

# Einsy Rambo

## UltiMachine

0.3a Revision Summary (for detailed infomation goto: <https://github.com/ultimachine/Einsy-Rambo/tree/0.3a>)

- Added TVS and over-voltage protection to select nets
- Added and corrected testpoints
- Added "XTRA0" net between 32U2 and 2560
- Removed via tenting underneath QFNs and other flat solder lug/ heatsink primitives
- Added teardrops to vias
- Standardized via sizes to 10/22 and 15/30 (mils)
- New footprint for 5V SMPS inductor (fits two inductors now)
- Added I2C pullup footprints (resistors are "DNI")
- Fan connectors now have a 3rd pin for reading the TACH signal
- Added 100R to the gate of each FET
- Adjusted the stackup to better reflect a standard 4-layer stack

0.4a Revision Summary

- Touchup diode polarity markings in silkscreen
- New footprint for P3
- Moved thermistor TPs to connector pin
- Increased GND stitching
- Increased copper pour coverage
- Updated paste mask apertures on QFNs
- Added nAC\_FAULT to pin\_6 of Atmega2560
- Added J7, power failure relay input.
- Added R73
- Removed RN4
- Stole RX1 and TX1 from P1, moved to J19
- Combined 2560 ICSP (X18) with pins\_9-14 of J19
- Removed J16-J18, X\_MAX, Y\_MAX, Z\_MAX
- Changed X\_MIN and Y\_MIN endstops to 2-pin headers
- Changed Z\_MIN endstop to Z\_PROBE, 4-pin header
- Combined DIAG\_0 and DIAG\_1 on TMC2130 drivers
- TP40 moved 0.1" to the left
- TP32 moved 0.1" to the left

0.5a Revision Summary

- Added ferrites to motor controller outputs.
- Removed fuse and input filter for VMOT
- Move MOSFET pulldown resistors to input side of AND gates
- Added ferrites to all P1 and P2 signals.
- Changed RN1 and RN2 from 10k to 5.6k (increases voltage on motor controller Vref pins)
- Changed motor controller low-side I-sense resistors from 0.1 to 0.22Ohm
- Voltage regulator U3 is now sourced from VMOT (was +12V2)
- Added power bypass capacitors to J7 and J15
- +12V2(Logic) and +12V3(Bed) now have micro-controller ADC based voltage monitoring.
- Added 2 internal layers (now 6 layers total)
- Added filtered internal island for micro-controller Vcc
- Most bottom layer routing (Layer 6) was moved to the new adjacent internal layer (Layer 5)
- Moved MOSFET pulldowns R43 and R57 upstream from FETs and placed at input of AND gate.
- New pinout for J19 header.
- Motor connectors are now flush with the bottom edge of the board.

1.0a Revision Summary

- Populate FGND to GND resistor ties

1.1a Revision Summary

- Added 2Mb serial flash
- Added voltage translators for serial flash
- Added tri-state buffer to block 3.3V MISO on the SD Card from the 5V MISO bus
- Added barrel-relief to bottom side of thermal vias for TMC2130, FETs and SMPS
- Added 3.3V LDO for serial flash

1.2a Revision Summary

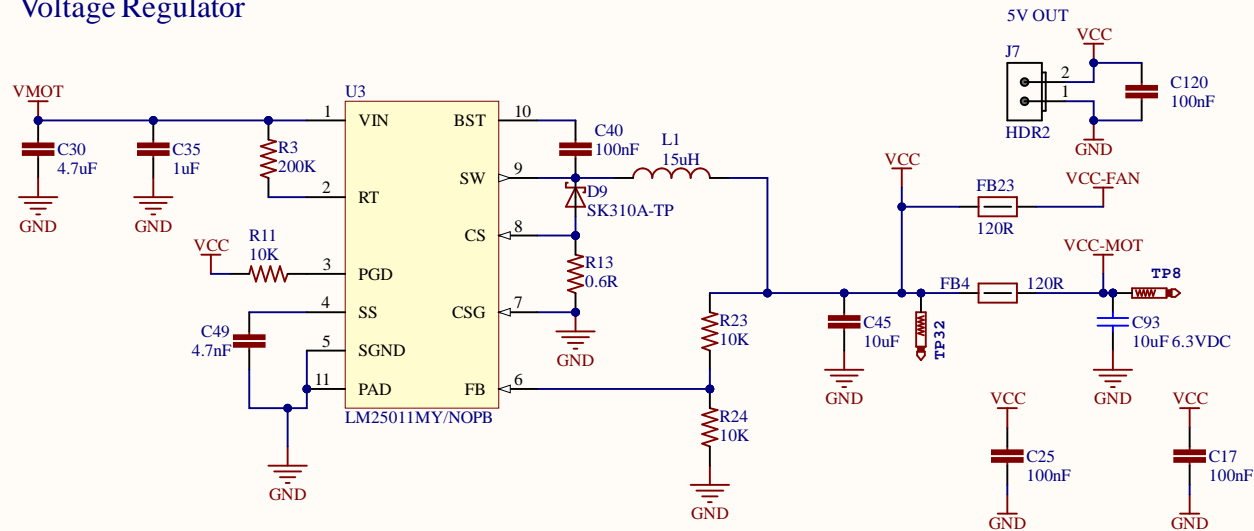
- Added ferrites to off board signals

Notes:  
DNI Do Not Include No Populate

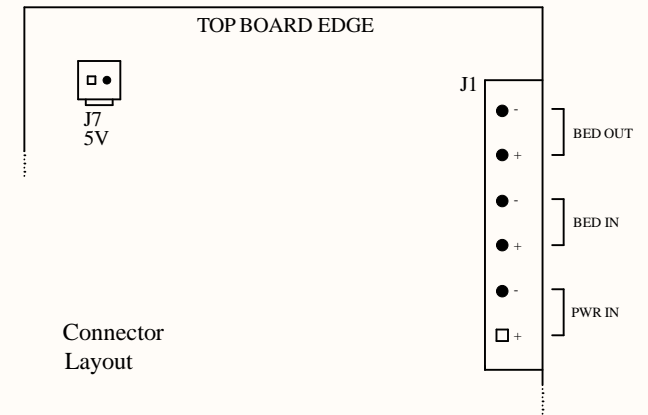
Project: Einsy Rambo	Ver: 1.2 c
Title: *	File: Title.SchDoc
Drawn by: UltiMachine	Sheet: 1 of 11



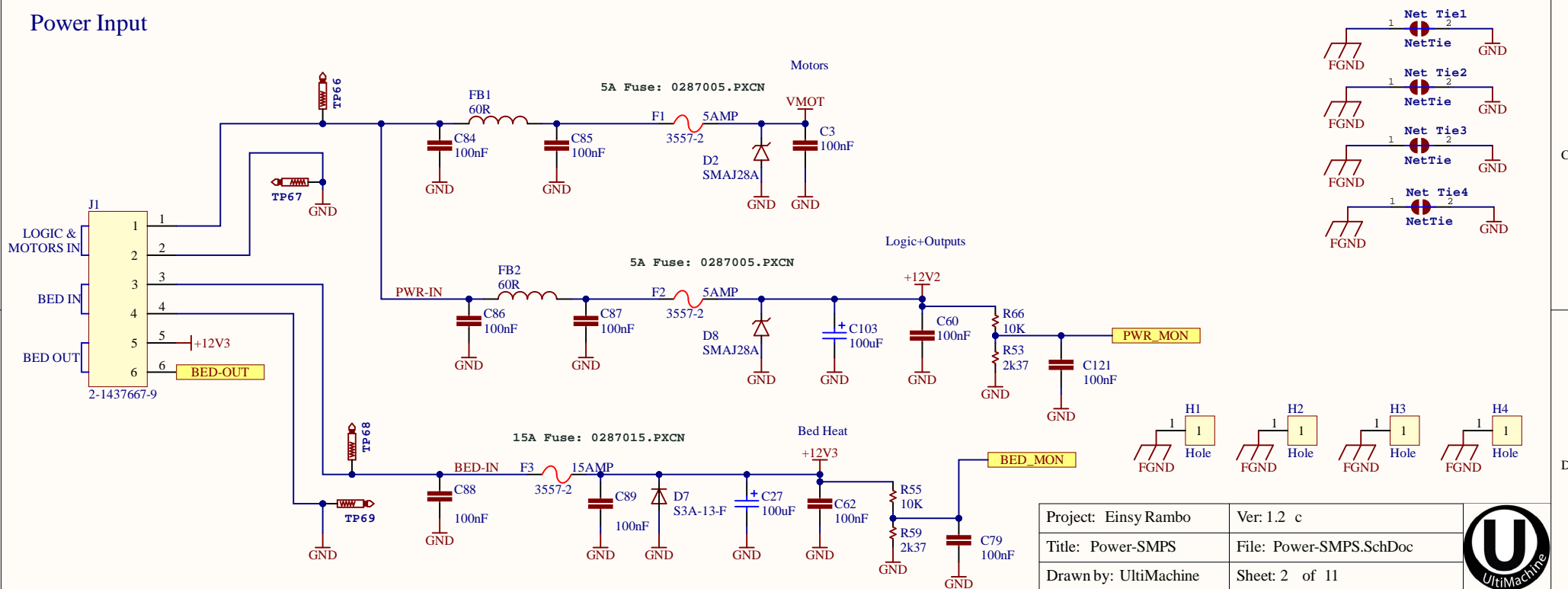
## Voltage Regulator




## TOP BOARD EDGE



## Power Input



Project: Einsy Rambo	Ver: 1.2 c	
Title: Power-SMPS	File: Power-SMPS.SchDoc	
Drawn by: UltiMachine	Sheet: 2 of 11	

A

A

B

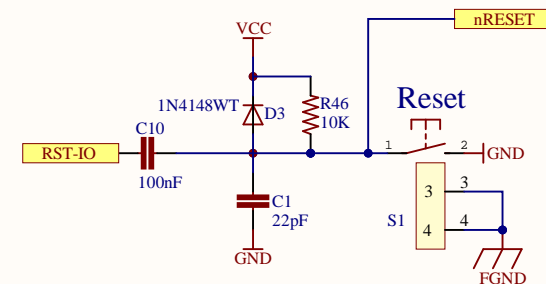
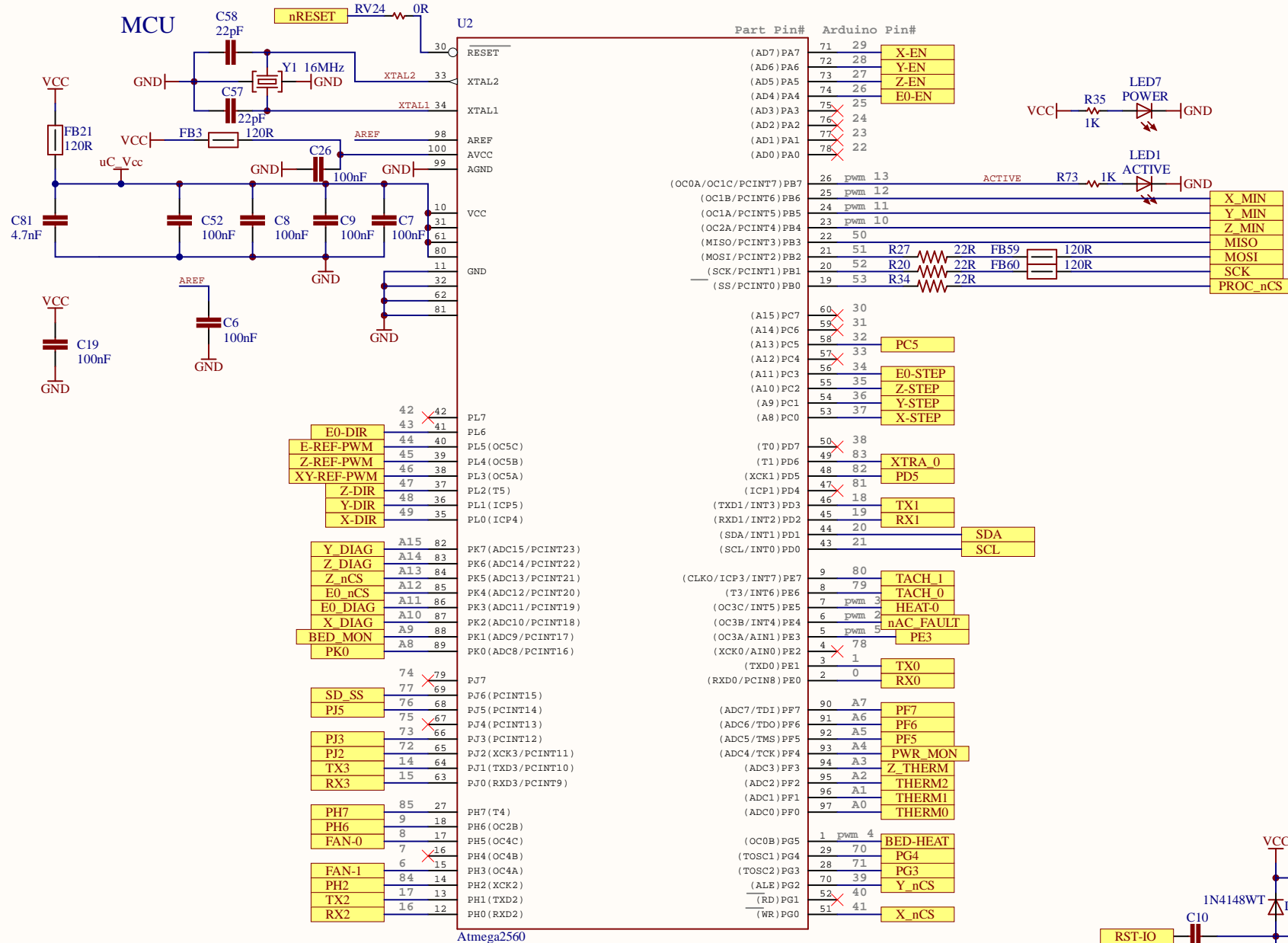
B

C

C

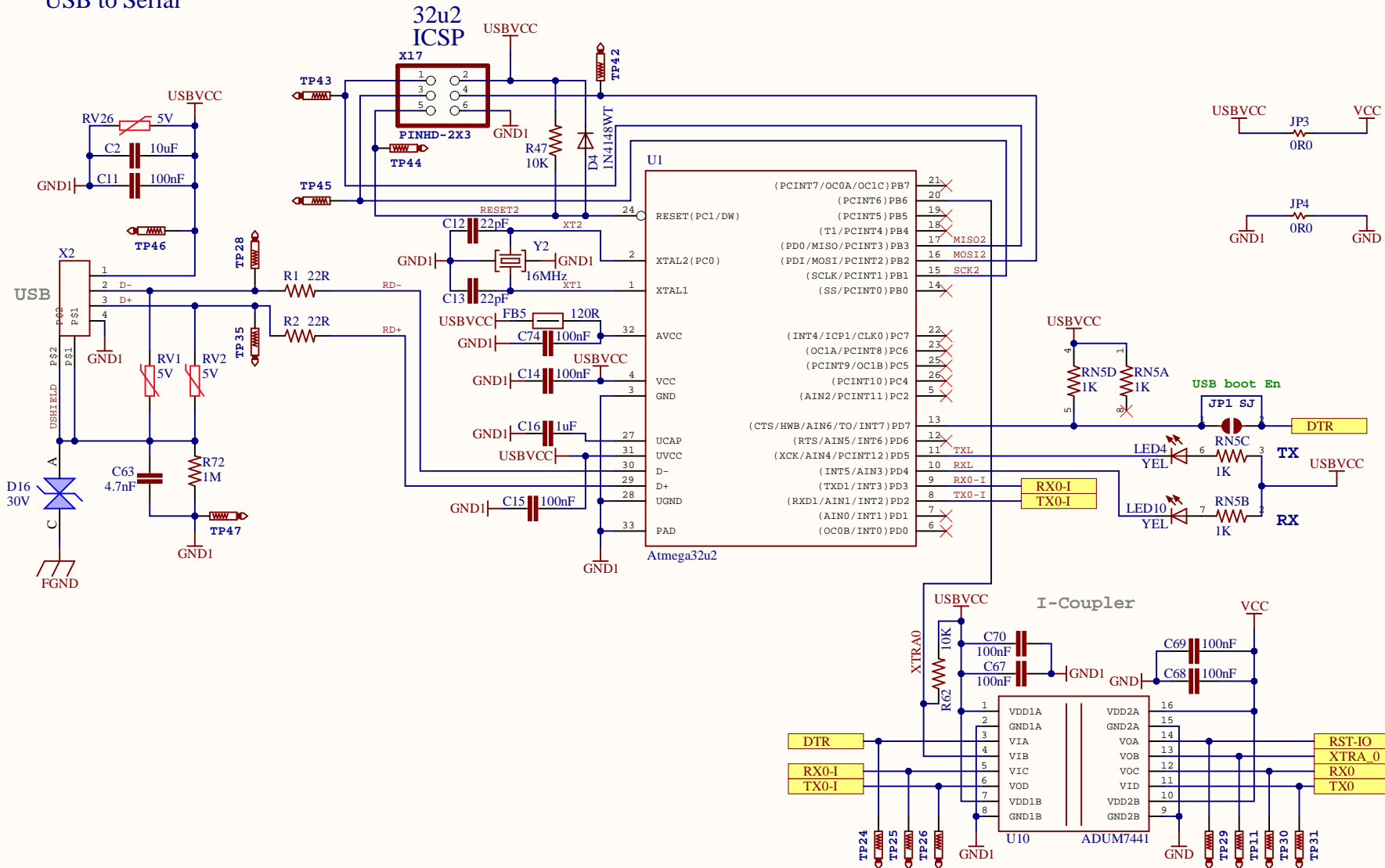
D

D



# Atmega 32u2 USB

## USB to Serial



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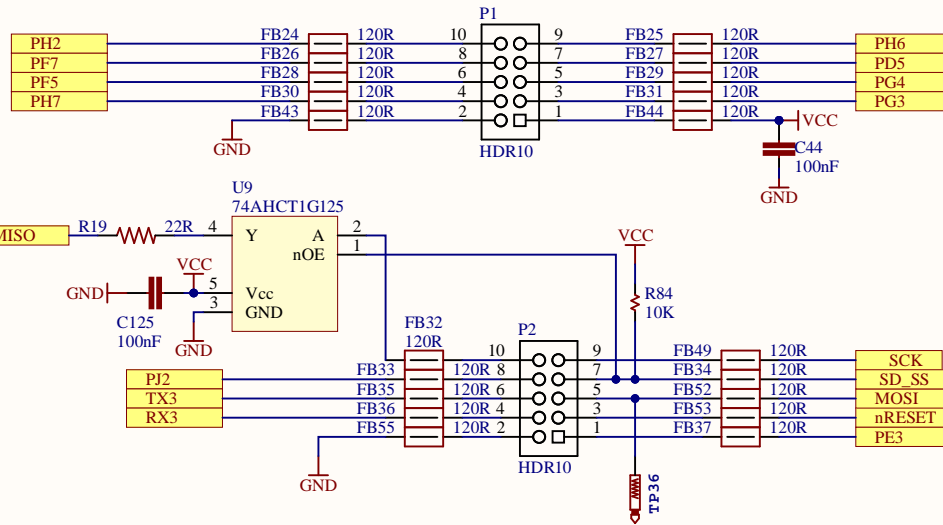
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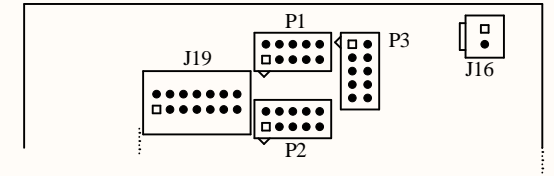
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Project: Einsy Rambo	Ver: 1.2 c	
Title: USB-Serial	File: USB-Serial.SchDoc	
Drawn by: UltiMachine	Sheet: 4 of 11	

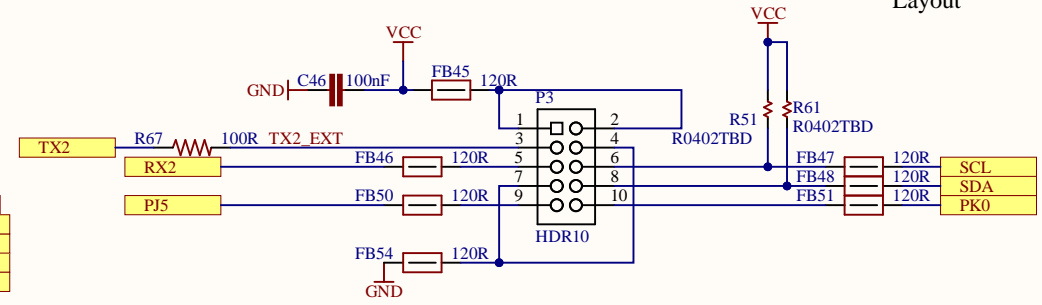
## Expansion Connectors



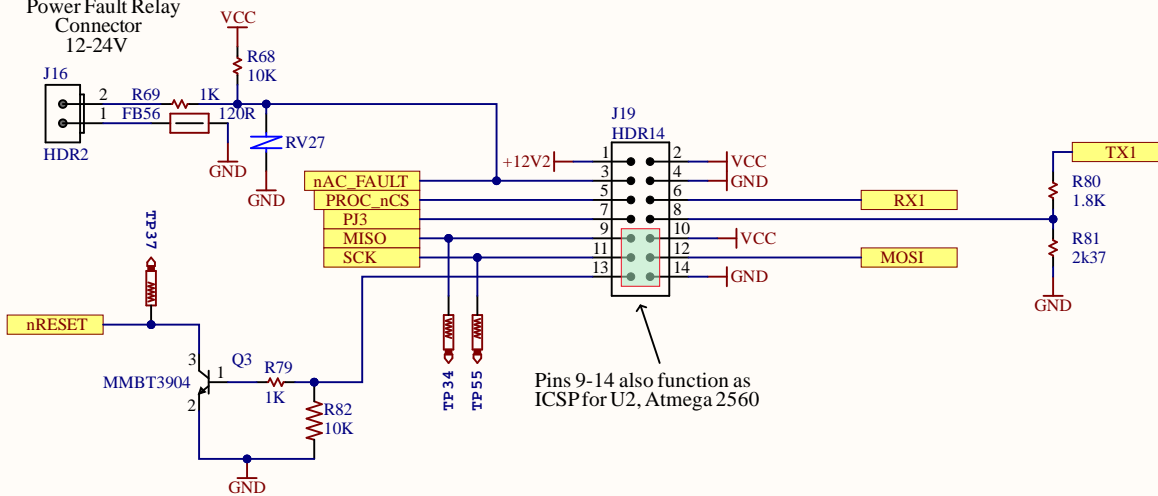
## TOP BOARD EDGE



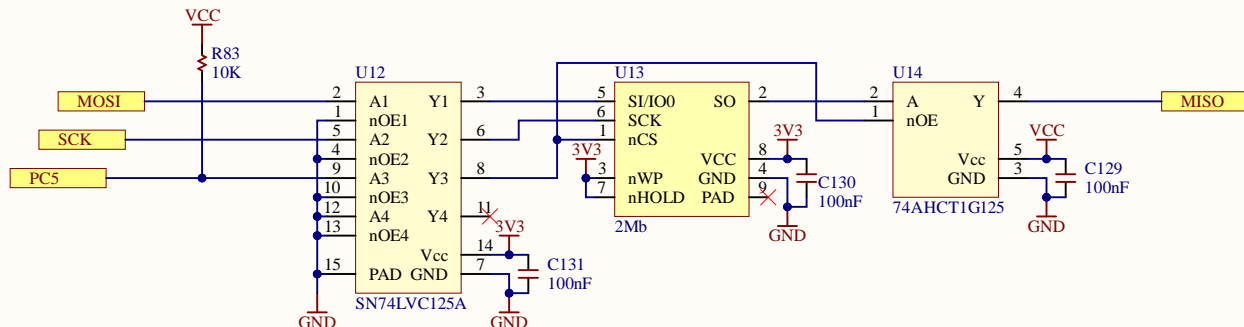
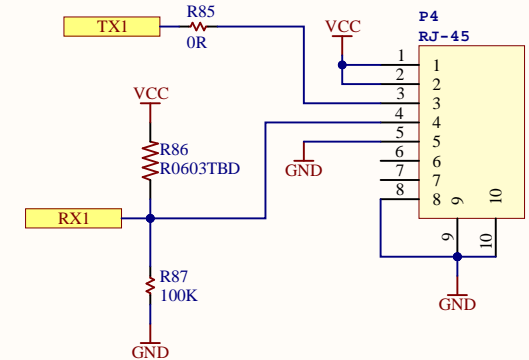
## Connector Layout




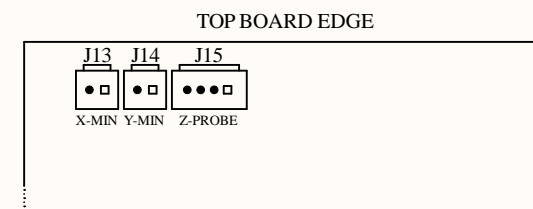
## Power Fault Relay Connector 12-24V



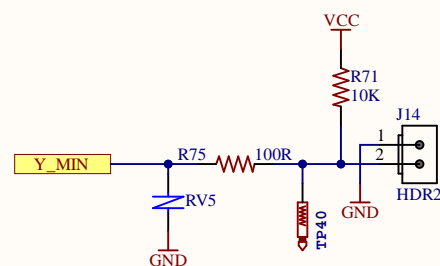
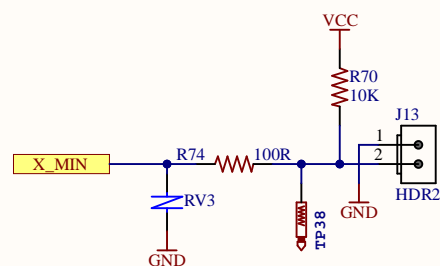
Pins 9-14 also function as ICSP for U2, Atmega 2560



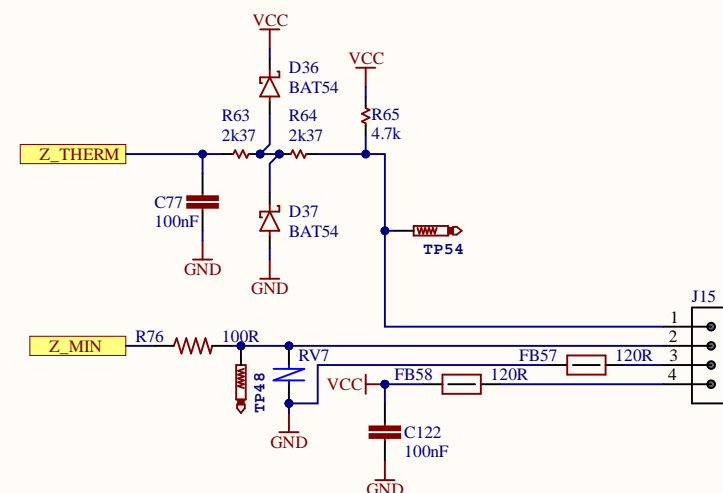
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Title: Connectors	File: Connectors.SchDoc	
Drawn by: UltiMachine	Sheet: 5 of 11	




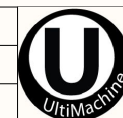
## Connector Layout



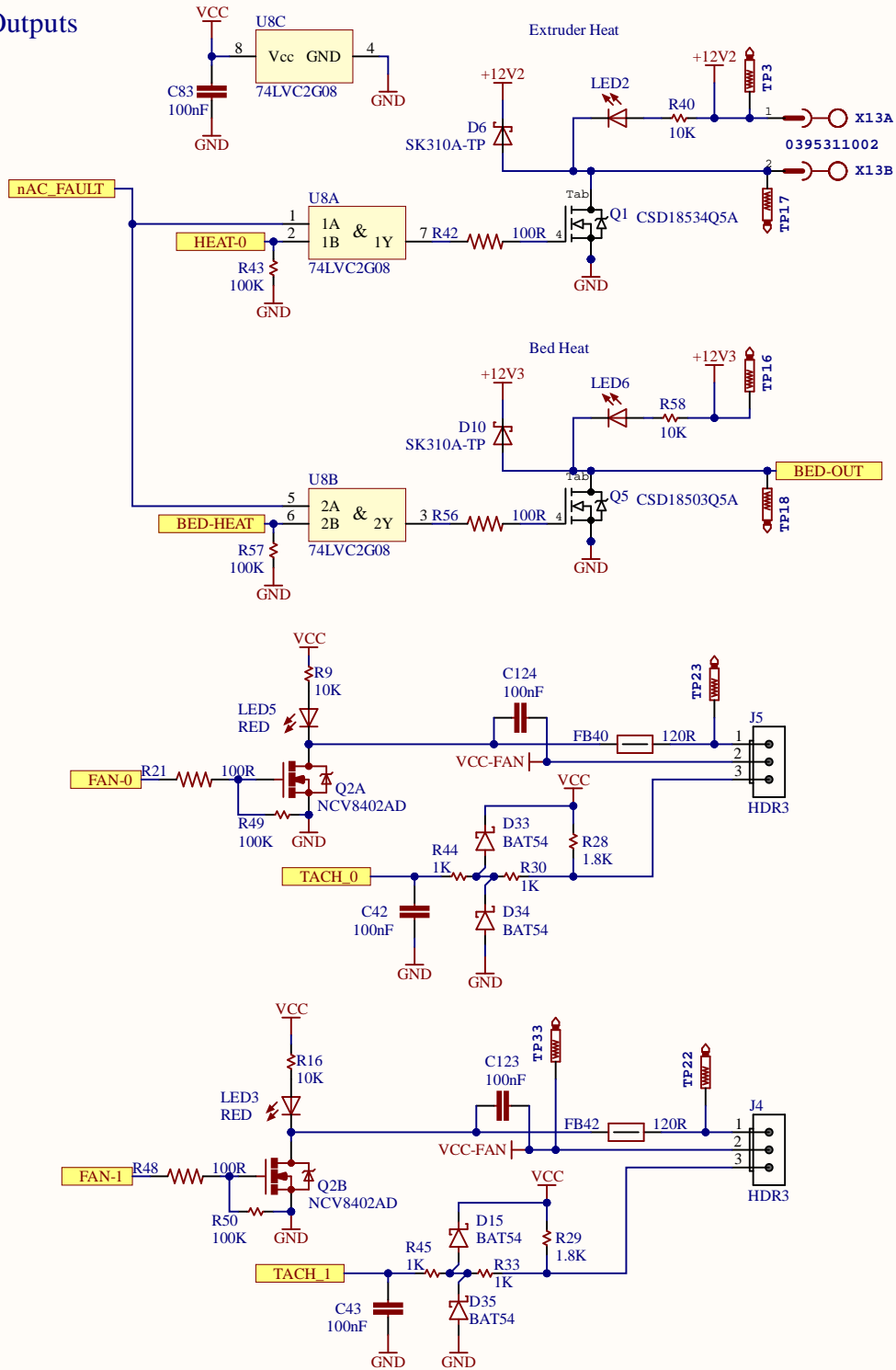
## End Stops



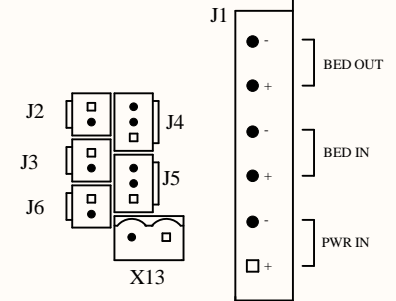
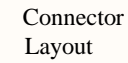
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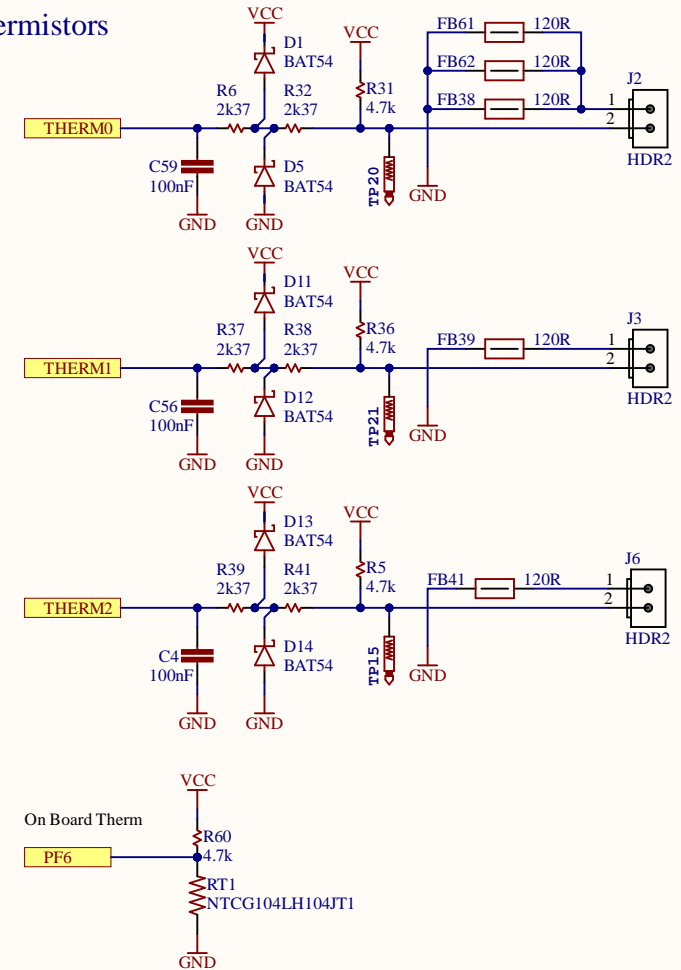
## Heater Outputs




## TOP BOARD EDGE

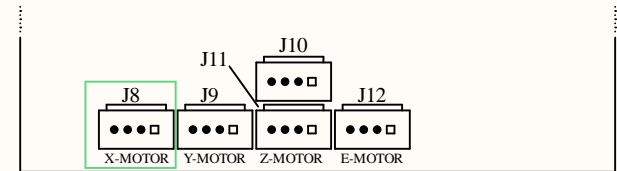


## Thermistors



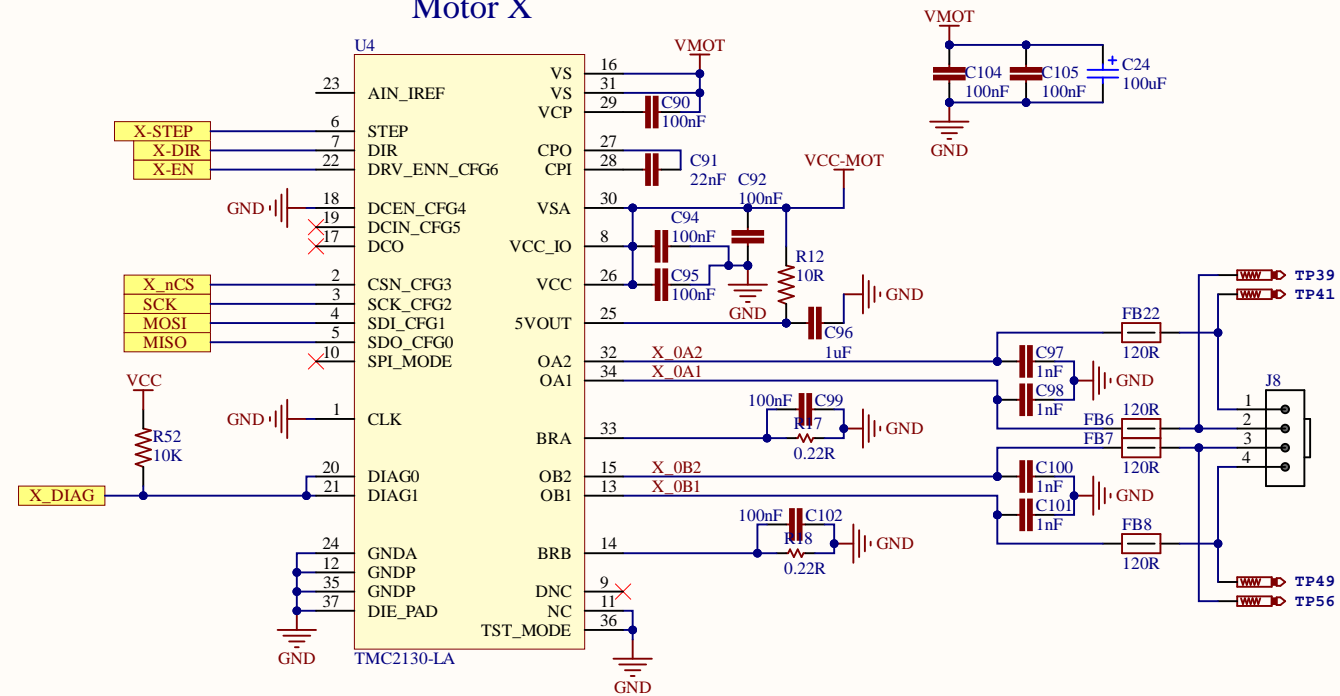
Project: Einsy Rambo	Ver: 1.2 c	
Title: Heaters	File: Heaters.SchDoc	
Drawn by: UltiMachine	Sheet: 7 of 11	

Connector  
Layout



BOTTOM BOARD EDGE

Motor X

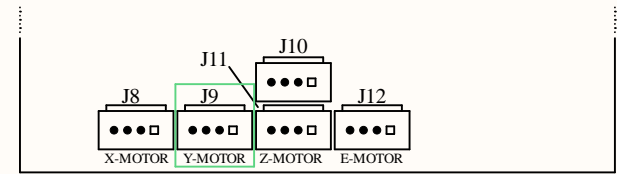


Deprecated Test Points

X_0A1	TP75
X_0A2	TP73
X_0B1	TP1
X_0B2	TP74

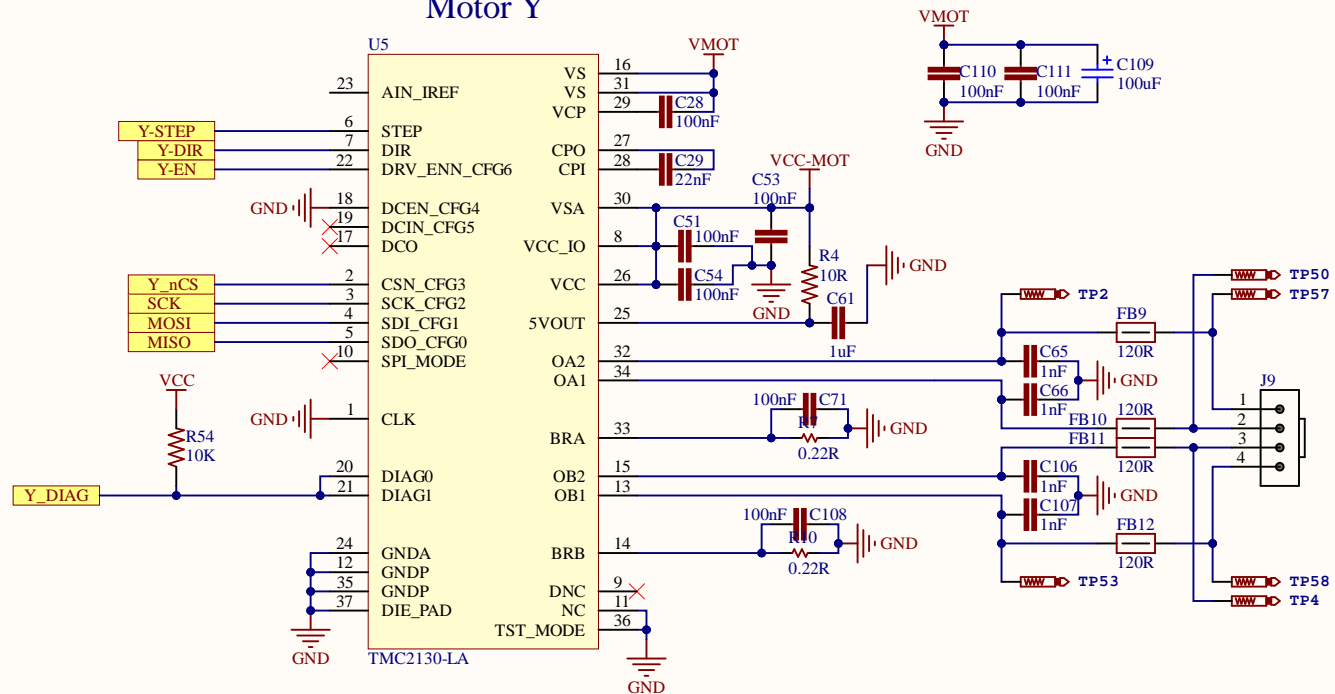
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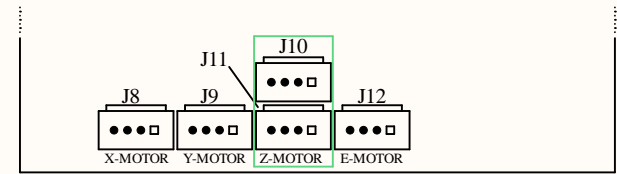


Connector  
Layout

BOTTOM BOARD EDGE

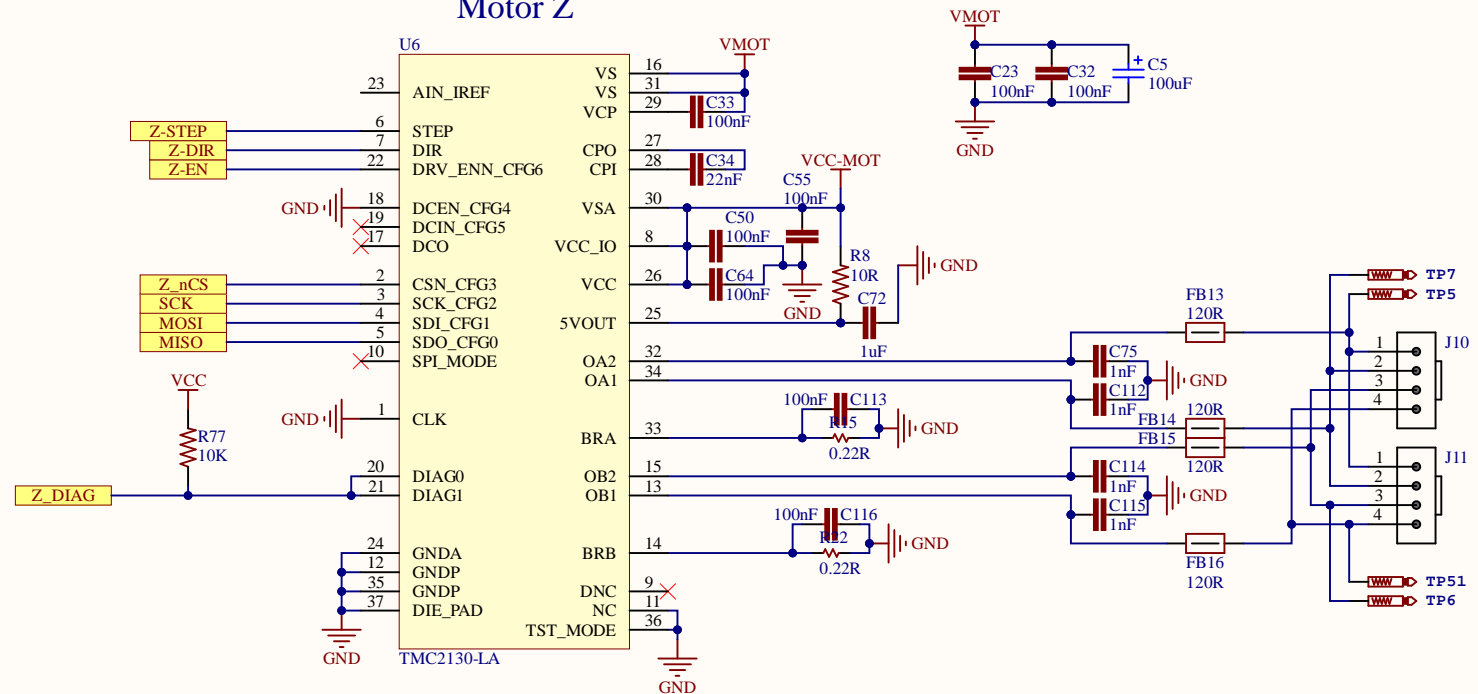
## Motor Y

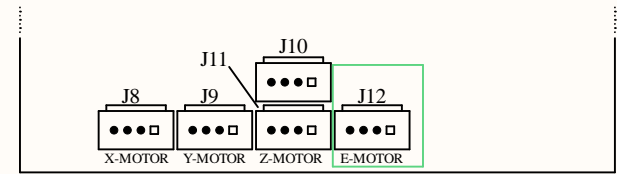


Connector  
Layout

BOTTOM BOARD EDGE

## Motor Z



Connector  
Layout

BOTTOM BOARD EDGE

## Motor E

