

ULTRATRONICS V1.0 QUICK START GUIDE

Thank you for purchasing the Ultratronics! This guide will help you install your board safely. Please read the warnings below before putting any power to the board.

ReprapWorld.com may provide updates to the firmware, documentation and specifications. Please refer to the product page for the latest information.

Safety warnings

Unlike the other electronics lines, Ultratronics uses a 3V microprocessor. **DO NOT** exceed this voltage on the digital I/O pins. Unless specifically mentioned, assume 3D printer components are incompatible.

Turn off 12V input to the board while uploading, as resetting the processor may cause heaters to temporarily turn on.

Do not exceed the recommended voltage (24V) for the board on the power supply (high power) input. This may cause permanent damage to the board.

The 5V circuit is protected from shorts by a resettable 500mA fuse. The high power inputs are protected by a **NON-resettable** fuse. Shorting the high power circuit may cause the fuse to burn out, requiring replacement of the fuse.

Do not unplug stepper motors from the board while powered. This may cause the stepper drivers to be damaged permanently and/or damage the board permanently.

Do not change anything while the board is powered, always remove the USB cable and power off the power supply before modifying anything.

Features

The Ultratronics board is designed to be the most advanced electronics board, with many out-of-the-box functionality on-board. You can use this board in all types of 3D-printers in the consumer market today. Amongst others, these are the major features:

Atmega SAM3X8E

Powerful SAM3X8E 32-bit processor with 512 KB memory, running at 84Mhz

Thermocouple

On-board support for connecting four thermo couples*

SD Card

Autonomous printing from Micro SD card on board or an external SD card upgrade option.

Ethernet

The board comes with Ethernet on board. This requires firmware that supports the chip. *

Seven MOSFETs

The board has 4 regular MOSFETs (25A), two small MOSFETs for fans, and one MOSFET for

the heated bed (IRLS3034PBF) to support many needs.

Up to seven stepper drivers

Compatible with RAMPS, 7 slots for stepper drivers (not included). Modularized to make replacement easy.

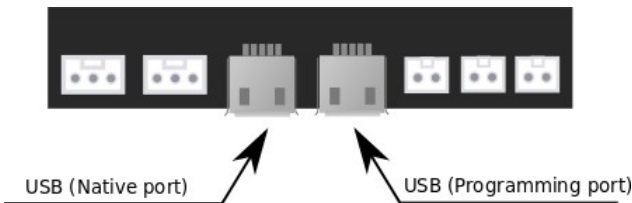
Support for many peripherals

The board's functions can be easily extended with LCD, keypad etc. See the connectors section for more information

* This requires the FULL edition.

Uploading software

We provide software on our website to help you out. This software is modified to support our hardware out-of-the-box. See the section 'software downloads' for the latest version of the software.



Like the Arduino Due the Ultratronics has two USB ports: a native USB and a programming port (USBP). It's recommended to use the USBP port for uploading sketches as the native USB port may be less reliable on some systems. Select Arduino Due (Programming port) from the boards menu in Arduino and press upload.

Testing the board

To test the functionality of the board, a test firmware is available from the Ultratronics product page. This firmware will help you test the board. **Disconnect everything except the USB cable to your computer.** Upload the the test firmware to the board with Arduino, the blue debug LED should blink every second and the speaker should emit a small bleep. By using the serial monitor in Arduino the board will provide an output like:

```
AD values - T0: 1023 T1: 1023 T2: 1023 T3: 1023 T4: 1023
```

```
TC values - 1=ERR 2=ERR 3=ERR 4=ERR
```

```
SD Card: No card detected
```

AD values represent the the measurement on T0 – T4. 1023 means nothing connected, a value of around 900 means room temperature. Try connecting a thermistor to each thermistor header to check if the values change reasonably.

TC value stand for the thermocouple. When a thermocouple is connected the value should change from ERR to around room temperature.

SD Card will check if the SD card can be read. 'No card detected' means that no card was inserted. 'Card ok' will be outputted when the card could be read ok or 'Card NOT ok' when a

failure happened.

By connecting the 12V lines, the MOSFETs should have power and their LEDs will blink in order. This verifies the MOSFETs and 12V power are OK.

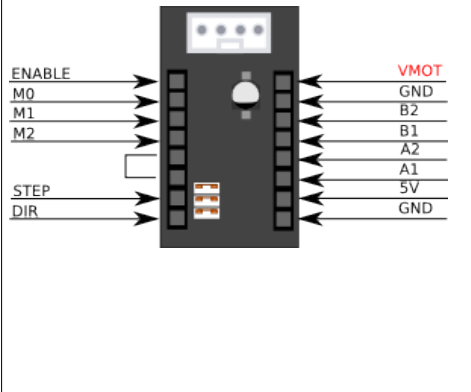
Also the stepper motors should turn when connected, with the 12V lines and stepper drivers in place. They will turn a short time and switch direction.

These tests will verify the basic functionality of the board.

Plugging in the stepper drivers

Most importantly you need to look at the correct orientation of the stepper driver. Plugging it the wrong way may cause permanent damage to the stepper driver and/or the Ultratronics board.

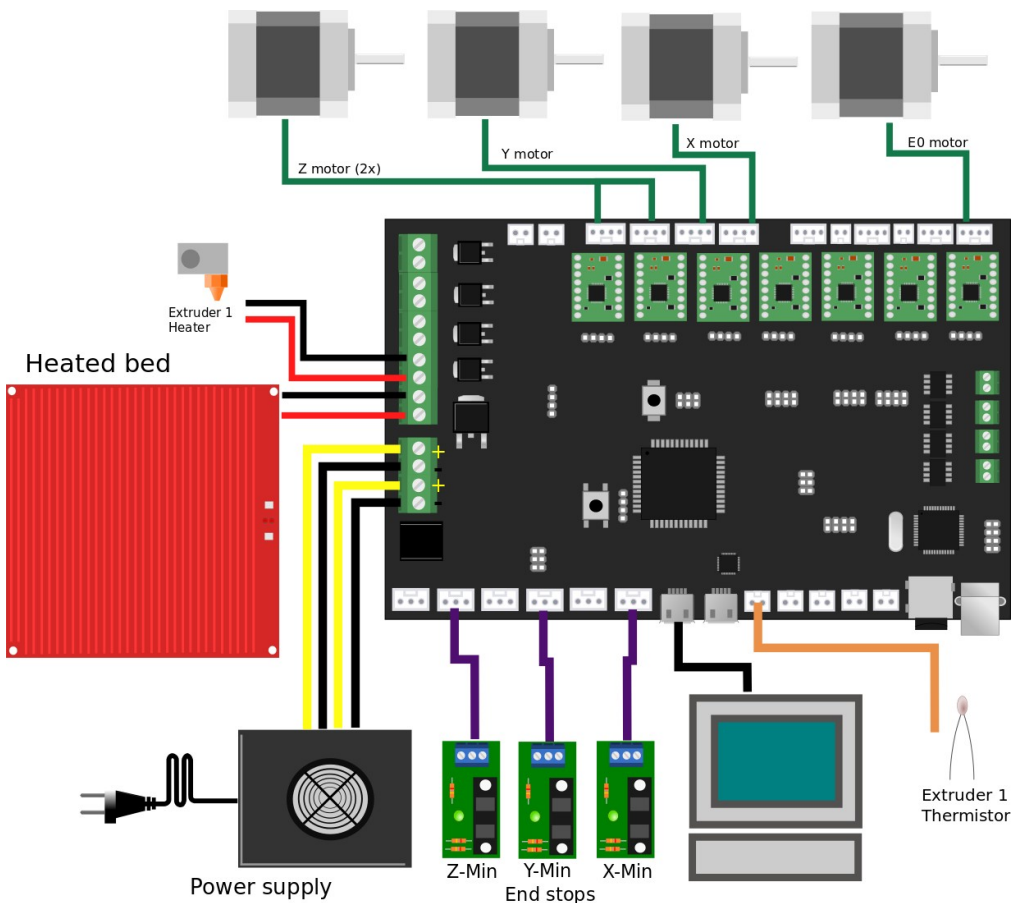
On the back of the stepper driver pcb should be a description of the pin layout. Determine the vmot pin and layout the board to match the following pin definition:

	ENABLE M0 M1 M2 STEP DIR	VMOT GND B2 B1 A2 A1 5V GND	ENABLE Disable/enable stepper M0 Microstep setting 1/3 M1 Microstep setting 2/3 M2 Microstep setting 3/3 STEP Step pulses DIR Direction VMOT High power input (supply voltage) GND B2 Coil 2 B1 Coil 2 A2 Coil 1 A1 Coil 1 5V +5V GND
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Setting the micro stepping can be done using the jumpers. Refer to the stepper driver documentation on how to set the jumpers.

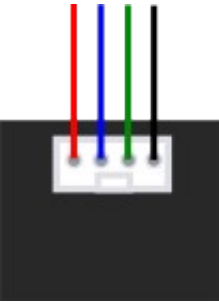
Quick Start

This paragraph will show you how to connect the board. This is just a basic example, your requirements may differ. There is a lot of community support available in the RepRap forums <http://forums.reprap.org>. By placing your questions there other users may benefit of the information too.



First connect your computer with a micro USB cable. The power LED should light up.

Put the stepper drivers into the slots, and connect the stepper motors. You can connect up to 8 stepper motors, 1 for each axis, except for the Z-axis, which allows two stepper motors to be connected. You can use the following order of colors, but if you reverse the connector, the stepper motor will just reverse.



The power supply should be connected to the power screw terminals. Mind the polarization, the **yellow wires should be +**.

Connect the heated bed to HB, this terminal allows larger currents, up to 14A. The first extruder heater should be connected to E0. A second extruder can be connected to E1. Fans can be connected to the fan1 and fan2 terminals.

You can easily connect end stops to the board. There is support for 6 end stops (3 min, 3 max). For opto end stops you will need the S(ignal), - and + pins. For mechanical end stops the S(ignal) and – pins are sufficient.

The thermistors for reading heated bed and extruder temperature can be connected to the thermistor pins. Polarization is not an issue here.

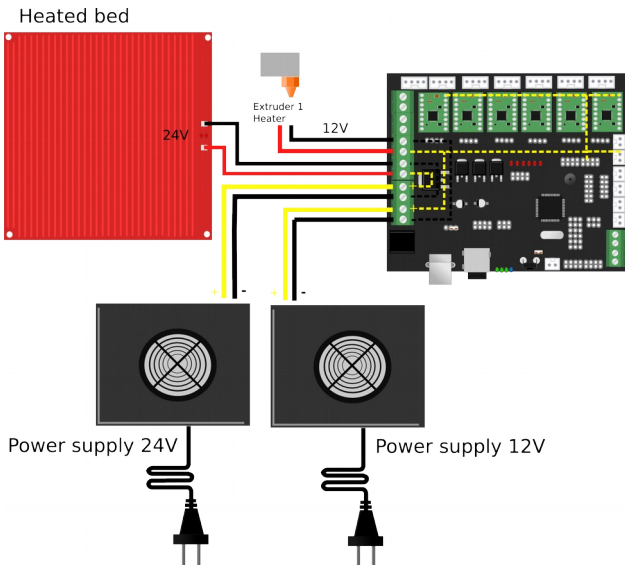
Advanced usage

Hooking up a LCD

Ultratronics supports LCD controlled using ISP or I2C. Check the datasheet of the LCD screen for details on connecting it to the controller board.

A different power supply for the heated bed

Ultratronics supports using a second power supply for the heated bed. This allows you to use a lower current rated power supplies or at a different voltage. For example use 12V for the normal electronics and 24V for the heated bed.



This diagram shows the internal wiring.

You can also use 24V to power the stepper motors, heaters fans etc. Keep in mind that the output will change to 24V as well o all peripherals should support 24V.

Connecting a servo

Some use cases for a servo include heated bed leveling or a nozzle sweep. Ultratronics supports a servo using PWM on the Y-max (D11) or Y-Min (D12) end stops.

Connecting a second or third extruder

You can hook up another extruder using the applicable stepper driver slots, temperature reading pins and power terminals.

Hooking up an external stepper driver

ReprapWorld.com provides external stepper drivers to enable you to run multiple stepper drivers on one axis. You can use the Out headers located below the stepper driver slots to connect an external stepper driver. Refer to the Ultratronics datasheet and external stepper driver documentation for more information.

Warranty

We provide a three months limited warranty on the board. You should verify the proper function of the board when it arrives, you may use the test firmware as described in the paragraph 'Testing the board'. When you have determined that the board is not functioning properly, please provide a detailed description of the problem including pictures (if applicable) to info@reprapworld.com. Make sure to include your order number.

Feedback

We love to hear feedback from our users. This way we can keep our boards the best option for the RepRap community. If you have ideas or comments, please feel free to drop an email to info@reprapworld.com.