

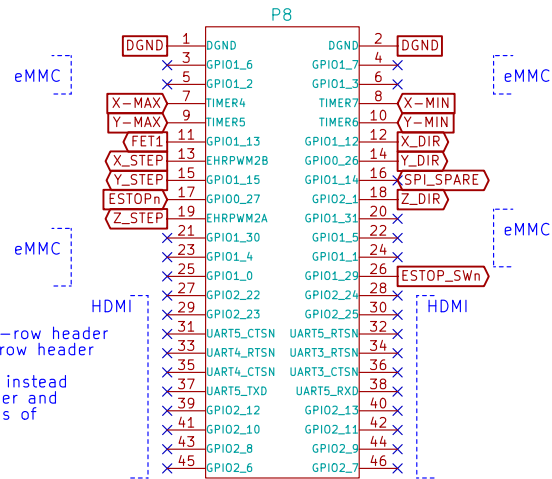
To save money on all the pin headers when buying parts for a few boards you can get large breakaway headers instead of the individual parts. You will need a total of:

18 pins of single-row header
82 pins of dual-row header

Which you can get using

- (1) Harwin M20-9993645 36-pin single-row header
- (2) Harwin M20-9983645 72-pin dual-row header

If you want to use standard pin headers instead of the latching KK headers for the stepper and ESTOP headers, you need another 32 pins of single-row header



Stepper Drivers

steppers.sch

Emergency Stop

e-stop.sch

Inputs

con_inputs.sch

Mosfet Outputs

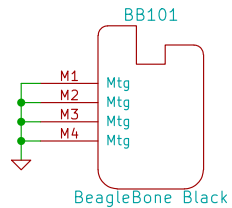
con_outputs.sch

Serial Console



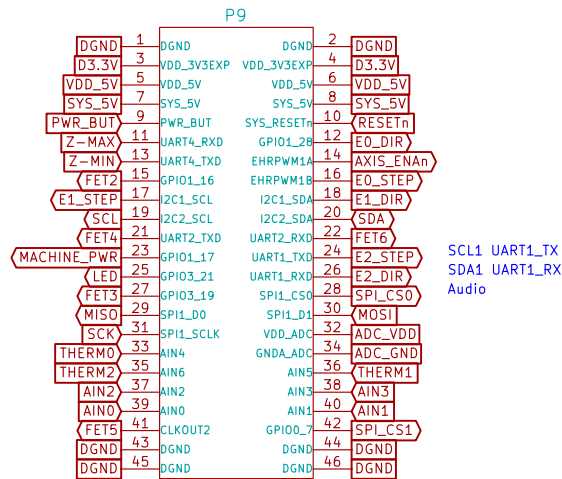
BeagleBone serial console pass-through header

Uses Arduino 6-pin stacking connector for low-cost



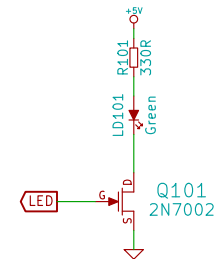
24.576MHz Audio

Audio

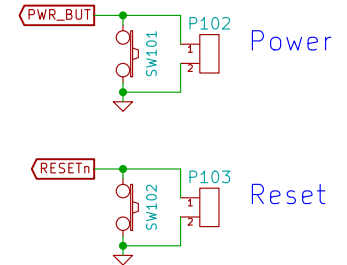
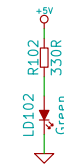


SCL1 UART1_TX
SDA1 UART1_RX
Audio

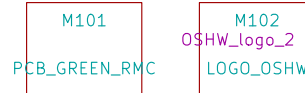
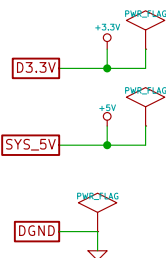
Status LED



BB Turned On



BeagleBone Logic supply is always 3.3V



CRAMPS by Charles Steinkuehler and Murray Lindeblom
Copyright 2014 GPL v3
Derived from RAMPS-FD by Bob Cousins
Derived from RAMPS 1.4 repp.org/wiki/RAMPS1.4

File: CRAMPS.sch

Sheet: /

Title: CRAMPS (Cape-RAMPS for BeagleBone)

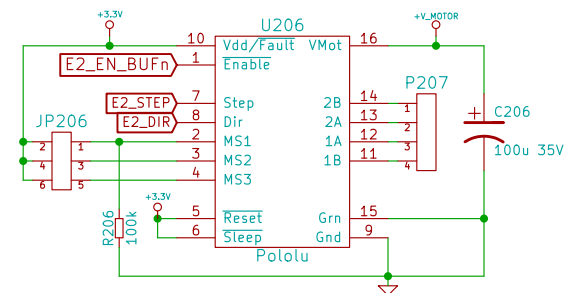
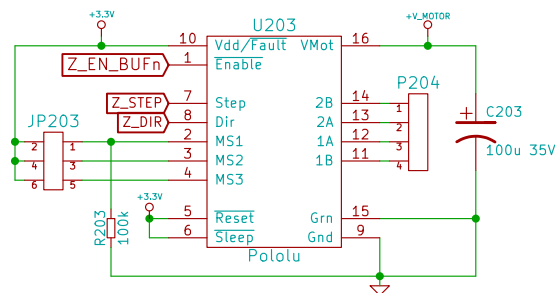
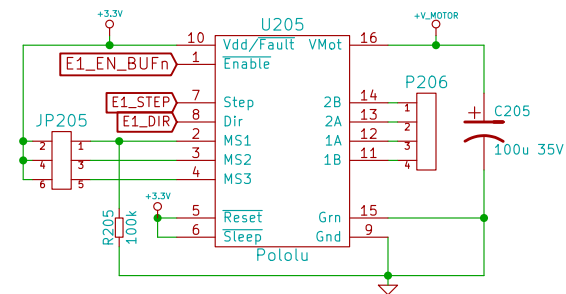
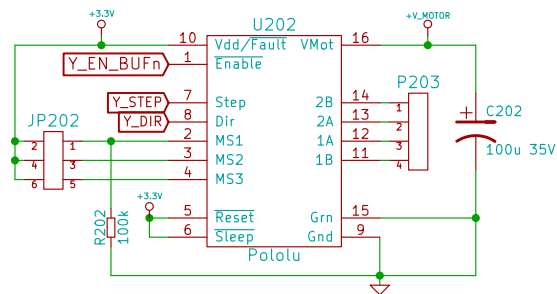
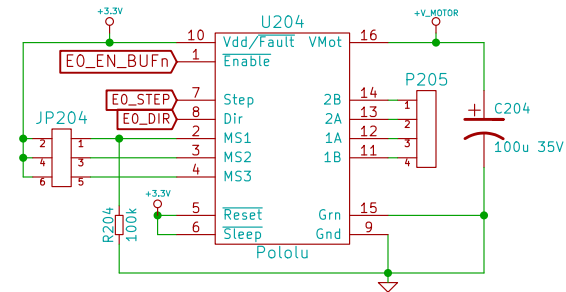
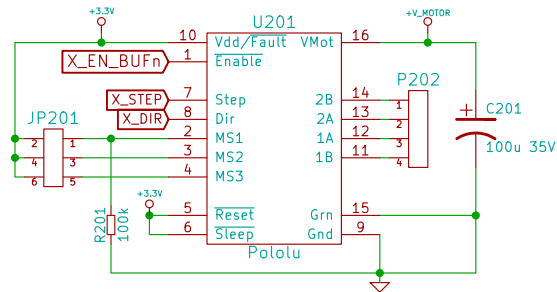
Size: A

Date: 2 may 2014

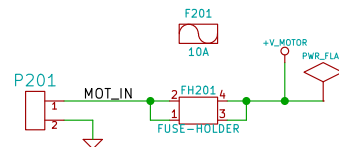
Rev: v1.0

KiCad E.D.A.

Id: 1/5



Motor Power
12-24V, 10A



Shunts to set
micro-stepping

S201	S207	S213
SHUNT	SHUNT	SHUNT
S202	S208	S214
SHUNT	SHUNT	SHUNT
S203	S209	S215
SHUNT	SHUNT	SHUNT
S204	S210	S216
SHUNT	SHUNT	SHUNT
S205	S211	S217
SHUNT	SHUNT	SHUNT
S206	S212	S218
SHUNT	SHUNT	SHUNT

24-pin Single-Row
sockets for Pololu

P208	P210
POLOLU_SOCKET	POLOLU_SOCKET
P209	P211
POLOLU_SOCKET	POLOLU_SOCKET

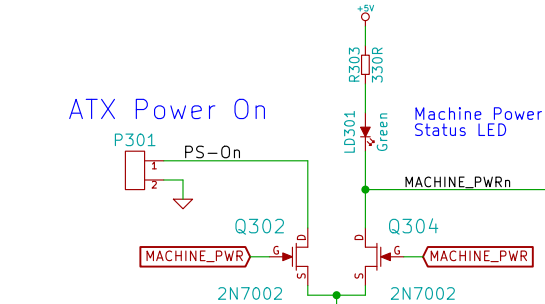
CRAMPS by Charles Steinkuehler and Murray Lindeblom
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Derived from RAMPS-FD by Bob Cousins
Derived from RAMPS 1.4 reprap.org/wiki/RAMPS1.4

File: steppers.sch
Sheet: /Stepper Drivers/
Title: CRAMPS (Cape-RAMPS for BeagleBone)

Size: A Date: 2 may 2014
KiCad E.D.A.

Rev: v1.0
Id: 2/5

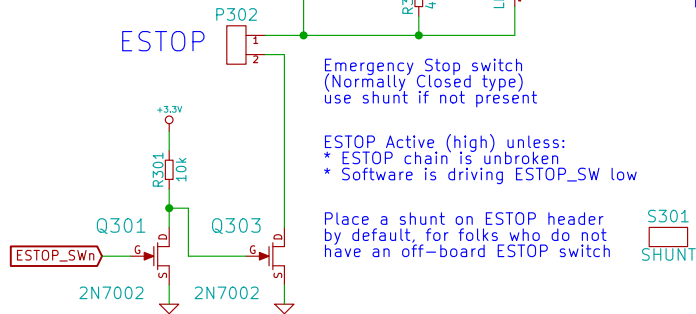
ATX Power On



Series resistor on ESTOPn provides some protection from ESTOP chain

FETs protect against high voltage from PS_ON or MACHINE_PWRn feeding back to the 3.3V 'Bone

ESTOP



Emergency Stop switch (Normally Closed type) use shunt if not present

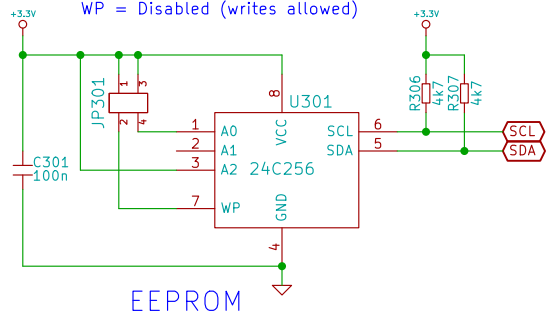
ESTOP Active (high) unless:
* ESTOP chain is unbroken
* Software is driving ESTOP_SW low

Place a shunt on ESTOP header by default, for folks who do not have an off-board ESTOP switch

S301
SHUNT

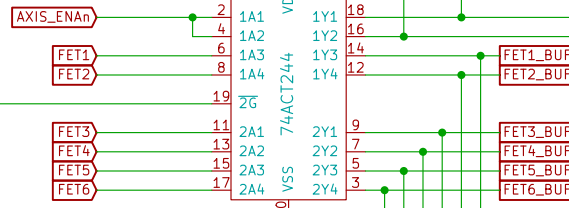
Two FETs used to keep ESTOP polarity consistent with V1.0

Address and WP pins have internal pull-down
Default configuration is no shunts populated:
Addr = 0xA8
WP = Disabled (writes allowed)



EEPROM

Must use ACT type buffer with 24 mA output drive
Inputs are compatible with 3.3V or 5V logic



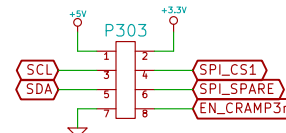
Each Pololu has a 100K pull-down on the enable line. Make sure the pull up will reach a valid logic level (2.2V or more) with multiple enables paralleled.

Active high

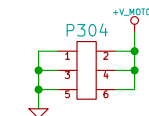
Active low

CRAMP3 Expansion

I2C and misc signals

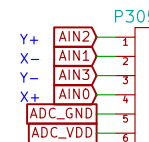


Motor Power



Analog

Resistive Touch Screen



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Copyright 2014 GPL v3
Derived from RAMPS-FD by Bob Cousins
Derived from RAMPS 1.4 reprap.org/wiki/RAMPS1.4

File: e-stop.sch

Sheet: /Emergency Stop/

Title: CRAMPS (Cape-RAMPS for BeagleBone)

Size: A Date: 2 may 2014

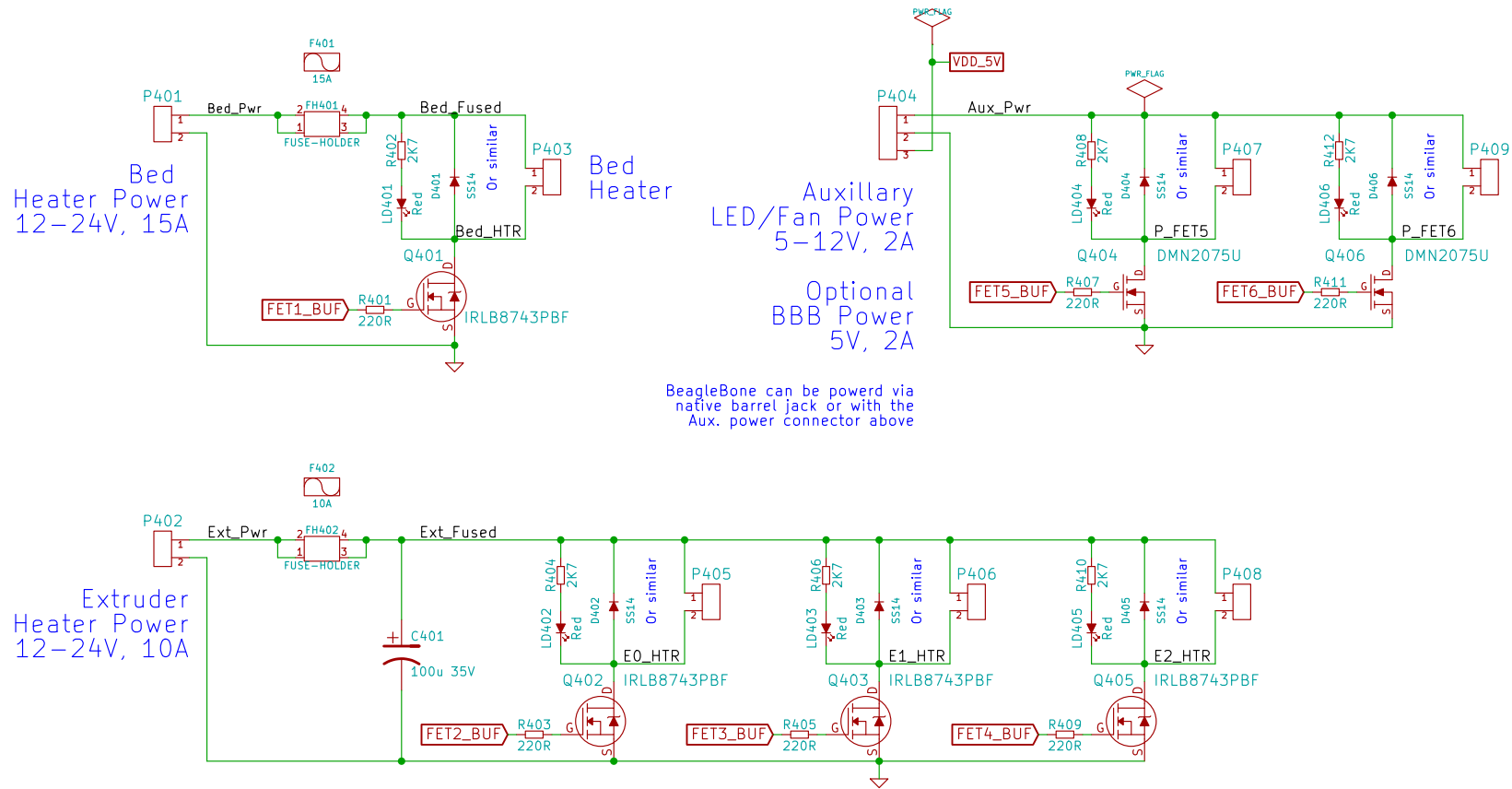
KiCad E.D.A.

Rev: v1.0

Id: 3/5

MOSFET Outputs

Non-inverting drivers



CRAMPS by Charles Steinkuehler and Murray Lindeblom
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 Derived from RAMPS-FD by Bob Cousins
 Derived from RAMPS 1.4 reprap.org/wiki/RAMPS1.4

File: con_outputs.sch

Sheet: /Mosfet Outputs/

Title: CRAMPS (Cape-RAMPS for BeagleBone)

Size: A Date: 2 may 2014

KiCad E.D.A.

Rev: v1.0

Id: 4/5

Endstops

Endstop inputs are 5V tolerant and may also be used as 3.3V output signals if desired

5V

C501 100n

5V

P501

P502

P503

MISO-5V

SCK-5V

MOSI-5V

SPI_CS0

U501

A1

A2

A3

A4

A5

A6

A7

A8

A9

A10

A11

A12

B1

B2

B3

B4

B5

B6

B7

B8

B9

B10

22

21

20

19

18

17

16

15

14

13

12

11

10

9

8

7

6

5

4

3

2

1

0

74CBTD3861

X-MIN

X-MAX

Y-MIN

Y-MAX

Z-MIN

Z-MAX

MISO

SCK

MOSI

SPI_CS0-5V

Thermistor Inputs

ADC_VDD

ADC_GND

THERMO

R511 2K0 1%

R515 4k7

C502 100n

C506 10u

THERM1

R512 2K0 1%

R516 4k7

C503 100n

C507 10u

THERM2

R513 2K0 1%

R517 4k7

C504 100n

C508 10u

THERM3

R514 2K0 1%

R518 4k7

C505 100n

C509 10u

AIN3

JP501

S501 SHUNT

Shunt populated by default. Remove to support 4-wire touch-screen using AIN 0-3

From Thermistors

To ADC Inputs

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Derived from RAMPS-FD by Bob Cousins
Derived from RAMPS 1.4 reprap.org/wiki/RAMPS1.4

File: con_inputs.sch
Sheet: /Inputs/
Title: CRAMPS (Cape-RAMPS for BeagleBone)

Size: A	Date: 2 may 2014	Rev: v1.0
KICad E.D.A.		Id: 5/5

Endstops

Endstop inputs are 5V tolerant and may also be used as 3.3V output signals if desired

5V

C501 100n

5V

P501

P502

P503

MISO-5V

SCK-5V

MOSI-5V

SPI_CS0

U501

74CBTD3861

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12

B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12

X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

Thermistor Inputs

ADC_VDD

ADC_GND

THERMO

THERM1

THERM2

THERM3

AIN3

JP501

S501 SHUNT

Shunt populated by default. Remove to support 4-wire touch-screen using AIN 0-3

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Derived from RAMPS-FD by Bob Cousins
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Sheet: /Inputs/
Title: CRAMPS (Cape-RAMPS for BeagleBone)

Size: A	Date: 2 may 2014	Rev: v1.0
KICad E.D.A.		Id: 5/5

Endstops

Endstop inputs are 5V tolerant and may also be used as 3.3V output signals if desired

Thermistor Inputs

From Thermistors

To ADC Inputs

U501 Pinout:

Pin	Signal
1	A1
2	A2
3	A3
4	A4
5	A5
6	A6
7	A7
8	A8
9	A9
10	A10
11	OE
12	GND
13	B10
14	MOSI
15	SCK
16	MISO
17	Z-MAX
18	Z-MIN
19	Y-MAX
20	Y-MIN
21	X-MAX
22	X-MIN

74CBTD3861 Pinout:

Pin	Signal
1	VCC
2	A1
3	A2
4	A3
5	A4
6	A5
7	A6
8	A7
9	A8
10	A9
11	A10
12	OE
13	B10
14	MOSI
15	SCK
16	MISO
17	Z-MAX
18	Z-MIN
19	Y-MAX
20	Y-MIN
21	X-MAX
22	X-MIN

Endstop Connections:

- Endstop inputs are 5V tolerant and may also be used as 3.3V output signals if desired.
- Endstop inputs are connected to the microcontroller pins (A1-A10, OE) via a 74CBTD3861 decoder.
- Endstop inputs are connected to the microcontroller pins (A1-A10, OE) via a 74CBTD3861 decoder.

Thermistor Connections:

- Thermistor inputs are connected to the microcontroller pins (A1-A10, OE) via a 74CBTD3861 decoder.
- Thermistor inputs are connected to the microcontroller pins (A1-A10, OE) via a 74CBTD3861 decoder.

ADC Inputs:

- ADC inputs are connected to the microcontroller pins (A1-A10, OE) via a 74CBTD3861 decoder.
- ADC inputs are connected to the microcontroller pins (A1-A10, OE) via a 74CBTD3861 decoder.

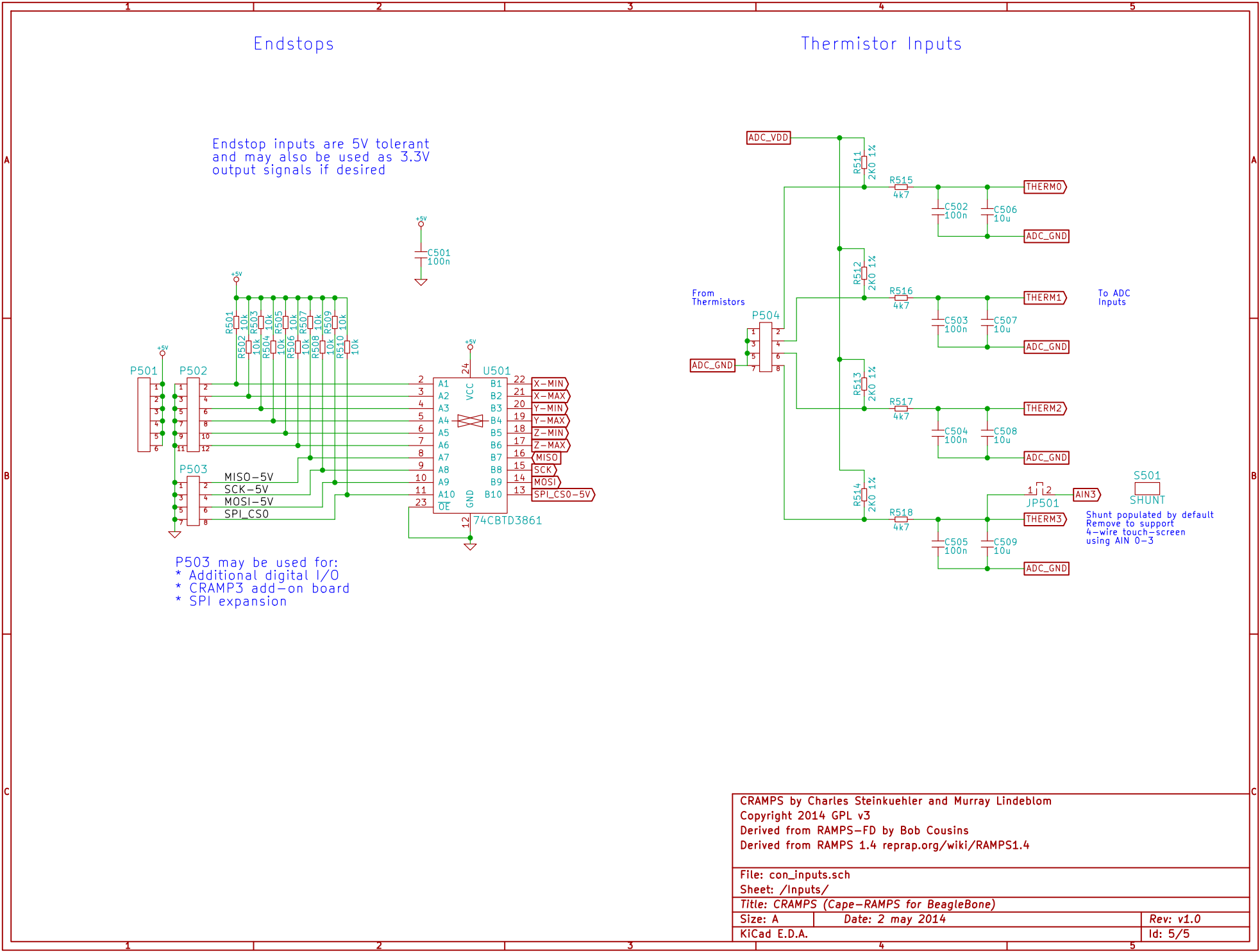
Other Components:

- P501:** MISO-5V, SCK-5V, MOSI-5V, SPI_CS0
- P502:** MISO-5V, SCK-5V, MOSI-5V, SPI_CS0
- P503:** MISO-5V, SCK-5V, MOSI-5V, SPI_CS0
- P504:** MISO-5V, SCK-5V, MOSI-5V, SPI_CS0
- S501:** SHUNT
- JP501:** SHUNT

CRAMPS by Charles Steinkuehler and Murray Lindeblom
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 Derived from RAMPS-FD by Bob Cousins
 Derived from RAMPS 1.4 reprap.org/wiki/RAMPS1.4

File: con_inputs.sch
 Sheet: /Inputs/
 Title: CRAMPS (Cape-RAMPS for BeagleBone)

Size: A	Date: 2 may 2014	Rev: v1.0
KICad E.D.A.		Id: 5/5



Endstops

Endstop inputs are 5V tolerant and may also be used as 3.3V output signals if desired

5V

C501 100n

P501 P502 P503 P504 P505 P506 P507 P508 P509 P510

10k 10k 10k 10k 10k 10k 10k 10k 10k 10k

2 3 4 5 6 7 8 9 10 11 12

MISO-5V SCK-5V MOSI-5V SPI_CS0

U501

22 21 20 19 18 17 16 15 14 13

X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

74CBTD3861

P503 may be used for:

- * Additional digital I/O
- * CRAMP3 add-on board
- * SPI expansion

Thermistor Inputs

ADC_VDD

R511 2K0 1%

R515 4k7

C502 100n C506 10u

THERM0

ADC_GND

R512 2K0 1%

R516 4k7

C503 100n C507 10u

THERM1

ADC_GND

R513 2K0 1%

R517 4k7

C504 100n C508 10u

THERM2

ADC_GND

R514 2K0 1%

R518 4k7

C505 100n C509 10u

THERM3

ADC_GND

AIN3

JP501

S501 SHUNT

Shunt populated by default. Remove to support 4-wire touch-screen using AIN 0-3

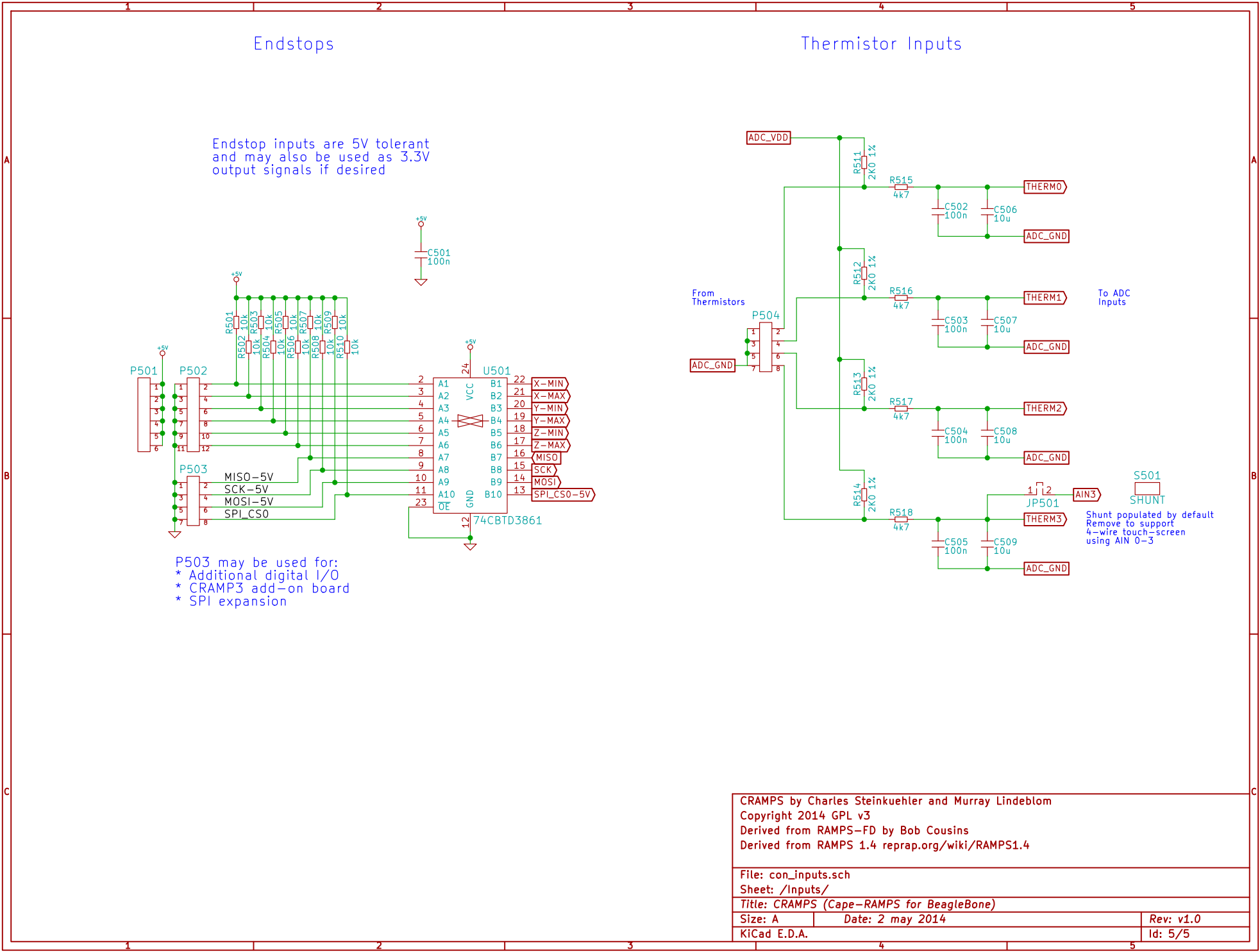
From Thermistors

To ADC Inputs

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Size: A	Date: 2 may 2014	Rev: v1.0
KICad E.D.A.		Id: 5/5



Endstops

Endstop inputs are 5V tolerant and may also be used as 3.3V output signals if desired

5V

C501 100n

P501 P502 P503 P504 P505 P506 P507 P508 P509 P510

MISO-5V SCK-5V MOSI-5V SPI_CS0

U501

74CBTD3861

X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

P503 may be used for:

- * Additional digital I/O
- * CRAMP3 add-on board
- * SPI expansion

Thermistor Inputs

ADC_VDD

ADC_GND

THERM0 THERM1 THERM2 THERM3

From Thermistors

To ADC Inputs

S501 SHUNT

AIN3

JP501

Shunt populated by default. Remove to support 4-wire touch-screen using AIN 0-3

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Endstops

Endstop inputs are 5V tolerant and may also be used as 3.3V output signals if desired

5V

C501 100n

5V

P501

P502

P503

MISO-5V

SCK-5V

MOSI-5V

SPI_CS0

U501

74CBTD3861

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12

B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12

X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

Thermistor Inputs

ADC_VDD

ADC_GND

THERMO

THERM1

THERM2

THERM3

AIN3

JP501

S501 SHUNT

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C501 100n

5V

P501

P502

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MISO-5V

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SPI_CS0

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B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12

X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

Thermistor Inputs

ADC_VDD

ADC_GND

THERMO

THERM1

THERM2

THERM3

AIN3

JP501

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Shunt populated by default. Remove to support 4-wire touch-screen using AIN 0-3

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MISO-5V

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SPI_CS0

U501

74CBTD3861

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12

B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12

X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

Thermistor Inputs

ADC_VDD

ADC_GND

THERMO

THERM1

THERM2

THERM3

AIN3

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S501 SHUNT

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Endstops

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5V

C501 100n

5V

P501

P502

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MISO-5V

SCK-5V

MOSI-5V

SPI_CS0

U501

74CBTD3861

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12

B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12

X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

Thermistor Inputs

ADC_VDD

ADC_GND

THERMO

THERM1

THERM2

THERM3

AIN3

JP501

S501 SHUNT

Shunt populated by default. Remove to support 4-wire touch-screen using AIN 0-3

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5V

C501 100n

5V

P501

P502

P503

MISO-5V

SCK-5V

MOSI-5V

SPI_CS0

U501

74CBTD3861

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12

B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12

X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

Thermistor Inputs

ADC_VDD

ADC_GND

THERMO

THERM1

THERM2

THERM3

AIN3

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Endstops

Endstop inputs are 5V tolerant and may also be used as 3.3V output signals if desired

5V

C501 100n

5V

P501

P502

P503

MISO-5V

SCK-5V

MOSI-5V

SPI_CS0

U501

74CBTD3861

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12

B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12

X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

Thermistor Inputs

ADC_VDD

ADC_GND

THERMO

THERM1

THERM2

THERM3

AIN3

JP501

S501 SHUNT

Shunt populated by default. Remove to support 4-wire touch-screen using AIN 0-3

CRAMPS by Charles Steinkuehler and Murray Lindeblom
Copyright 2014 GPL v3
Derived from RAMPS-FD by Bob Cousins
Derived from RAMPS 1.4 reprap.org/wiki/RAMPS1.4

File: con_inputs.sch
Sheet: /Inputs/
Title: CRAMPS (Cape-RAMPS for BeagleBone)

Size: A	Date: 2 may 2014	Rev: v1.0
KICad E.D.A.		Id: 5/5

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X-MIN X-MAX Y-MIN Y-MAX Z-MIN Z-MAX MISO SCK MOSI SPI_CS0-5V

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U501

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X-MIN

X-MAX

Y-MIN

Y-MAX

Z-MIN

Z-MAX

MISO

SCK

MOSI

SPI_CS0-5V

Thermistor Inputs

ADC_VDD

R511 2K0 1%

R515 4k7

C502 100n

C506 10u

THERM0

ADC_GND

R512 2K0 1%

R516 4k7

C503 100n

C507 10u

THERM1

ADC_GND

R513 2K0 1%

R517 4k7

C504 100n

C508 10u

THERM2

ADC_GND

R514 2K0 1%

R518 4k7

C505 100n

C509 10u

THERM3

ADC_GND

From Thermistors

P504

ADC_GND

To ADC Inputs

S501 SHUNT

AIN3

JP501

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