopping control that automatically selects the correct current decay mode (fast decay or slow decay)
- Over-temperature thermal shutdown, under-voltage lockout, and crossover-current protection
- Short-to-ground and shorted-load protection



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