OpenROV Controller 2.8

Digital I/O Channels (Arduino Addresses)

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 J20-1	34	User J2-8
7	Servo2 J20-4	35	User J2-6
8	Servo3 J20-7	36	User J2-4
9	Servo4 J21-1	37	User J2-2
10	Servo5 J21-4	38	N/C
11	Servo6 J21-7	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	3.3V ENABLE
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 (Arduino Addresses)

0	Current for non-ESC loads (BB, Controller, etc)	
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. Additonal 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.
2.7	18 Aug 2014	RWH	Revised ESC mounting pads to fit Afro 12A and 20A ESCs. New +5V switching power supply with 3A output vs. 1.6A on Controller 2.6. Resized programming resistors on power PWM outputs to handle 2A output vs 1A. Heavier traces on TP20-TP25. Revised ROV and ESC power switching. Additional +3.3V supply added to isolate homeplug adapter from +3.3V instrumentation
2.8	27 May 2015	RWH	Board shortened 5mm. DB-25 Connector J5 changed to right-angle as default. Humidity sensor SENS1 mount pad isolated from ground. Enable added to 3.3V supply for I2C and PWM outputs (D48). EEPROM U8 is now read-only; ground Test Pad TP1 to allow writes. Filters added to current monitors for batteries and non-ESC loads. Corner frequency of current monitor filters lowered to 50 Hz. PWM3 and Servo4 routed to DB25 connector for external lights and servo. Aux power input J11 moved to board periphery. Circuitry added to detect imminent power failure and interrupt/shut down BeagleBone, via BB pin P9-23.

Sheet Finder

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4	5V and 3.3V Power
5	Microcontroller (Arduino Mega compatible)
6	PWM Power Outputs 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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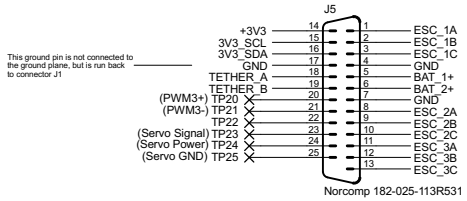
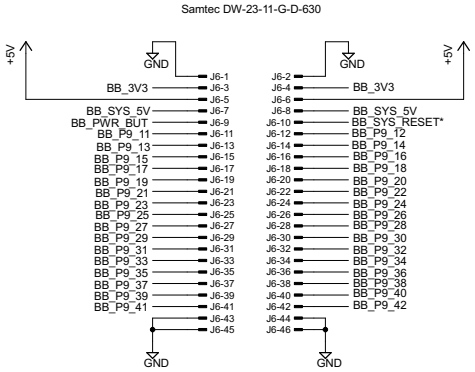
Wire Harness Connector



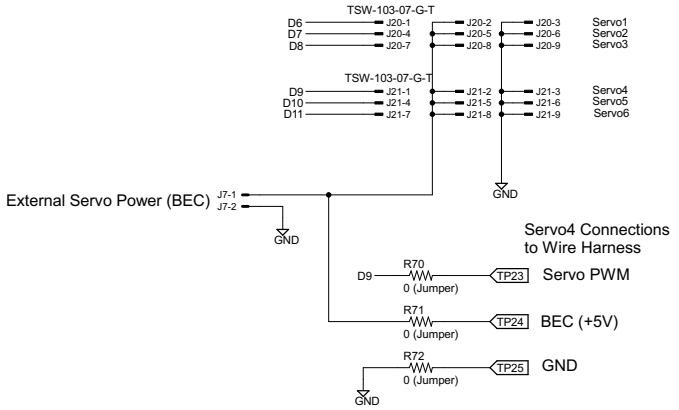
DB-25 Male Right-Angle Connector

For backwards compatibility with OROV 2.5-2.7, substitue straight connector such as FCI 10090096-P254

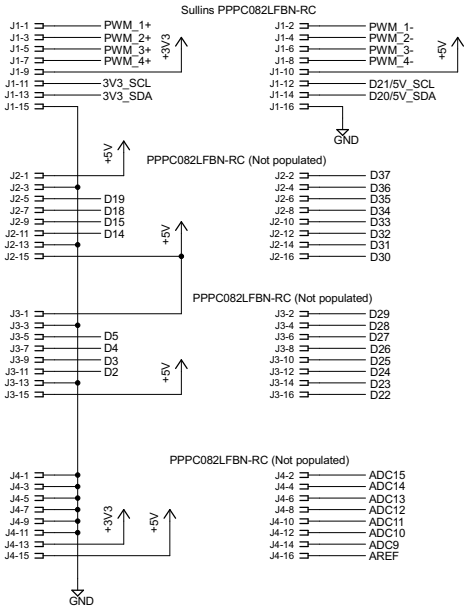
BeagleBone P9 Connector



Servo Outputs



Header Sockets

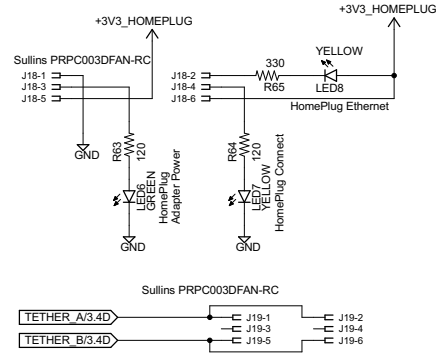


Ground Points

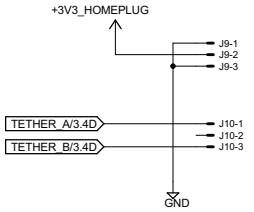
Alignment Fiducials

Homeplug Adapter Connectors

Header Pins for Tenda V2.0 Adapters
0.32" Engagement Length



Solder Pads for Tenda V1.0 Adapters



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Input / Output	
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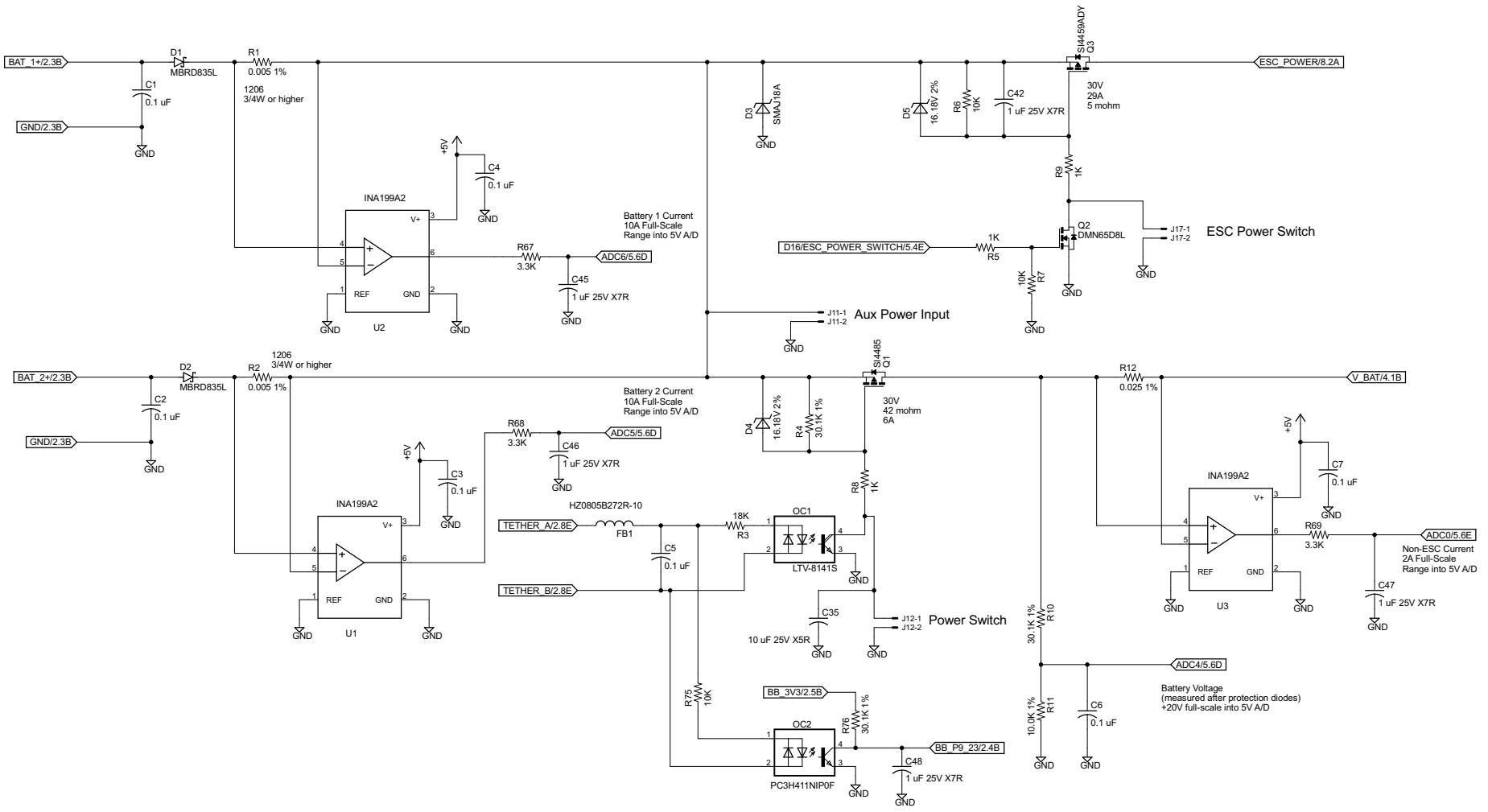

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Power Switching

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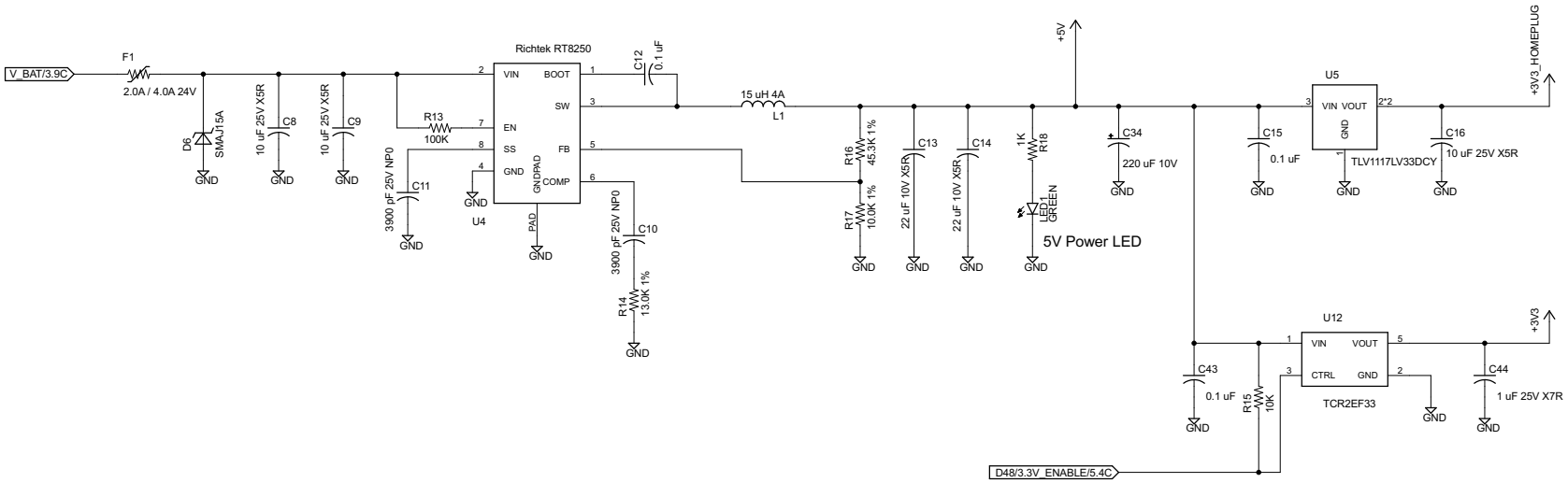

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5V and 3.3V Power

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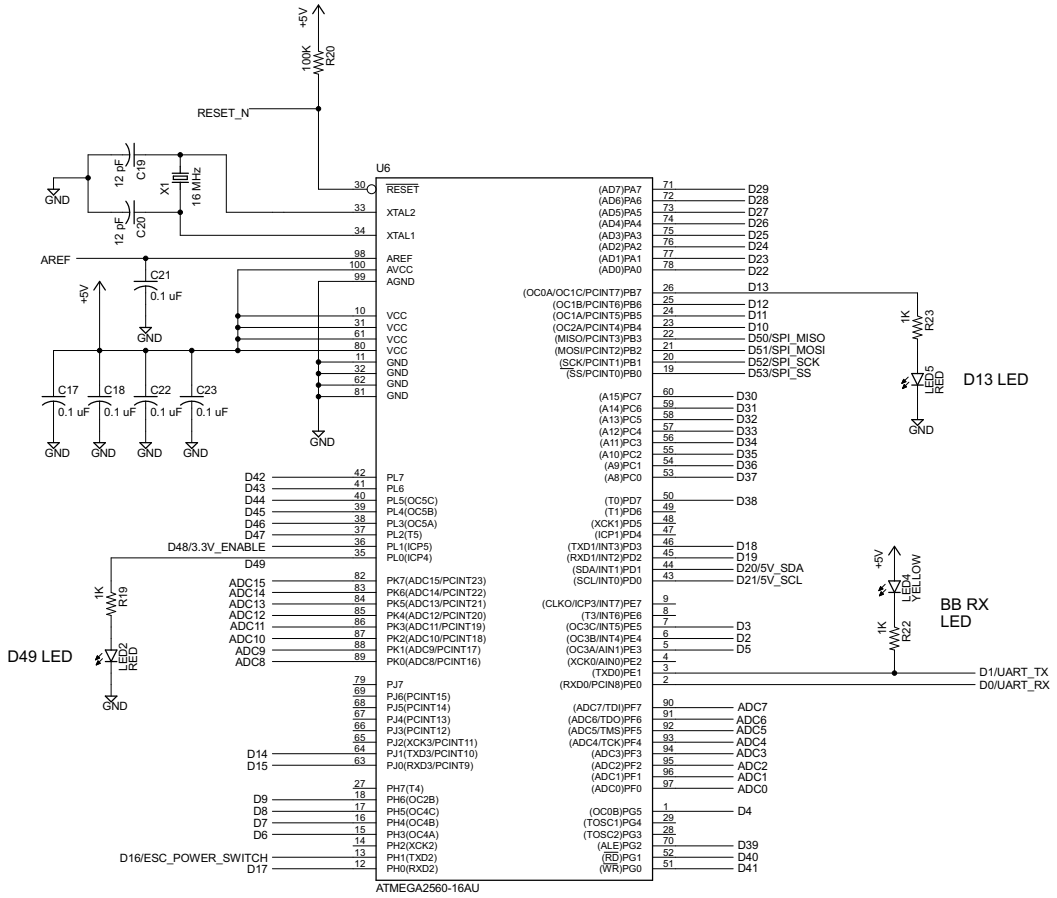

Adapted from Arduino Mega 2560 R3

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Microcontroller

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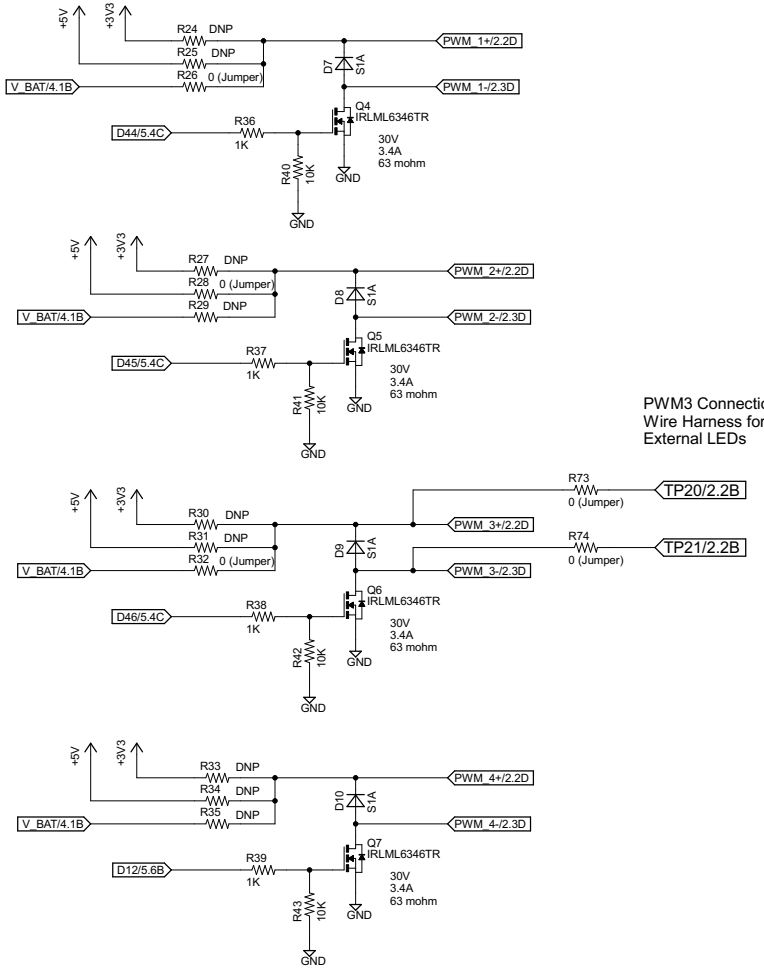
PWM Outputs

Populate one jumper only for each PWM channel.

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

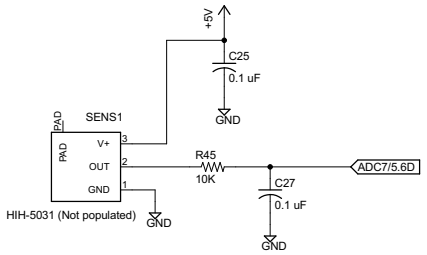
Default configuration is Battery Voltage on Channel 1 (Internal LED Board), 5V on Channel 2 (Scaling Lasers), and Battery Voltage on Channel 3 (External LEDs)

For Battery outputs, 2.0A maximum current on each PWM channel
For +5V outputs, maximum total PWM current is 1.5A
For +3.3V outputs, maximum total PWM current is 0.2A

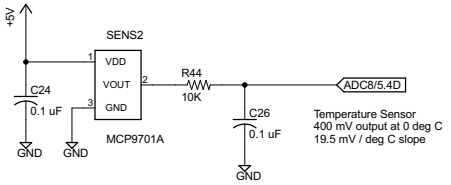


PWM3 Connections to Wire Harness for External LEDs

Humidity Sensor



Temperature Sensor



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PWM and Environment Sensors

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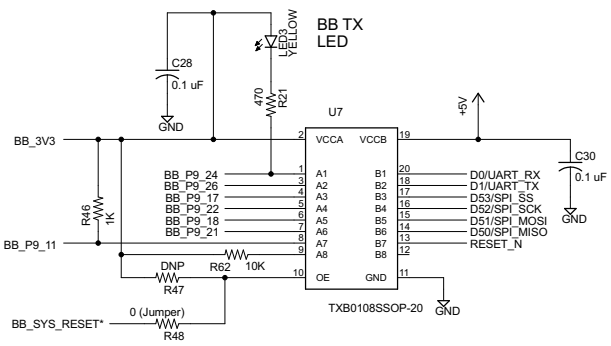
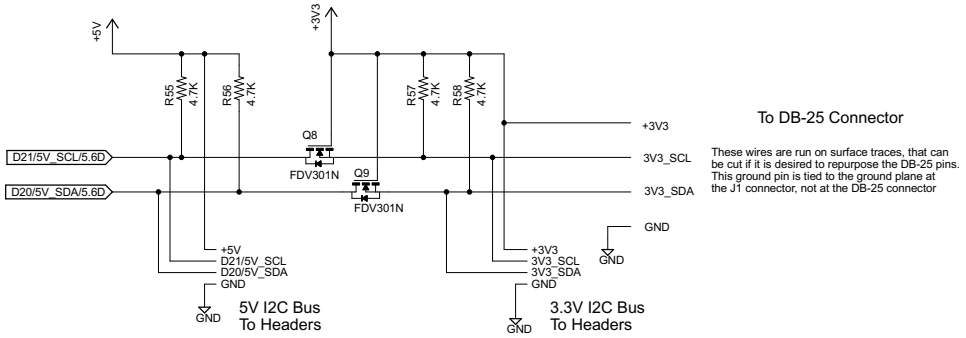
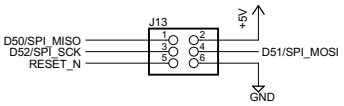
BeagleBone Interface



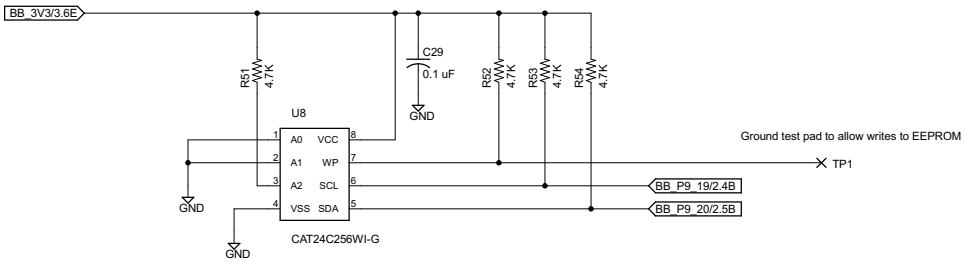
I2C Interface



ICSP Header



BeagleBone Cape ID



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I2C and BeagleBone Interface

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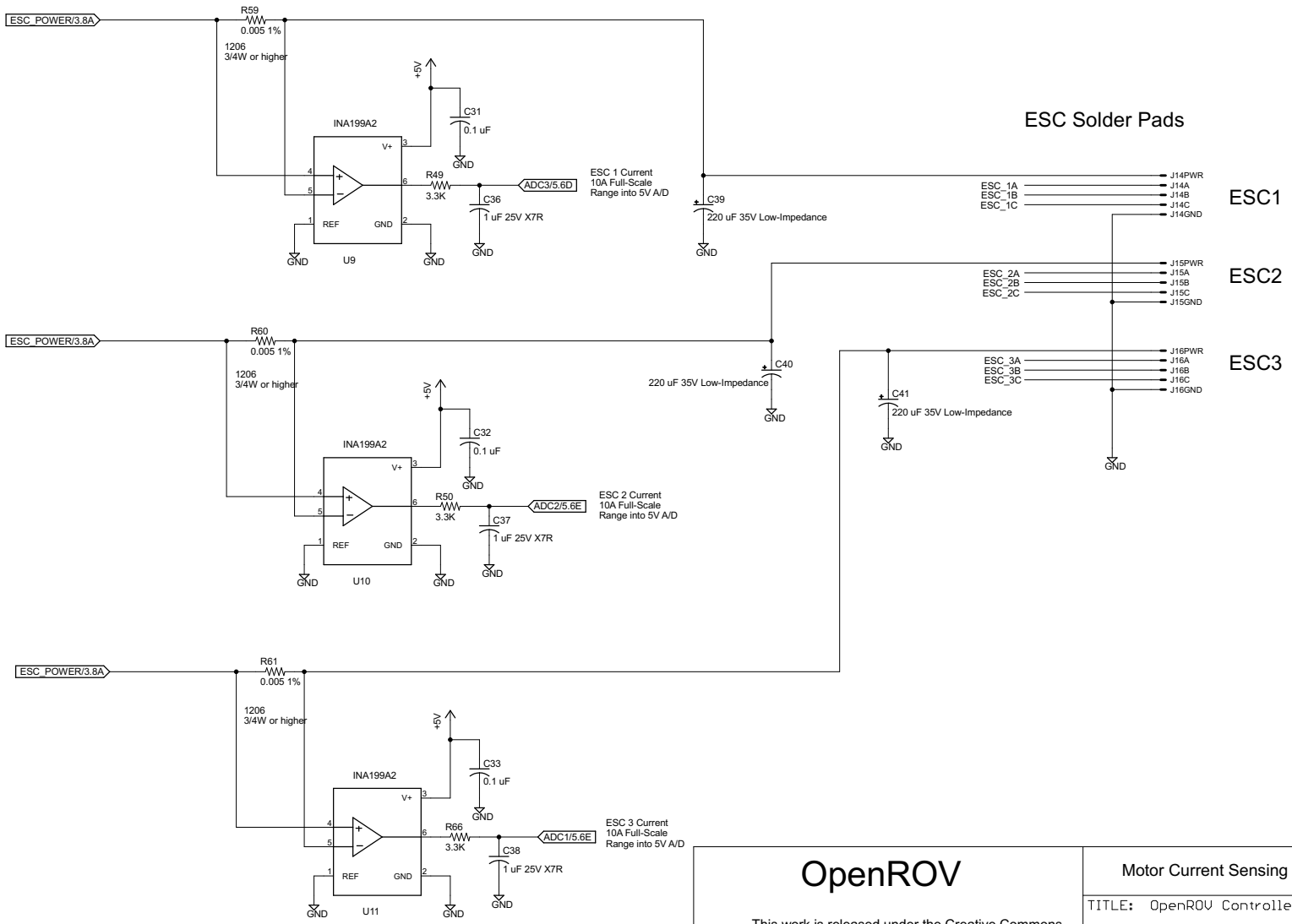

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Motor Current Sensing and ESC Connections

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