

OpenROV Controller 2.6

Digital I/O Channels

0	BB UART	28	User J3-4
1	BB UART	29	User J3-2
2	User J3-11	30	User J2-16
3	User J3-9	31	User J2-14
4	User J3-7	32	User J2-12
5	User J3-5	33	User J2-10
6	Servo1 J8-1	34	User J2-8
7	Servo2 J8-4	35	User J2-6
8	Servo3 J8-7	36	User J2-4
9	Servo4 J8-10	37	User J2-2
10	Servo5 J8-13	38	N/C
11	Servo6 J8-16	39	N/C
12	PWM4 J1-7/8	40	N/C
13	LED	41	N/C
14	User J2-11	42	N/C
15	User J2-9	43	N/C
16	ESC Power Switch	44	PWM1 J1-1/2
17	N/C	45	PWM2 J1-3/4
18	User J2-7	46	PWM3 J1-5/6
19	User J2-5	47	N/C
20	I2C SDA J1-14	48	N/C
21	I2C SCL J1-12	49	LED
22	User J3-16	50	SPI MISO to BB and ICSP Header
23	User J3-14	51	SPI MOSI to BB and ICSP Header
24	User J3-12	52	SPI SCK to BB and ICSP Header
25	User J3-10	53	SPI SS to BB
26	User J3-8		
27	User J3-6		

Analog I/O Channels

0	Controller and BB Battery Current
1	ESC 3 Current
2	ESC 2 Current
3	ESC 1 Current
4	Battery Voltage (after protection diodes)
5	Battery 2 Current
6	Battery 1 Current
7	Humidity (optionally populated)
8	Board Temperature
9	User J4-14
10	User J4-12
11	User J4-10
12	User J4-8
13	User J4-6
14	User J4-4
15	User J4-2

Revision History

Rev	Date	Engr	Changes
2.5	13 Aug 2013	RWH	Initial Prototype
2.5 Rev A	20 Aug 2013	RWH	Prototype Batch. Revised J6 connector orientation. Changed BB node names. Revised C11, C15, and U5 and added C34 to avoid +5V and +3.3V brownout when switching ESCs on. Revised ESC mounting holes. Revised LED colors. Revised silkscreen. Added weak Arduino reset pullup for standalone operation. Added cap slot C35 to hold vehicle on if noisy tether connection. Added bypass points J17 for ESC power switch. Arduino reset function moved from BB pin 13 to BB pin 11.
2.5 Rev B	2 Sep 2013	RWH	First production batch. J6 changed from socket to male board stacker. 4th mounting hole added to board. Revised fiducial locations. Inverted logical case of UART LEDs. BB TX LED moved from Arduino space to BB space. Board ID EEPROM circuitry DNP.
2.6	12 Nov 2013	RWH	Layout changes to accept V2.0 Tenda/MediaLink Homeplug adapter. Additional sockets added to accept V2.0 pin configuration. LEDs added to display Homeplug adapter status. Board ID circuitry modified. Servo output connector split into two. Filters added to ESC current monitors. Test points updated. Silkscreen updated.

Sheet Finder

1	Cover Page
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3	Power Switching
4	5V and 3.3V Power
5	Microcontroller (Arduino Mega compatible)
6	PWM and Environment Sensors
7	I2C and BeagleBone Interface
8	Motor Current Sensing and ESC Connections

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Cover Page

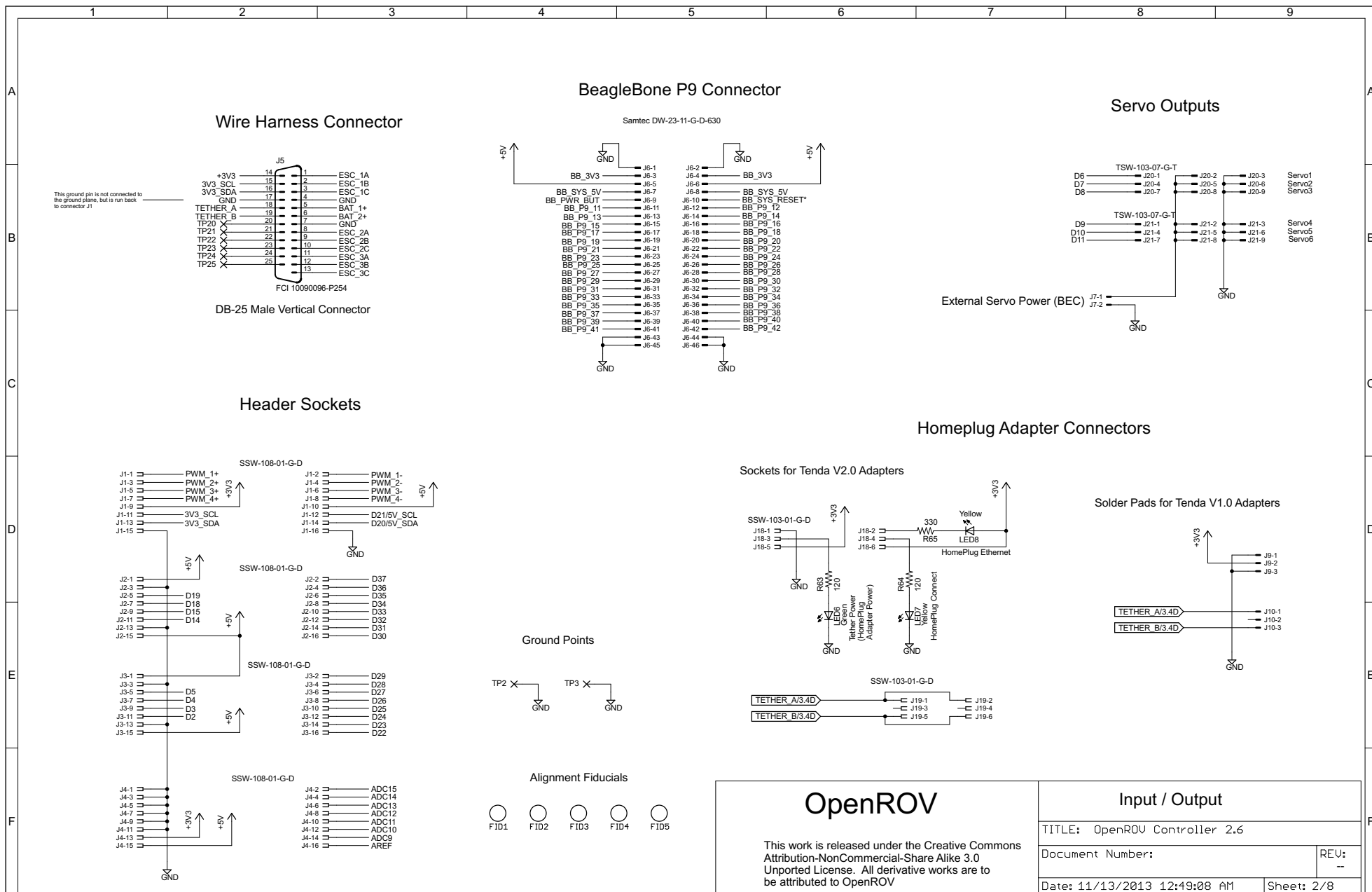
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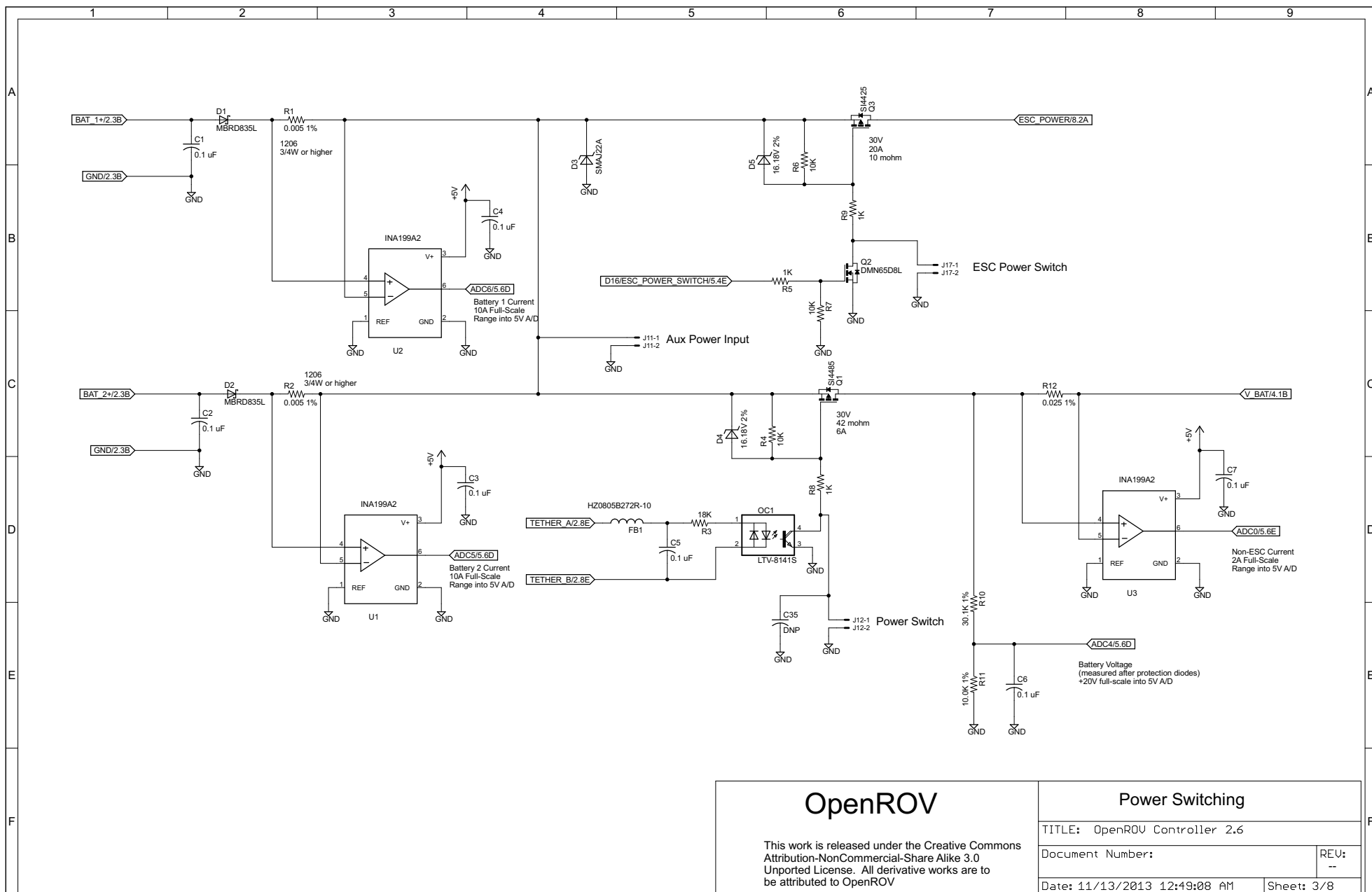
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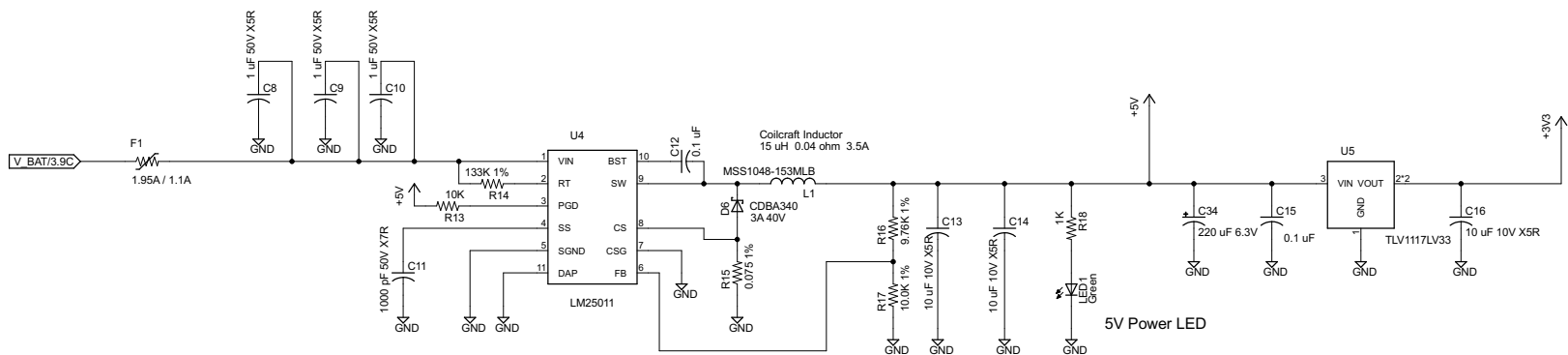
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+5V Supply Adapted from the CircuitCo OpenROV Cape

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5V and 3.3V Power

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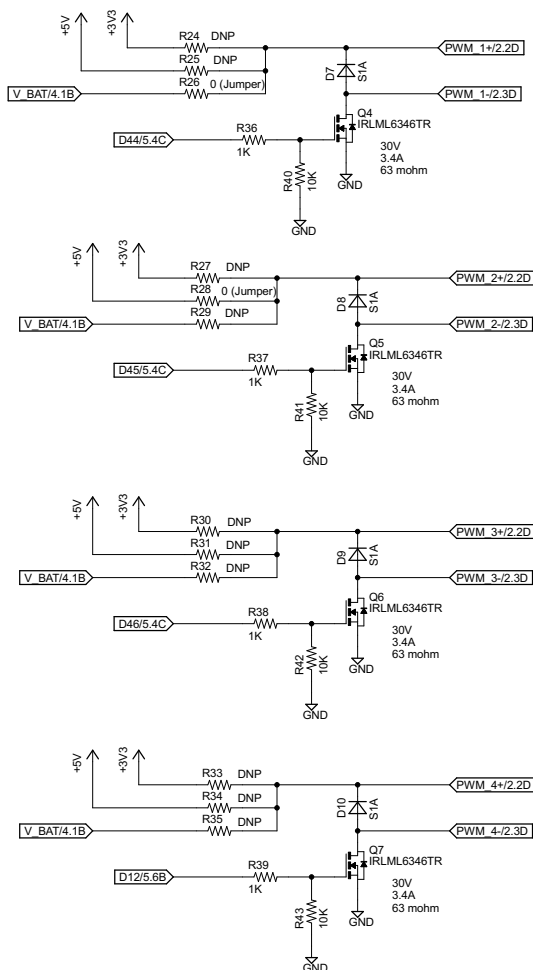
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Populate one jumper only for each PWM channel.

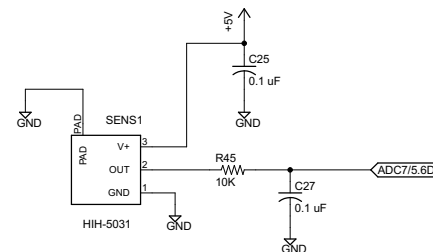
Select from maximum output of 3.3V, 5V, or battery voltage

Default configuration is Battery Voltage on Channel 1 (LED Modules), and 5V on Channel 2 (Scaling Lasers)

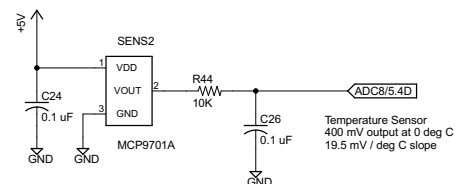
PWM Outputs



Humidity Sensor



Temperature Sensor



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PWM and Environment Sensors

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BeagleBone Interface

BB TX LED

BB_P9_24, BB_P9_26, BB_P9_17, BB_P9_22, BB_P9_18, BB_P9_21, BB_P9_11, BB_SYS_RESET*

TXB0108SSOP-20

I2C Interface

To DB-25 Connector

D21/5V_SCL/5.6D, D20/5V_SDA/5.6D

3V3_SCL, 3V3_SDA

5V I2C Bus To Headers

3.3V I2C Bus To Headers

BeagleBone Cape ID

BB_3V3/2.5B

CAT24C256W1-G

ICSP Header

J13

D50/SPI_MISO, D52/SPI_SCK, RESET_N

D51/SPI_MOSI

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I2C and BeagleBone Interface

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BeagleBone Interface

BB TX LED

BB_P9_24, BB_P9_26, BB_P9_17, BB_P9_22, BB_P9_18, BB_P9_21

BB_3V3, BB_P9_11, BB_SYS_RESET*

U7: TXB0108SSOP-20

BB_P9_24, BB_P9_26, BB_P9_17, BB_P9_22, BB_P9_18, BB_P9_21

A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20

B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, B15, B16, B17, B18, B19, B20

D0/UART_RX, D1/UART_TX, D53/SPI_SS, D52/SPI_SCK, D50/SPI_MISO, D51/SPI_MOSI, RESET_N

OE, GND

C28: 0.1 uF

C30: 0.1 uF

R46: 1K, R62: 10K, R47: DNP, R48: 0 (Jumper)

I2C Interface

+5V, +3V3

D21/5V_SCL/5.6D, D20/5V_SDA/5.6D

Q8, Q9: FDV301N

R55, R56, R57, R58: 4.7K

+5V, +3V3

D21/5V_SCL, D20/5V_SDA, GND

5V I2C Bus To Headers, 3.3V I2C Bus To Headers

To DB-25 Connector

+3V3, 3V3_SCL, 3V3_SDA, GND

These wires are run on surface traces, that can be cut if it is desired to repurpose the DB-25 pins. This ground pin is tied to the ground plane at the J1 connector, not at the DB-25 connector

BeagleBone Cape ID

BB_3V3/2.5B

U8: CAT24C256W1-G

A0: VCC, A1: WP, A2: SCL, A3: VSS, A4: SDA

8, 7, 6, 5

R51, R52, R53, R54: 4.7K

C29: 0.1 uF

R67: 0 (Remove resistor for write-protect)

BB_P9_19/2.4B, BB_P9_20/2.5B

ICSP Header

J13

D50/SPI_MISO, D52/SPI_SCK, RESET_N

1, 2, 3, 4, 5, 6

D51/SPI_MOSI

+5V, GND

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U7: TXB0108SSOP-20

BB_P9_24, BB_P9_26, BB_P9_17, BB_P9_22, BB_P9_18, BB_P9_21

A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20

B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, B15, B16, B17, B18, B19, B20

D0/UART_RX, D1/UART_TX, D53/SPI_SS, D52/SPI_SCK, D50/SPI_MISO, D51/SPI_MOSI, RESET_N

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To DB-25 Connector

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ICSP Header

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D50/SPI_MISO, D52/SPI_SCK, RESET_N

1, 2, 3, 4, 5, 6

D51/SPI_MOSI

+5V, GND

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A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20

B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, B15, B16, B17, B18, B19, B20

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ICSP Header

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D50/SPI_MISO, D52/SPI_SCK, RESET_N

1, 2, 3, 4, 5, 6

D51/SPI_MOSI

+5V, GND

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I2C and BeagleBone Interface

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BeagleBone Cape ID

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ICSP Header

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D50/SPI_MISO, D52/SPI_SCK, RESET_N, D51/SPI_MOSI

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BB_P9_19/2.4B, BB_P9_20/2.5B

BeagleBone Cape ID

BB_3V3/2.5B

CAT24C256W1-G

ICSP Header

J13

D50/SPI_MISO, D52/SPI_SCK, RESET_N, D51/SPI_MOSI

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BeagleBone Cape ID

BB_3V3/2.5B

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ICSP Header

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D50/SPI_MISO, D52/SPI_SCK, RESET_N, D51/SPI_MOSI

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BB_P9_19/2.4B, BB_P9_20/2.5B

BeagleBone Cape ID

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CAT24C256W1-G

ICSP Header

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D50/SPI_MISO, D52/SPI_SCK, RESET_N, D51/SPI_MOSI

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I2C and BeagleBone Interface

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BeagleBone Interface

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I2C Interface

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BB_P9_19/2.4B, BB_P9_20/2.5B

BeagleBone Cape ID

BB_3V3/2.5B

CAT24C256W1-G

ICSP Header

J13

D50/SPI_MISO, D52/SPI_SCK, RESET_N, D51/SPI_MOSI

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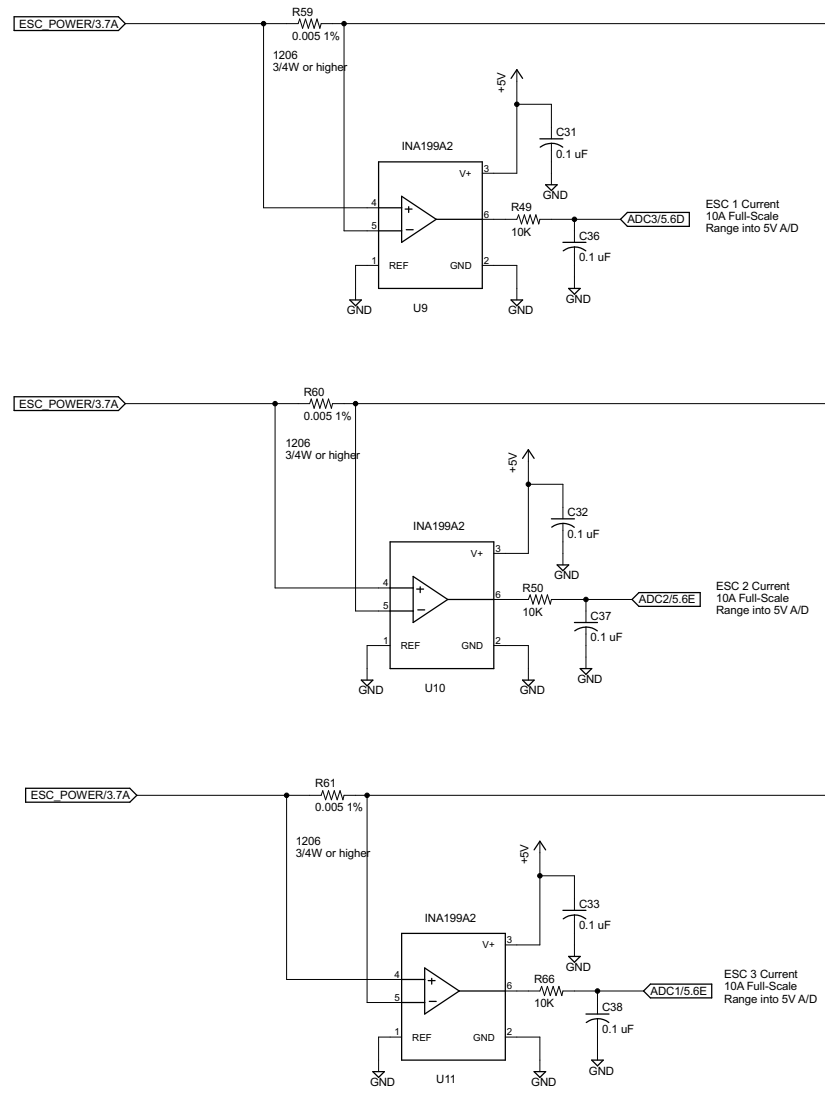
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I2C and BeagleBone Interface

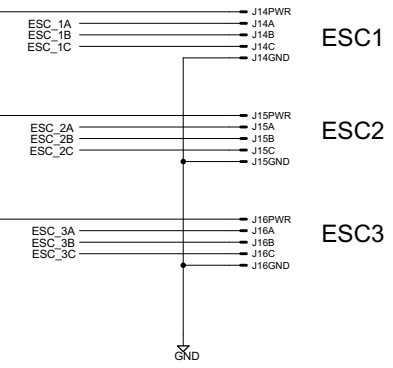
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ESC Solder Pads



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Motor Current Sensing and ESC Connections

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