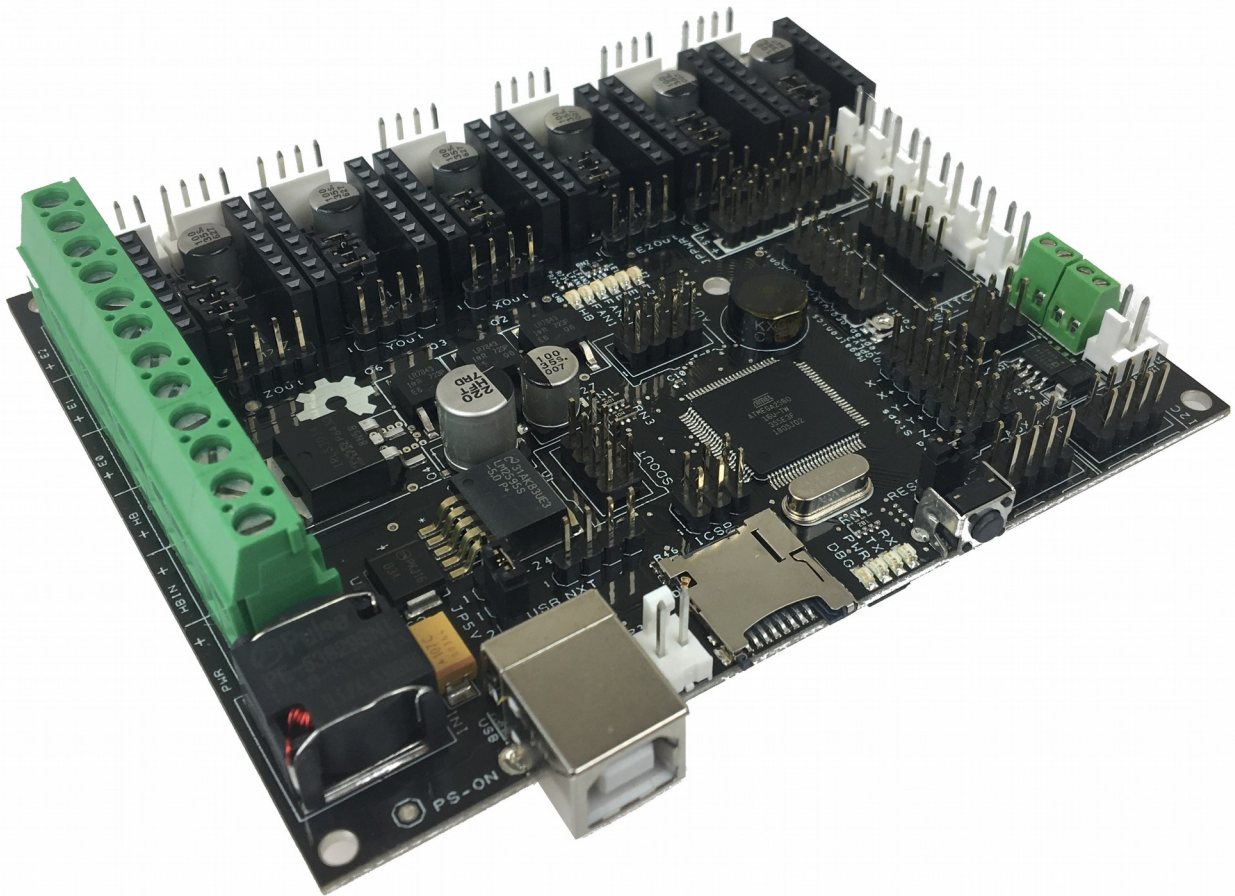


MEGATRONICS v3.3 DATASHEET



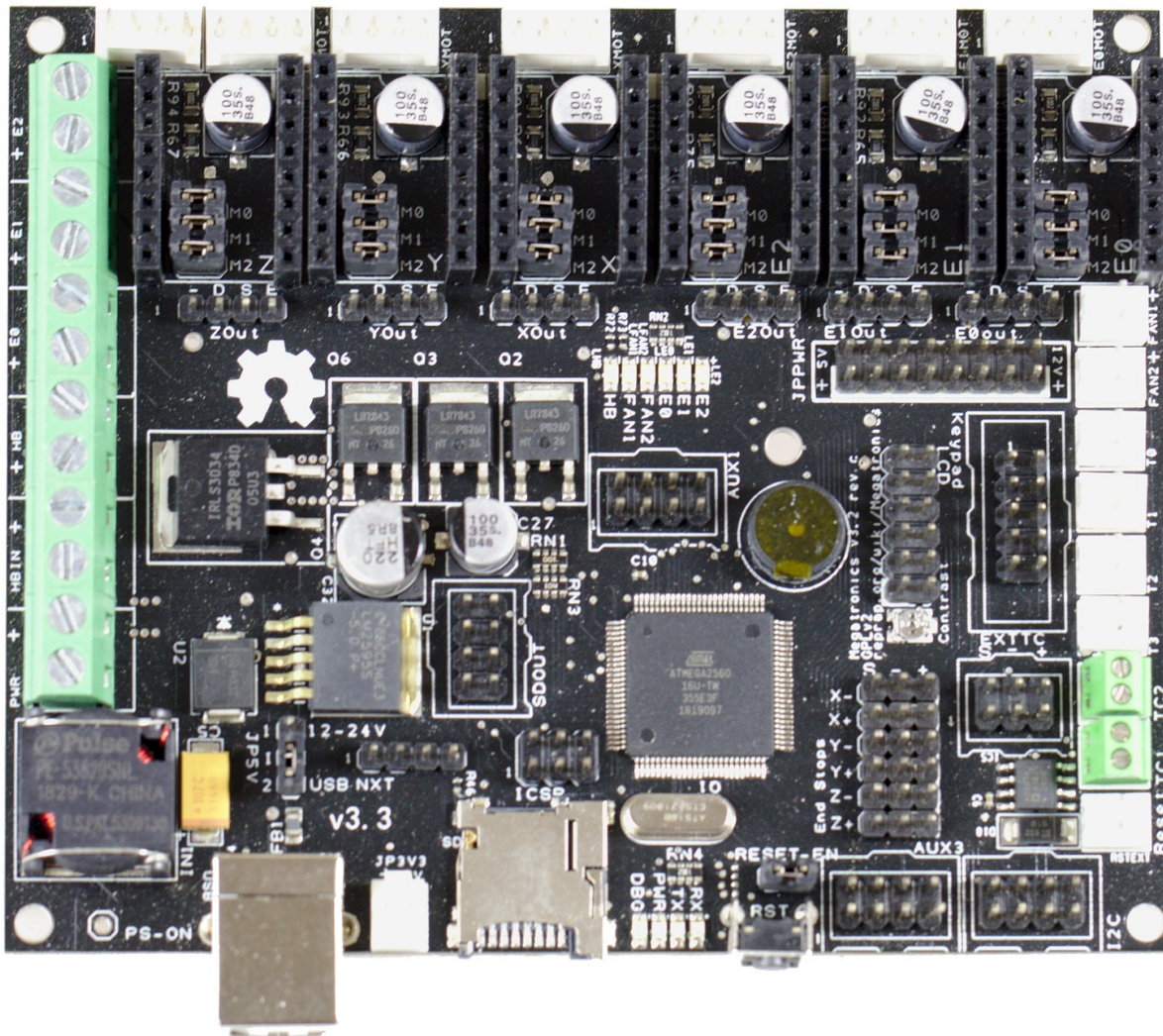
Author Bart Meijer
Date 10th of March 2020
Document version 1.9



PRODUCT OVERVIEW

Megatronics is based on many famous open-source products including: Arduino Mega, RAMPS, SD Ramps. Therefor this product is an already proven design. It combines all major features of these board into a single board solution for more reliable 3D-printing.

Megatronics has a powerful Atmega2560 processor with 256 kB memory, running at 16Mhz. The board can be connected to a PC using a normal USB cable. It will register as FTDI FT232R device. The board is compatible with the Arduino Mega 2560 and will therefor be easily programmed from the Arduino IDE.



DOCUMENT HISTORY

Version 1.0	Creation
Version 1.1	Adjustments for new board revision
Version 1.2	Fix in pin table + PWM pins marked
Version 1.3	Fix in hole positions for rev F and higher.
Version 1.4	Version 3.1 release
Version 1.5	Fixed AUX header in documentation
Version 1.6	Added information on the EXTTC header
Version 1.7	Updated to Megatronics v3.2
Version 1.8	Updated to Megatronics v3.3
Version 1.9	Corrected keypad layout pin numbering Fix thermistor numbering in pin mapping

PRODUCT CHANGE HISTORY

Version 3.3 – revision a

- SD card fixed
- KEYPAD header pin numbering is back to 3.1 version

Version 3.2 – revision c

- KEYPAD header changed position and rotated 180 degrees, pin assignment changed
- Thermo couple connector change to smaller connectors, renamed to TCn
- RSTEXT changed position
- SDOUT changed position
- Header for Nexion displays (NXT) added
- OUT headers per stepper driver now populated with 4-way header
- AUX-1 renamed to AUX1 and now populated.
- FAN1 and FAN2 traces made beefier to avoid damage to the trace in case of shorting the pins.

Version 3.1 – revision A

- SD card detect support on A2/D57
- I2C now kept active even without power on the board

Version 3.0 – revision F

- Minor change in dimensions, now 110.5x91.3mm
- Heated bed mosfet better outlined

Version 3.0

- Added a forth thermistor header
- Changed motor and thermistor headers to lock headers
- Added support for the external SD card pcb
- Stand-alone printing also possible when powered from 24V
- External reset header added
- External thermo couple board support (2x)

- Support for 3 extruders, 2 fans and a heated bed on board.
- Added more protective features

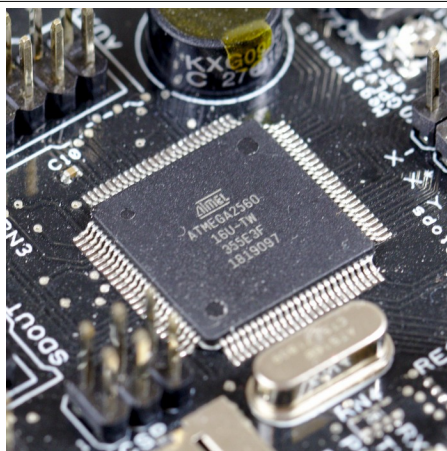
Version 2.0

- Improved thermo couple support.
- Second thermo couple supported
- Support for 6 stepper drivers
- SMD fuses and MOSFETs
- Extra MOSFET, making 4 regular MOSFETs and one for heated bed.
- Support for the new DRV8825 Pololu stepper drivers

TECHNICAL SPECIFICATION

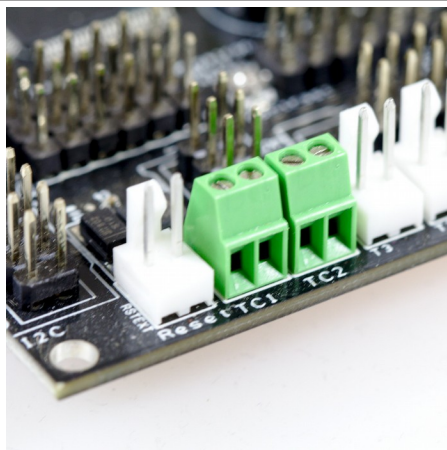
Microcontroller	Atmega2560-16AU
Operating Voltage Electronics	5V
Operating Voltage High	12-24V (15A heated bed, 7A electronics)
DC Current per I/O Pin	40mA
Clock Speed	16Mhz

MAJOR FEATURES



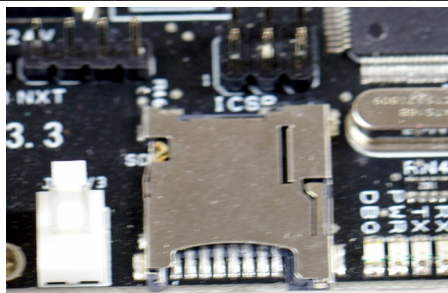
Atmega2560

Powerful Atmega2560 processor with 256 kB memory, running at 16Mhz



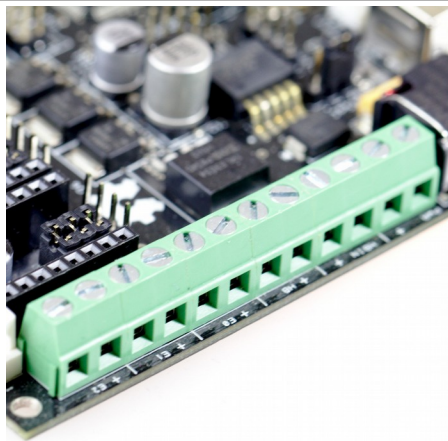
Thermocouple

On board support for connecting two thermo couples two external



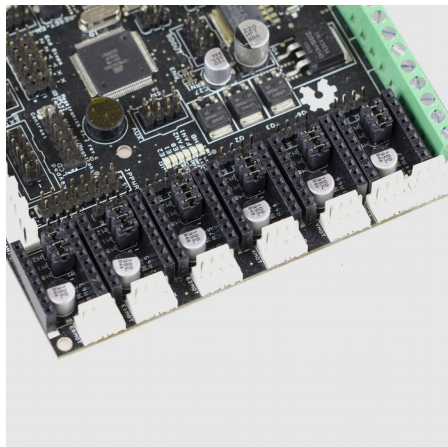
SD Card

Autonomous printing from Micro SD card on board or external SD card, using the external SD card PCB module. Now with SD card detection pin.



Six MOSFETs

The board has 3 regular MOSFETs (25A), two 1A MOSFETs (fans) and one MOSFET for the heated bed (IRLS3034PBF) to support many needs.



Up to 6 stepper drivers

Compatible with RAMPS, 6 slots for stepper drivers (not included). Modularized to make replacement easy for damaged drivers. Also the new DRV8825 Pololu stepper drivers are supported.

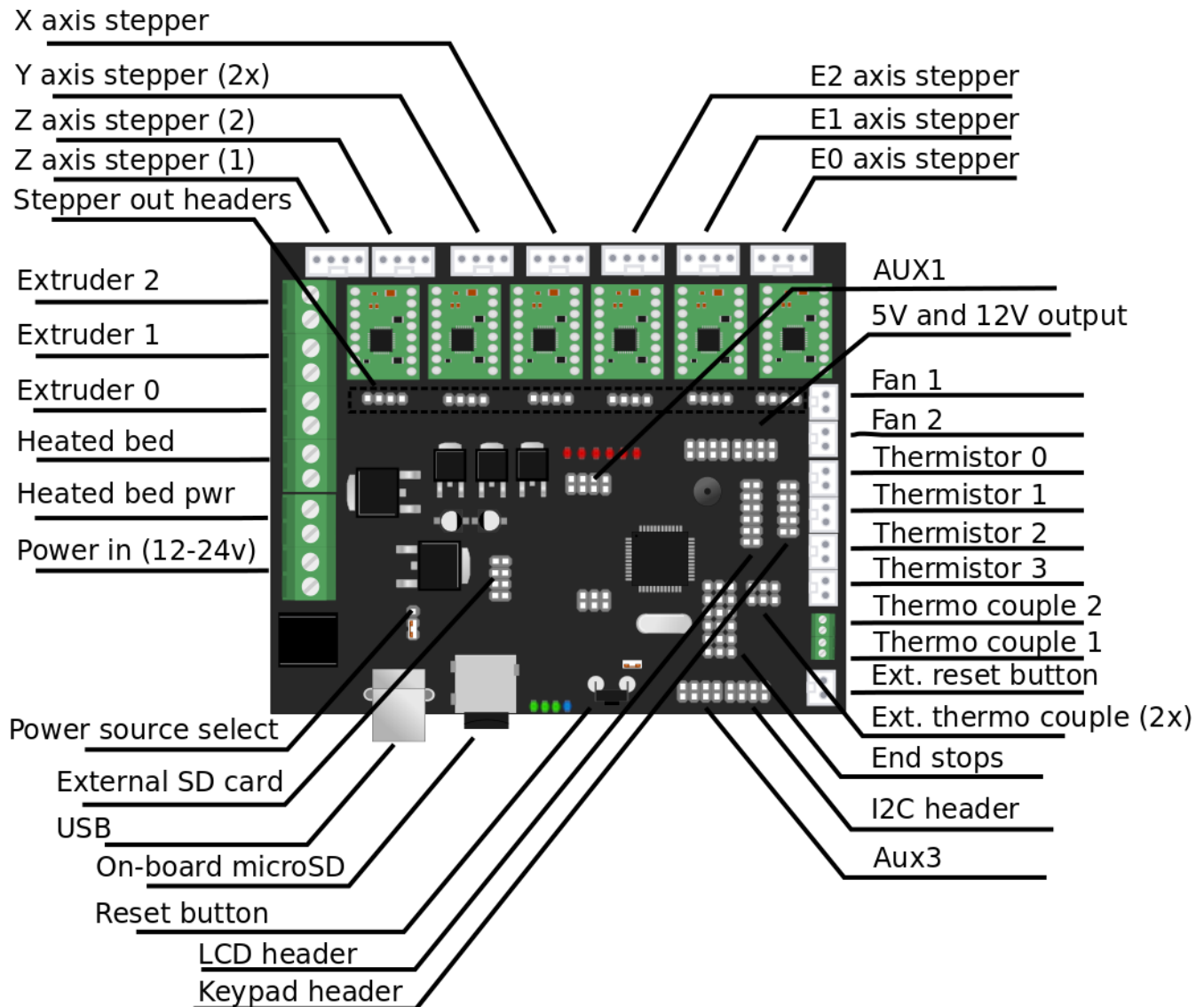
	Support for many peripherals
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	The board's functions can be easily extended with Nextion LCD, keypad etc. See the connectors section for more information
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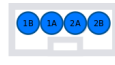
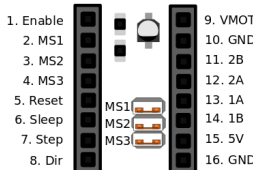

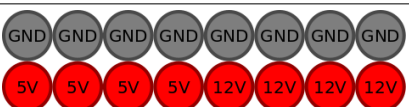








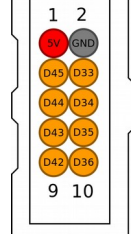
OTHER FEATURES

- Auto reset can be disabled by removing a jumper
- The board's low voltage circuit can be powered from 12-24V, by setting a jumper
- The LCD contrast can be adjusted with a trimpot
- PWR has a diode to protect against reverse polarization
- The 5V line is protected by a 500mA resettable fuse
- A piezo is included to allow the printer to give feedback with sound
- Each stepper driver slot has a breakout to connect external stepper drivers to the board.
- Four layer high quality PCB board

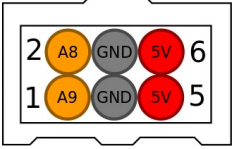
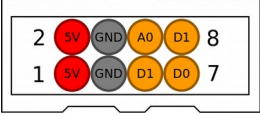

CONNECTORS - OVERVIEW



CONNECTORS - DETAILS

Name	Description	
XMOT, YMOT, ZMOT (2x), E0MOT, E1MOT, E2MOT	Connectors for bipolar stepper drivers and Pololu-compatible stepper driver slots.	<p>Motor connector</p>  <p>Stepper driver slot</p>  <p>Out-header</p> 
JP2-JP7	Microstepping mode jumpers. See your stepper driver documentation for more information.	
E0Out - Zout	Breakout headers for stepper slots 1. GND 2. DIR 3. STEP 4. ENABLE	
5V	5V output (4x)	
12V	12V output ** (4x)	
FAN1	Fan 1 (1A max) D6 PWM controlled	
FAN2	Fan 2 (1A max) D7 PWM controlled	
T0	Thermistor 0 (A15)	
T1	Thermistor 1 (A14)	
T2	Thermistor 2 (A13)	
T3	Thermistor 3 (A12)	
TC1	Thermo couple 1 (A11)	
TC2	Thermo couple 2 (A10)	
Keypad	Keypad (2x5 header) 1. 5V 2. GND 3. D45 4. D33 5. D44 6. D34 7. D43 8. D35 9. D42 10. D36	

LCD	LCD Header (2x6 header) 1. GND 2. 5V 3. LCD Contrast 4. D32 5. GND 6. D31 7. D14 8. D30 9. D39 10. D15 11. 5V 12. GND	
I2C	I2C header (2x4 header) 1. SCL 2. SCL 3. SDA 4. SDA 5. 5V 6. 5V 7. GND 8. GND	
AUX3	Auxiliary header 3 (2x4 header) 1. 5V 2. 5V 3. D49 4. D48 5. D47 6. D46 7. GND 8. GND	
RSTEXT	Header to connect an external reset button.	
RESET-EN	When jumpered enables reset (DTR). Without it the board cannot be programmed using the IDE. It's recommended to remove the jumper for production machines.	
End stops	6x3 header to connect end stops	
SDOUT	External SD card header 1. 5V 2. A2/D56 3. MISO (D50) 4. MOSI (D51) 5. SCK (D52) 6. CS (D53) 7. GND 8. Not connected	
JP5V	Power source select. This determines how the 5V circuit is powered. 1: Power from Power In (12-24V) 2: Power from USB	

EXTTC	External Thermo couple header 1. A9/D63 2. A8/D62 3. GND 4. GND 5. 5V 6. 5V	
ICSP	2x3 header to program the Atmega chip directly	
AUX1	Analog/Serial output (compatible with RAMPS) 1. +5V 2. +5V 3. GND 4. GND 5. D1 6. A0/D54 7. D0 8. A1/D55	
PS-On	Header do enable/disable the power supply	
E0 - E2	Extruder heater output (5A max)	
HB	Heated bed (15A max)	
HBIN	Heated bed power (12-24V) *	
PWR	Power input (12-24V) *	
NXT	Serial header for i.e. connecting the Nextion displays 1. +5V 2. GND 3. D14 (Serial3 TX) 4. D15 (Serial3 RX)	

* Make sure that your peripherals support the input voltage. If you supply 24V, all outputs on the board will supply 24V too.

** With 12V input only, will output the same as the input

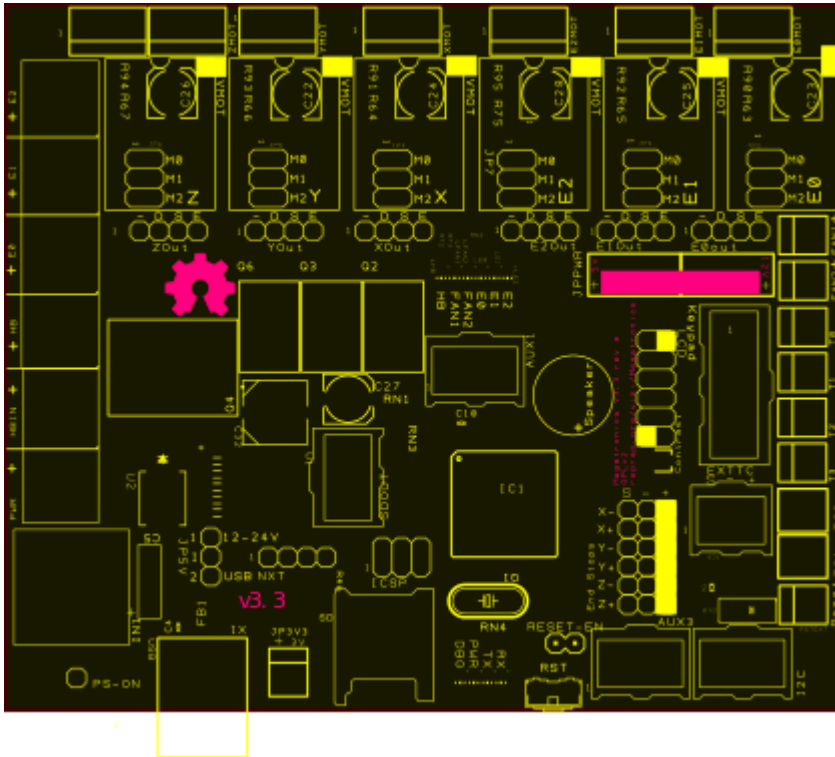
PIN DEFINITION

This is the digital I/O assignment for Megatronics. You can use it to adjust your firmware to match Megatronics.

Pin	Definition	Pin	Definition
D0	RXD	D38	Y+ End stop
D1	TXD	D39	LCD6
D2	Extruder 0 *	D40	X+ End stop
D3	Z axis enable *	D41	Y- End stop
D4	Y axis enable *	D42	Keypad D42
D5	Y axis step *	D43	Keypad Shift clock
D6	Fan *	D44	Keypad encoder (2)
D7	Fan 2 *	D45	Keypad encoder (1) *
D8	Extruder 2 *	D46	AUX3-6 *
D9	Extruder 1 *	D47	AUX3-5
D10	Heated bed *	D48	AUX3-4
D11	Z axis direction *	D49	AUX3-3
D12	PS-on *	D50	MISO
D13	Debug LED	D51	MOSI *
D14	LCD 4	D52	SCK
D15	LCD 7	D53	SS
D16	Z axis step	A0/D54	AUX1
D17	Y axis direction	A1/D55	AUX1
D18	Z- End stop	A2/D56	SDOUT
D19	Z+ End stop	A3/D57	X axis direction
D20	SDA	A4/D58	X axis step
D21	SCL	A5/D59	X axis enable
D22	E2 axis step	A6/D60	E2 axis direction
D23	E2 axis enable	A7/D61	Speaker
D24	E1 axis direction	A8/D62	Thermo couple 4
D25	E1 axis step	A9/D63	Thermo couple 3
D26	E1 axis enable	A10/D64	Thermo couple 2
D27	E0 axis direction	A11/D65	Thermo couple 1

D28	E0 axis step	A12/D66	Thermistor 3 (T3)
D29	E0 axis enable	A13/D67	Thermistor 2 (T2)
D30	LCD5	A14/D68	Thermistor 1 (T1)
D31	LCD Enable	A15/D69	Thermistor 0 (T0)
D32	LCD RS		
D33	Keypad D33		
D34	Keypad shift out		
D35	Keypad shift LD		
D36	Keypad D36		
D37	X- End stop		

BOARD DIMENSIONS



Width: 110.7mm

Depth: 91.6mm

List of M3 holes (measured from the bottom left):

2.8,	3.0
3.6,	88.5
74.3	54.1
108.1	3.0
107.8	89.0