

# GRBLDuino Mega Shield V2 Datasheet – GRBL v1.1 Compatible



GRBLDuino Mega Shield is a GRBL v1.1 compatible 3-axis CNC Stepper Driver Shield for the Arduino Mega platform.

The GRBLDuino Mega Shield is designed to provide easy access to the pins required for complete machine control. Terminal blocks are provided to allow for easy connections to control buttons and dual-axis limit switches.

GRBLDuino Mega Shield is designed around Pololu DRV8825 stepper drivers. The drivers designed to be inserted into sockets on each axis to be user replaceable in the event of damage.

Input voltage range for GRBLDuino Mega Shield is up to 45 volts DC and should be selected based on your stepper motor specifications and requirements. The Pololu DRV8825 drivers have a maximum input voltage of 45 volts and A4988 drivers have a maximum input voltage of 35 volts – anything higher will damage the drivers. Be sure to select a power supply appropriate to the stepper drivers you have chosen. The shield itself uses power from the host Arduino. There is no reverse voltage protection on GRBLDuino Mega Shield so take care when connecting the power wires.

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## Bill of Materials

- |      |                                  |     |                                      |
|------|----------------------------------|-----|--------------------------------------|
| • 1  | GRBLDuino Mega Shield V2 PCB     | • 1 | Tact Switch                          |
| • 21 | 2 Position Screw Terminal Blocks | • 1 | 10k Ohm Resistor (R1)                |
| • 6  | 8 Position Female Headers        | • 3 | 1k Ohm Resistor (R2, R3, R4)         |
| • 1  | 1x3 Pin Male Pin Headers         | • 1 | 680 Ohm Network Resistor (RN1, RN2)  |
| • 3  | 1x4 Pin Male Pin Headers         | • 3 | BC337 Transistor (Q1, Q2, Q3)        |
| • 1  | 1x6 Pin Male Pin Headers         | • 3 | 1N4001 Diode (D1, D2, D3)            |
| • 5  | 1x8 Pin Male Pin Headers         | • 7 | 150nF Ceramic Capacitors (C7-13)     |
| • 3  | 2x3 Pin Male Pin Headers         | • 6 | 100uF Electrolytic Capacitors (C1-6) |
| • 1  | 2x18 Pin Male Pin Headers        | • 3 | Relay (K1, K2, K3)                   |
| • 9  | Short 2 Pin Jumper Shunts        |     |                                      |
| • 1  | Long 2 Pin Jumper Shunts         |     |                                      |

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## Relay Specifications

The relays provided on GRBLDuino Mega control Spindle Enabled, Mist, and Flood. The relay controlled terminals are tied to the non-relayed controlled terminals of the same name.

Each relay is capable of switching 5 amps at 250 VAC or 5 amps at 30 VDC. The connection is made in approximately 20 milliseconds and released in 10 milliseconds. Each relay is rated for 100,000 cycles at the rated load and 10,000,000 cycles with no load.

Operating the relay with a higher load may damage the relay and cause premature failure.

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## Stepper Driver Connections

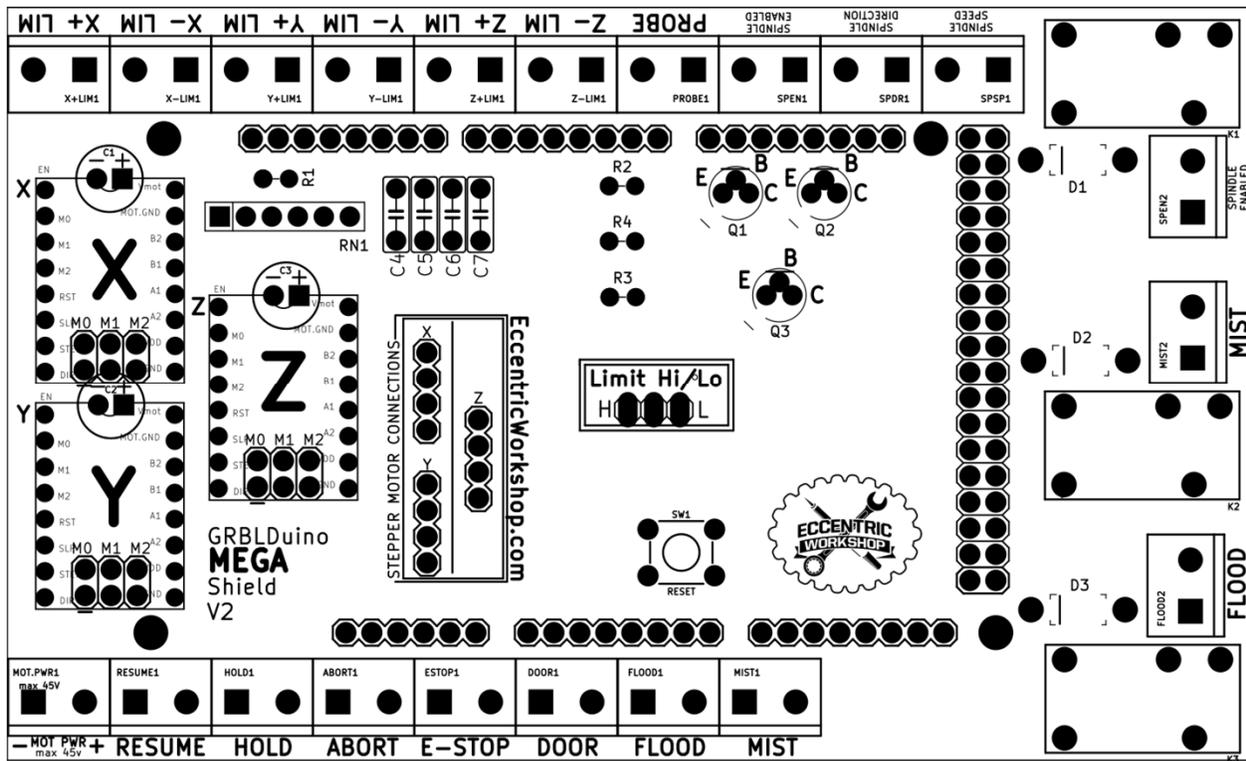
GRBLDuino Mega Shield is designed to be used with Pololu DRV8825 stepper drivers though other pin compatible drivers such as DRV8880, DRV8834, and A4899 will also work.

The Stepper Driver Enable Pin is the upper left pin in each axis socket. Pay attention to orientation when inserting stepper drivers as incorrect orientation will destroy the drivers (and possibly the GRBLDuino Mega Shield).

GRBLDuino Mega Shield V2 allows for connection of 11 machine functions: Resume, Hold, Abort, Emergency Stop, Door Safety, Flood Coolant, Mist Coolant, Spindle Enabled, Spindle Direction, Spindle Speed, and Probe. Screw terminal blocks are provided to allow for easy connections to the control buttons and machine functions.

The two pin screw terminal blocks for resume, hold, abort, e-stop, door safety, and coolant (flood and mist) are located along the bottom edge of the board. Because connecting the two terminals together activates the control function, switch wire polarity into the terminal does not matter. If you wish to perform more advanced functions, the control pin is the right terminal in each block when viewed from the top of the board. The control pin is the circled pad when looking at the bottom of the board.

The limit switch, probe, and spindle (enabled, direction, and speed) screw terminals are located along the top edge of the board. Spindle Speed is GRBL PWM spindle speed control ready to connect to a spindle motor driver PWM input. On these terminal blocks, the control pin is the left terminal in each block when viewed from the top of the board. The control pin is the circled pad when looking at the bottom of the board.



### Limit Switch Settings

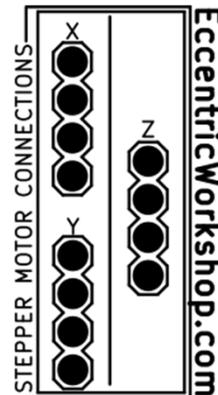
GRBLDuino Mega Shield allows for connection of 6 limit switches: two (+ and -) per X, Y, and Z axis. Two pin screw terminal blocks are provided to allow for easy connections to each limit switch. Because each switch is on an independent terminal block, either switch wire can go into either terminal without regard to polarity.



GRBL default is for limit switch activation through a normally-open switch connecting the limit switch pin to ground. This mode is picked by using the Limit Hi/Lo jumper to select the center and right points. If you prefer to have high activated limit switches, use the Limit Hi/Lo jumper to select the center and left pins.

GRBLDuino Mega Shield stepper motor connections are located near the center of the board and are labelled as STEPPER MOTOR CONNECTIONS.

All motor headers have the same pin outs. From top to bottom, the motor connections are B2, B1, A1, A2.



## Microstep Settings

### DRV8825 Microstepping Settings

Resolution	M0	M1	M2
Full Step	Low	Low	Low
1/2 Step	High	Low	Low
1/4 Step	Low	High	Low
1/8 Step	High	High	Low
1/16 Step	Low	Low	High
1/32 Step	High	Low	High
1/32 Step	Low	High	High
1/32 Step	High	High	High

### A4988 Microstepping Settings

Resolution	M0	M1	M2
Full Step	Low	Low	Low
1/2 Step	High	Low	Low
1/4 Step	Low	High	Low
1/8 Step	High	High	Low
1/16 Step	High	High	High

