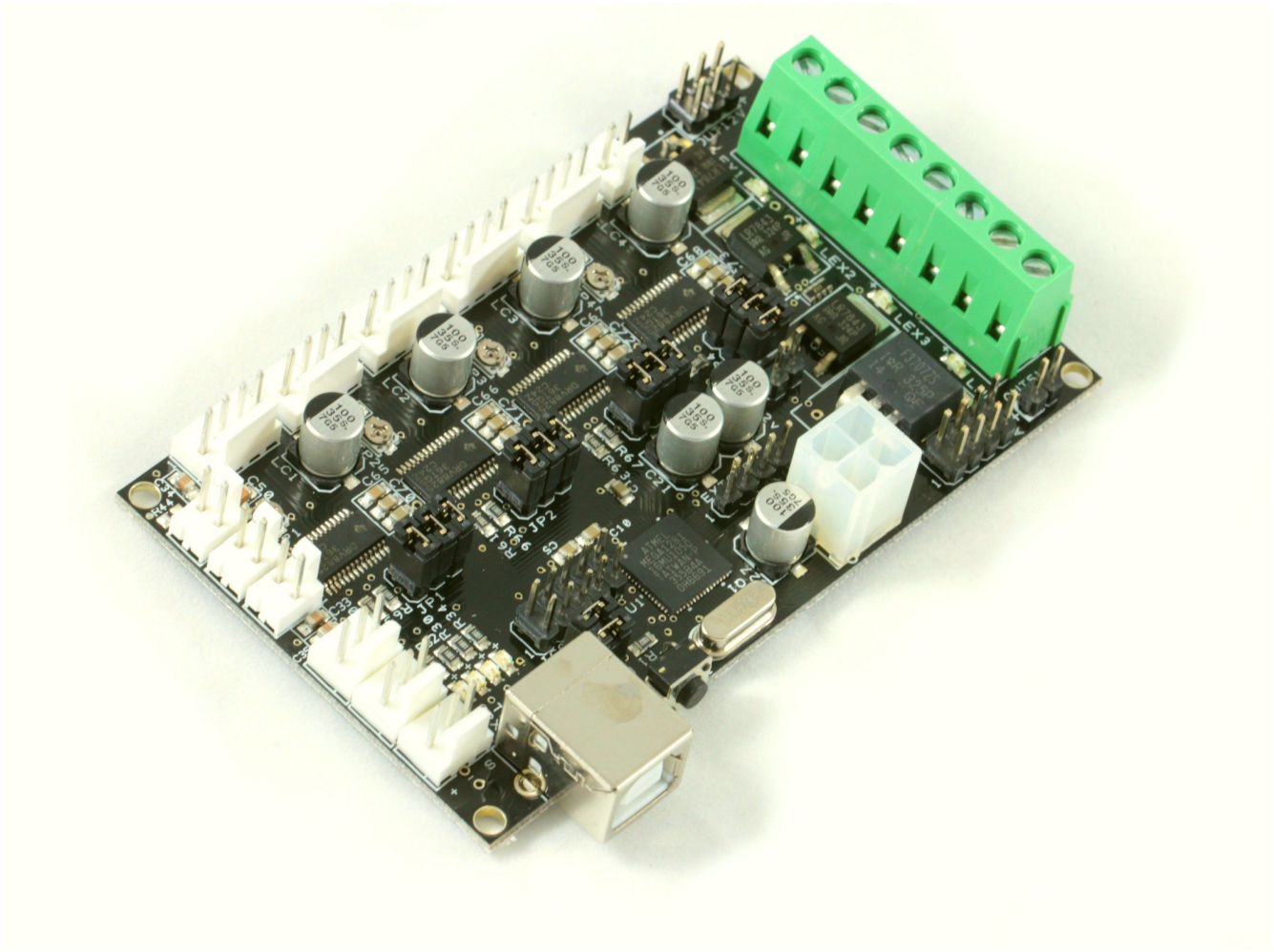
MINITRONICS v1.1 DATASHEET



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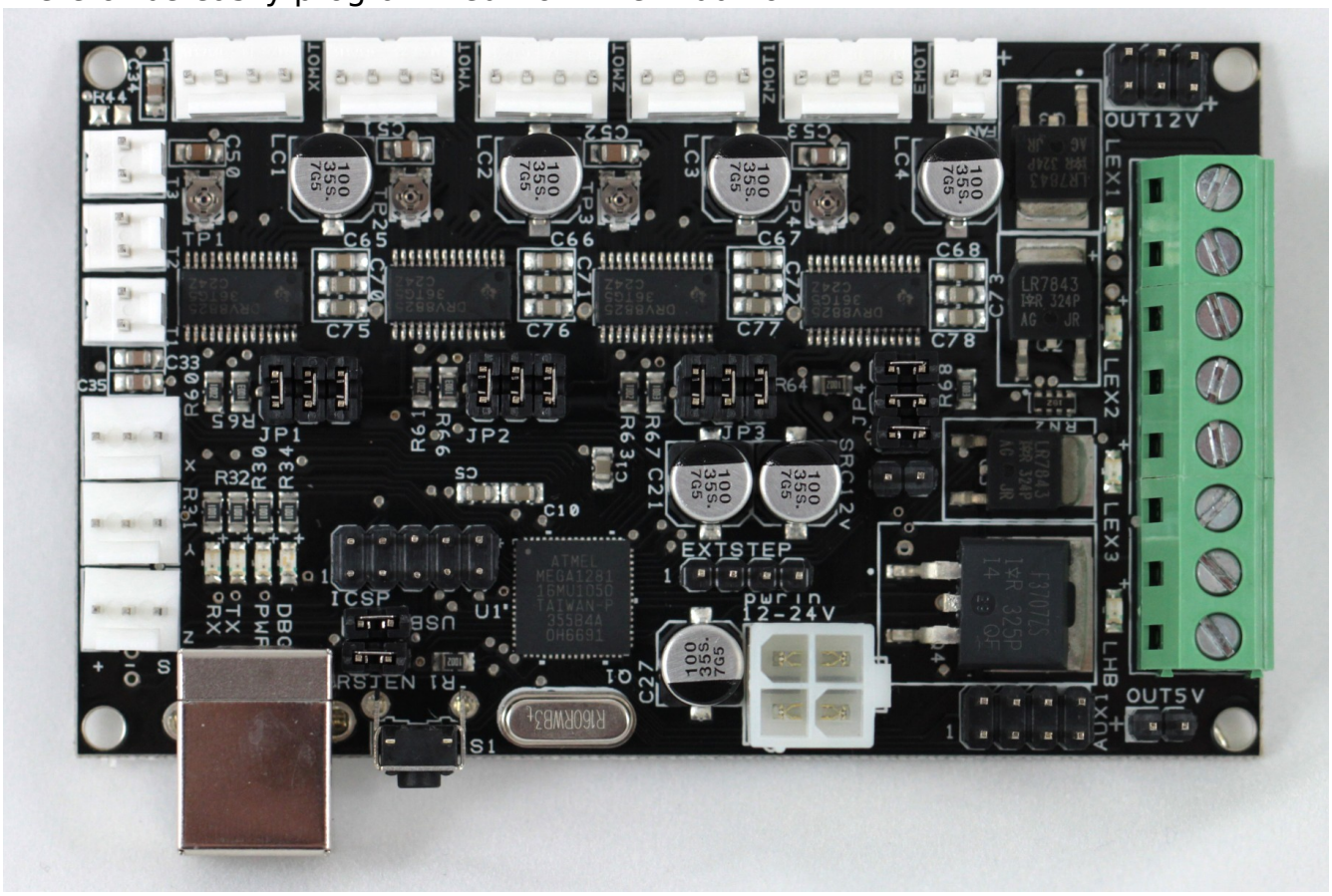
PRODUCT OVERVIEW

Minitronics is the slim but powerful electronics line. It's designed to be an easy to use, compact and smart solution to fit 90% of the 3D-printers. Unlike the Megatronics, which targets at the advanced range of usages, the Minitronics is plug and plug, which will fit the needs of the average user better.

Minitronics has a powerful Atmega1281 processor with 128 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 Arduino and will therefor be easily programmed from the Arduino IDE.



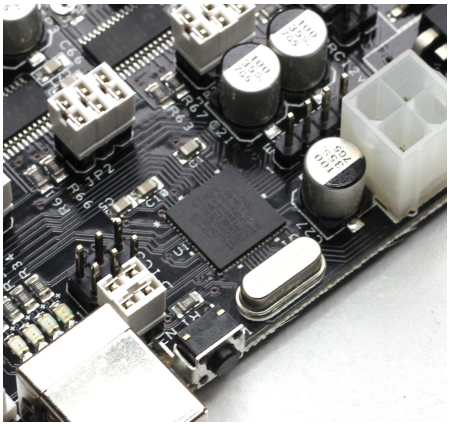
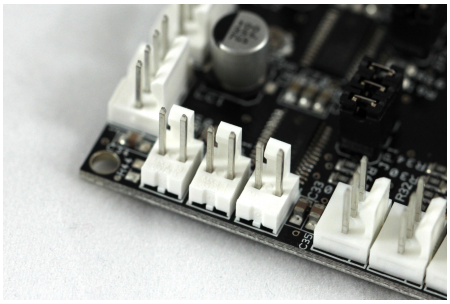
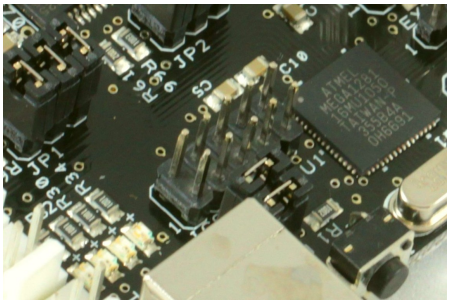
DOCUMENT HISTORY

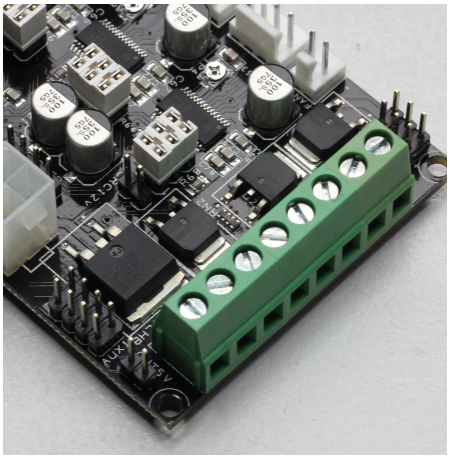
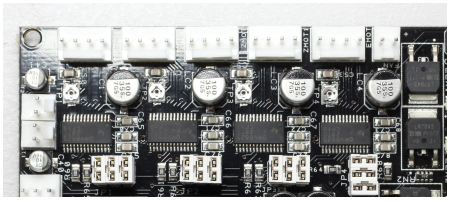
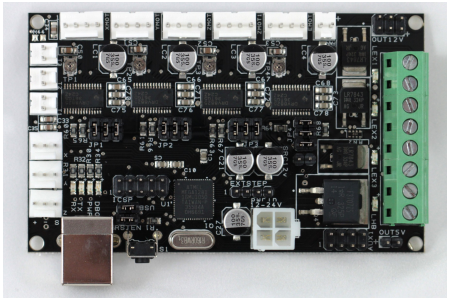
Version 1.0	Creation
Version 1.1	Added PWM to the pin definition table

TECHNICAL SPECIFICATION

Microcontroller	Atmega1281-16MU
Operating Voltage Electronics	5V
Operating Voltage High	12-24V
DC Current per I/O Pin	40mA
Clock Speed	16Mhz

MAJOR FEATURES

	**Atmega1281** Powerful Atmega1281 processor with 128 KB memory, running at 16Mhz
	**Three analog inputs for temperature** Minitronics v1.1 has three headers for temperature reading. Two have pull up resistors to hook up thermistors directly. One has not, so you can hook up an external thermo couple pcb. Optionally you can solder the third 4k7 resistor to have three thermistors.
	**External SD card support** You can now hook up an external SD card pcb, so you can print directly from SD.

	**Four MOSFETs** The board has 3 regular MOSFETs and one MOSFET for the heated bed (10A) to support many needs.
	**Up to 5 stepper drivers 1/32 step** The Minitronics has four on board stepper drivers. A fifth can be connected externally, using our External stepper driver board.
	**Small dimensions** Only 93.9 x 56.8mm x 18mm, comparable with Sanguinololu

Detailed feature list

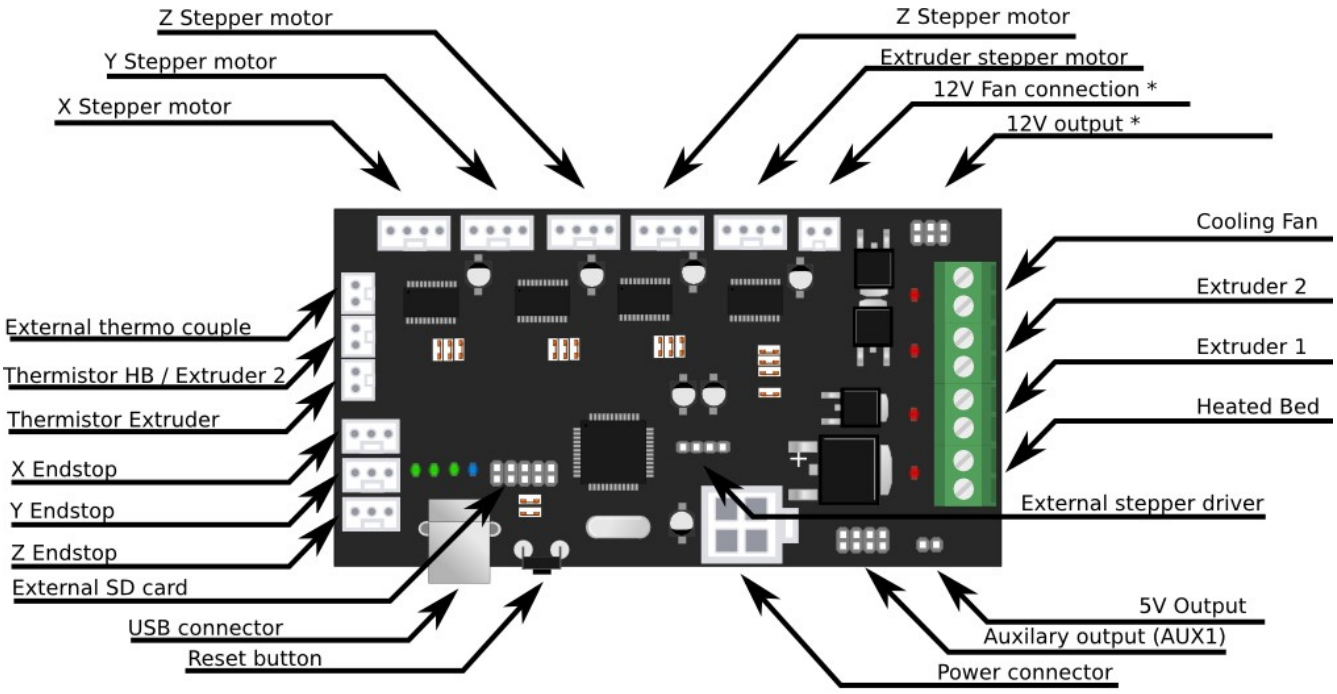
Microcontroller	Atmega1281-16MU Powerful Atmega1281 processor with 128 KB memory, running at 16Mhz
Nr. of extruders	2 (using 1 external stepper motor driver)
Nr. of end stops	3
Nr. of thermistors	3*
Input voltage	Max 12V when SRC12v is jumpered, else 12-24V
Nr. of stepper drivers	5 (4 on board with 1/32 step, 1 externally)

* With the optional 4K7 resistor soldered

OTHER FEATURES

- Auto reset can be disabled by removing a jumper
- The 5V logic circuit can be powered from 12V (**12V MAX!**), by setting a jumper
- 12V has a diode to protect against reverse polarization
- The 5V line is protected by a 500mA resettable fuse
- Four layer high quality PCB board

CONNECTORS



* If the board is powered from a 12V power supply

Name	Description
USB jumper	When jumpered powers the board from USB (5V)
RSTEN jumper	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.
ICSP	2x3 header to program the Atmega chip directly
AUX1	2x4 header for peripherals (I2C) 1. SCL 2. D25 3. SDA 4. D26 5. D19 6. D30 7. GND 8. 5V
X	X End stop
Y	Y End Stop

<table>
<tr><td>Z</td><td>Z End Stop</td></tr>
<tr><td>T1</td><td>Thermistor 1</td></tr>
<tr><td>T2</td><td>Thermistor 2</td></tr>
<tr><td>T3</td><td>External thermo couple header, if R44 (4K7) is soldered another thermistor can be hooked up</td></tr>
<tr><td>FAN</td><td>Output for a fan (same voltage as pwrin) *</td></tr>
<tr><td>OUT5V</td><td>2x1 header for 5V output</td></tr>
<tr><td>OUT12V</td><td>2x3 header for 12V output (same voltage as pwrin) *</td></tr>
<tr><td>XMOT,YMOT,ZMOT,ZMOT1,EMOT</td><td>Connectors for bipolar stepper drivers (ZMOT and ZMOT1 are the same stepper driver)</td></tr>
<tr><td>JP1-4</td><td>Stepper mode selector for stepper drivers, left-to-right or bottom-to-top:
<table>
<tr><th>Jumper 1</th><th>Jumper 2</th><th>Jumper 3</th><th>Resolution</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>Full step</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>Half step</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>¼ step</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1/8 step</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1/16 step</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1/32 step</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1/32 step</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1/32 step</td></tr>
</table></td></tr>
<tr><td>SRC12v jumper</td><td>Power the board from 12V. WARNING: MAX 12V is accepted *</td></tr>
<tr><td>EXTSTEP</td><td>Breakout to hook up an external stepper driver
1. Enable
2. Step
3. Dir
4. GND</td></tr>
<tr><td>PWRIN</td><td>+12V line input when SRC12v is NOT jumpered up to 24V is accepted. *</td></tr>
<tr><td>ICSP</td><td>1. D1
2. 5V
3. SCK
4. D0
5. RESET
6. GND</td></tr>
</table>

	7. MISO 8. MOSI 9. SS 10. D15

* When powering from 24V make sure your heaters and other peripherals can handle 24V as well.

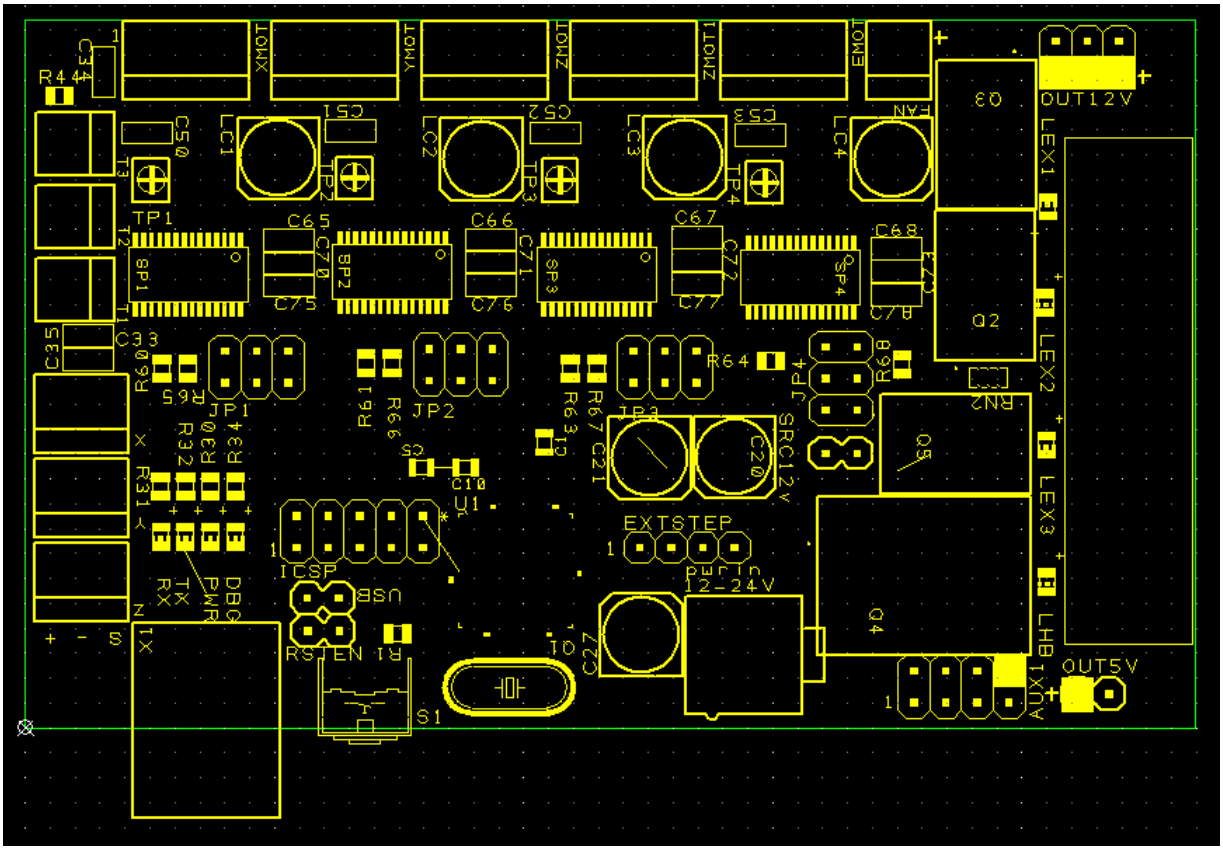
PIN DEFINITION

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

D0	RxD / ICSP	D27	Stepper E Enable
D1	TxD / ICSP	D28	Not Connected
D2	Y endstop *	D29	Not Connected
D3	Heated Bed *	D30	AUX1 (D30)
D4	Not Connected *	D31	Not Connected
D5	X Endstop *	D32	Not Connected
D6	Z Endstop *	D33	Not Connected
D7	Mosfet 3 *	D34	Not Connected
D8	Mosfet 2 *	D35	External Stepper pin 3 (Dir)
D9	Mosfet 1 *	D36	External Stepper pin 2 (Step)
D10	ICSP (SCK)	D37	External Stepper pin 1 (Enable)
D11	ICSP (MOSI)	D38	Stepper Y Enable
D12	ICSP (MISO)	D39	Stepper Y Step
D13	Not Connected	D40	Stepper Y Dir
D14	Not Connected	D41	Stepper Z Enable
D15	ICSP	D42	Stepper Z Step
D16	ICSP (SS)	D43	Stepper Z Dir
D17	SCL	D44	Stepper E Dir
D18	SDA	D45	Stepper E Step
D19	AUX1 (D19)	D46/A0	Debug LED
D20	Not Connected	D47/A1	Stepper X Dir
D21	Not Connected	D48/A2	Stepper X Step
D22	Not Connected	D49/A3	Stepper X Enable
D23	Not Connected	D50/A4	Not Connected
D24	Not Connected	D51/A5	Thermo couple T3
D25	AUX1 (D25)	D52/A6	Thermistor T2
D26	AUX1 (D26)	D53/A7	Thermistor T1

* PWM enabled

BOARD DIMENSIONS



Board dimensions: 93.9 x 56.8mm x 18mm

List of M3 holes (measured from the bottom left):
2.3, 2.3
2.6, 54.65
91.9, 2.25
91.9, 54.6