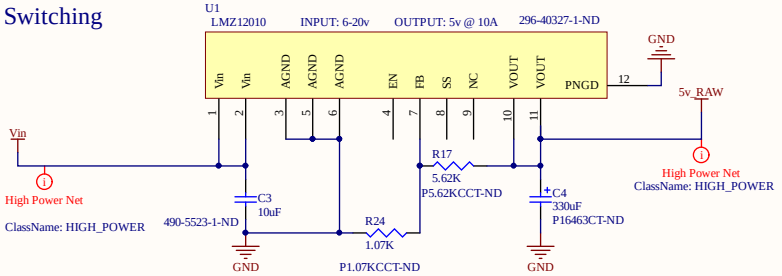
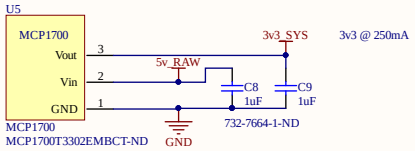
SYS 5v Switching

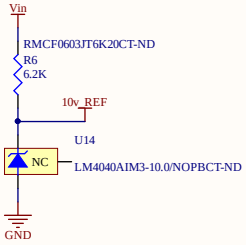


3v3 Linear



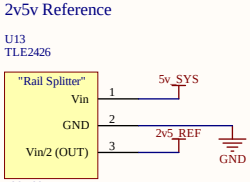
Precision Voltage References

10v Reference



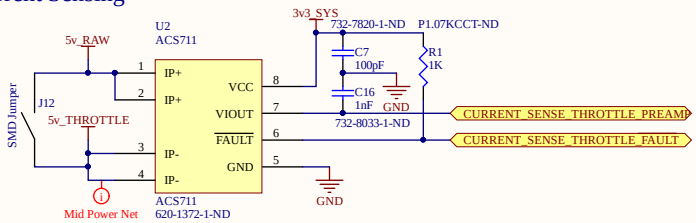
Note: Assumed calculated current of 2mA minimum required current is 100uA

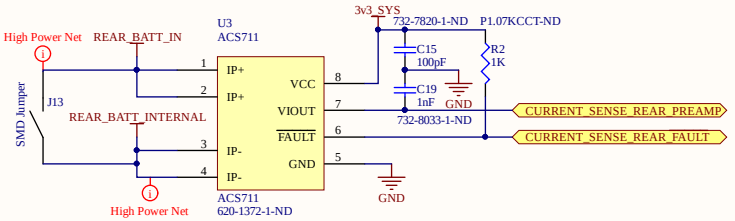
2v5v Reference

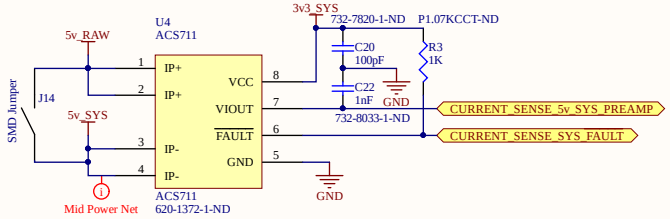


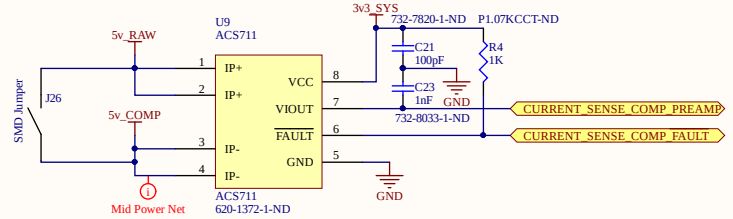
Max Current: 20mA

Current Sensing

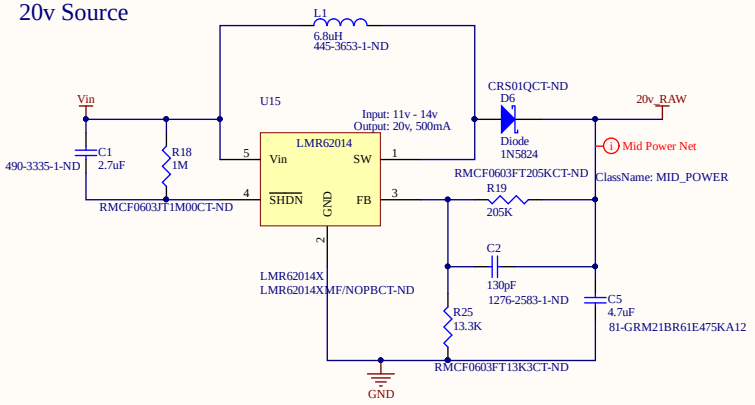




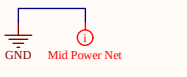




20v Source



GND Power Classification



Note: Even though GND is classified as "MID_POWER" parts of it must be manually routed as "HIGH_POWER" and the GND plane takes care of the rest.

Title	PowerManagement.SchDoc		
Size: A4	Number: 1	Engineer: Nick McComb	
Date: 3/1/2016	Time: 12:41:07 PM	Sheet 1 of 7	
File: C:\Users\nrpic_000\Google Drive\PCB Designs\ROSSPowerDistribution\PowerManagement.SchDoc			

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Steering Input

J4
Sig 3 — STEER_SIG_3v3
V+ 2
GND 1 — GND
Molex 3
WM4801-ND

Steering Output

J5
Sig 3 — STEER_SIG_5v
V+ 2
GND 1 — GND
Molex 3
WM4801-ND

Throttle Input

J6
Sig 3 — THROTTLE_SIG_3v3
V+ 2
GND 1 — GND
Molex 3
WM4801-ND

Throttle Output

J7
Sig 3 — THROTTLE_SIG_5v
5v_THROTTLE
V+ 2
GND 1 — GND
Molex 3
WM4801-ND

XTend Sig Input

J9 WM4803-ND
CURRENT_SENSE 5 — CURRENT_SENSE_XTEND_PREAMP
RSSI 4 — XTEND_RSSI
XT DI 3 — XTEND_DI
XT DO 2 — XTEND_DO
GND 1 — GND
XTEND_FTDI_RX
XTEND_FTDI_TX
MOLEX 5 Pin
XTend DB MCU Connection

XTend Sig Output

J10 WM4803-ND
CURRENT_SENSE 5
RSSI 4
XT DI 3
XT DO 2
GND 1 — GND
MOLEX 5 Pin
XTend DB MCU Connection

CD0603-S01575CT-ND
Note: ONLY POPULATE ONE BRANCH
D16
Diode S01575
S01575
R51 10K RMCF0603FT10K0CT-ND
R52 5.62K
R53 40K RMCF0603FT40K2CT-ND
CURRENT_SENSE_XTEND
P5.62KCCT-ND
GND
Note: Assuming absolute max XTend Current of 3A (@12v)

Aux Port

J29
AUX Port
AUX_0 AUX_1 AUX_RX AUX_TX AUX_4 AUX_5 AUX_6 AUX_7
0 1 2 3 4 5 6 7
AUX_3 AUX_4 AUX_5 AUX_6 AUX_7

Logic Level Shifting

U8
MAX3374
VL 3 — 3v3_SYS
VCC 7 — 5v_SYS
GND 2 — GND
I VL1 5 — STEER_SIG_3v3
O VCC 1 8 — STEER_SIG_5v
I VL2 4 — THROTTLE_SIG_3v3
O VCC 2 1 — THROTTLE_SIG_5v
THREE STATE 6
MAX3374
Note: Referred to as MAX3374E on datasheet
Note: Supplied by MOUSER
Note: Ensure vias can provide test points when routing

490-1695-1-ND 5v_SYS C6 1uF — C24 .1uF 490-1683-1-ND
3v3_SYS C25 .1uF 490-1683-1-ND
GND

Fault Processing

U10
CD4082
296-31523-1-ND
D 2 — CURRENT_SENSE_THROTTLE_FAULT
C 3 — CURRENT_SENSE_SYS_FAULT
B 4 — CURRENT_SENSE_REAR_FAULT
A 5 — CURRENT_SENSE_COMP_FAULT
VDD 14 — 3v3_SYS
AND J 1
E 9
F 10
G 11
H 12
AND K 13 — CURRENT_SENSE_FAULT
GND 7 — GND

Test Points

J16 Test Point TestPoint — CURRENT_SENSE_REAR — Labeled: C_REA
J17 Test Point TestPoint — CURRENT_SENSE_THROTTLE — Labeled: C_THR
J18 Test Point TestPoint — CURRENT_SENSE_5v_SYS — Labeled: C_SYS
J19 Test Point TestPoint — VOLTAGE_SENSE_ELECTRONICS_BATT — Labeled: V_EBX
J20 Test Point TestPoint — VOLTAGE_SENSE_REAR_BATT — Labeled: V_REA
J21 Test Point TestPoint — FTDI_RX — Labeled: FT_RX
J22 Test Point TestPoint — FTDI_TX — Labeled: FT_TX
J23 Test Point TestPoint — REAR_BATT_IN — Labeled: R_B_IN
J39 Test Point TestPoint — 3v3_SYS — Note: FT_RX -> uC TX
J24 Test Point TestPoint — 5v_RAW
J28 Test Point TestPoint — GND
J41 Test Point TestPoint — 2v5_REF
J42 Test Point TestPoint — 10v_REF
J43 Test Point TestPoint — 20v_RAW

Title	SignalProcessing.SchDoc		
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File: C:\Users\nrpic_000\Google Drive\PCB Designs\ROSSPowerDistribution\SignalProcessing.SchDoc			

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Power Input

J2
Input Power ~12v
Vin
GND
1
2
Vin
GND
Input Power
XT 60 Connector

XTend Power Output

J1
DC Jack
V+
GND
N/C
1
2
3
Vin
GND
BarrelJack_Female
CP-002A-ND

R/C Reciever

J3
Sig
V+
GND
3
2
1
5v_SYS
GND
Molex 3
WM4801-ND

Rear Power Switching

Note: Only 10mA required to activate

REAR_BATT_INTERNAL
REAR_BATT_OUT
CLA280-ND
K1
1
2
High Power Net
REAR_BATT_RELAY
R54
330
Relay_CTRL
4
3
+
-
Relay-SPST
GND

Power Status LEDs

5V_RAW
RMCF0603JT330RCT-ND
R20
330
160-1423-1-ND
D7
LED2

REAR_BATT_IN
RMCF0603JT680RCT-ND
R21
680
160-1423-1-ND
D8
LED2

REAR_BATT_OUT
RMCF0603JT680RCT-ND
R5
680
160-1423-1-ND
D1
LED2

3v3_SYS
RMCF0603JT220RCT-ND
R22
220
160-1423-1-ND
D9
LED2

Vin
RMCF0603JT680RCT-ND
R23
680
160-1423-1-ND
D10
LED2

20v_RAW
R7
1.07K
160-1423-1-ND
D11
LED2

GND

Note: All resistors are 0603

Rear Power I/O

J8
Input Power ~12v
Vin
GND
1
2
REAR_BATT_IN
Input Power
XT 60 Connector
REAR_BATT_GND

J11
Input Power ~12v
Vin
GND
1
2
High Power Net
Input Power
XT 60 Connector
REAR_BATT_GND

ClassName: HIGH_POWER
SMD Jumper
J51
BK-6010-ND
F1
Fuse
1
2
REAR_BATT_OUT
High Power Net
ClassName: HIGH_POWER
High Power Net
ClassName: HIGH_POWER

Note: Fuse is standard automotive, ATC, ATO
Note: Fuse should be >= 5A

Rear Manual Bypass

REAR_BATT_INTERNAL
REAR_BATT_OUT
SMD Jumper
J30

Computer Power Connection

UE27AC54100-ND
J27
USB A Conn
V+
D+
D-
GND
1
2
3
4
5v_COMP
GND
USB A Connector

Arduino UNO Power

J40
V+
GND
1
2
5v_SYS
GND
Molex 2-pin
WM4800-ND

Iridium Beacon Power

J31
V+
GND
1
2
Vin
GND
Molex 2-pin
WM4800-ND

Note: Place close to input voltage

AUX Power Access Points

J36
Servo
SIG
V+
GND
3
2
1
AUX_7
5v_SYS
GND
Servo_Connection

J37
Servo
SIG
V+
GND
3
2
1
AUX_6
5v_SYS
GND
Servo_Connection

Title	PowerDistribution.SchDoc		
Size: A4	Number: 3	Engineer: Nick McComb	
Date: 3/1/2016	Time: 12:41:08 PM	Sheet 3 of 7	
File: C:\Users\nrpic_000\Google Drive\PCB Designs\ROSSPowerDistribution\PowerDistribution.SchDoc			

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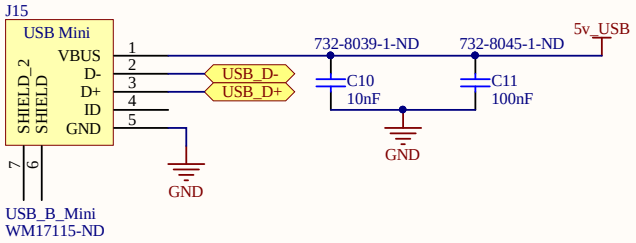
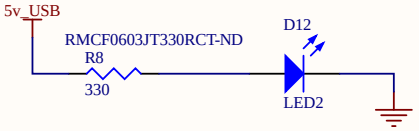
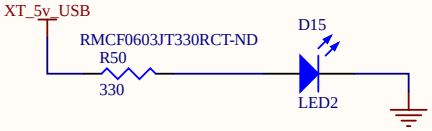
Microcontroller USB Connection



FTDI Status Indicators

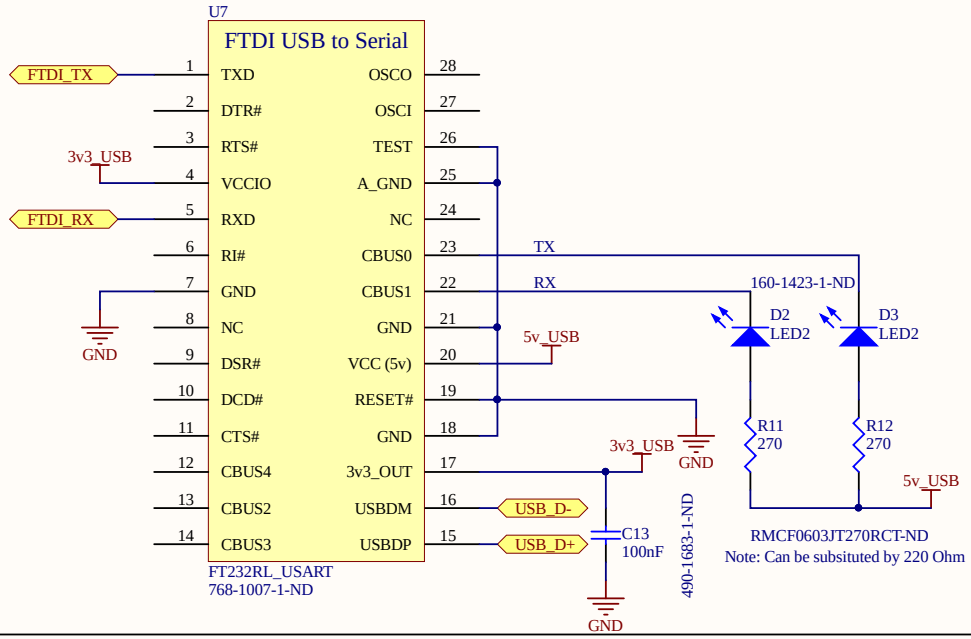


Note: Indicates the status of the USB power.
Note: uC Indicator



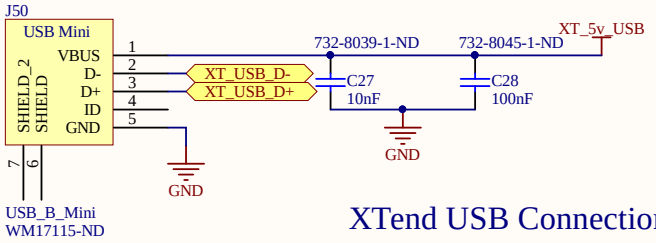
Note: Indicates the status of the USB power.
Note: uC Indicator

Onboard Microcontroller FTDI

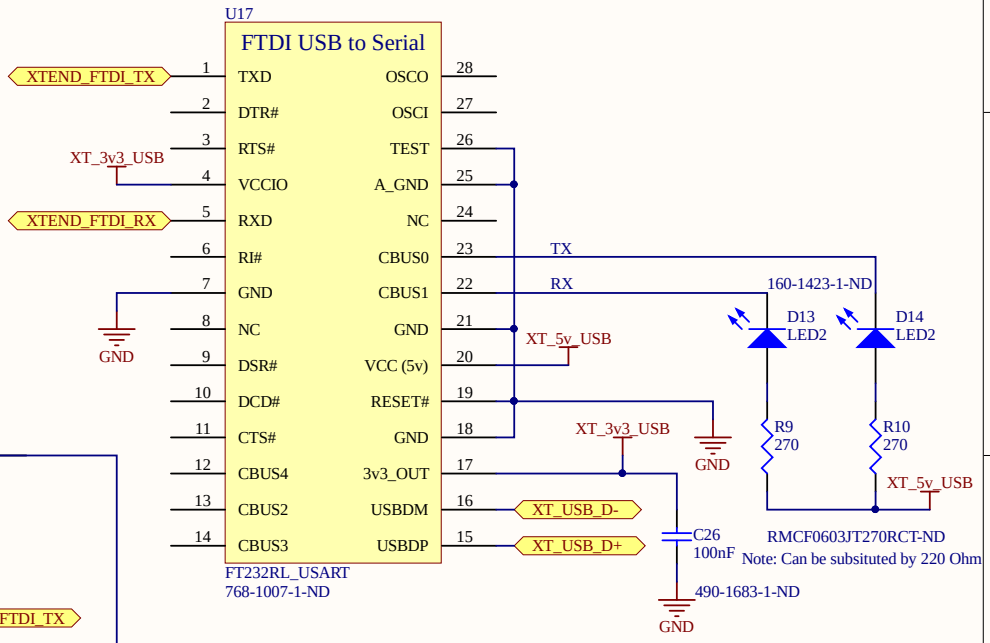


Note: Can be subsituted by 220 Ohm

XTend USB Connection



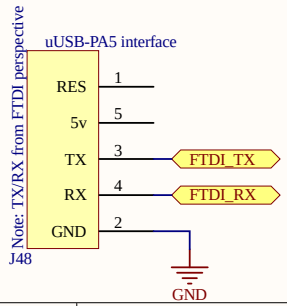
XTend FTDI

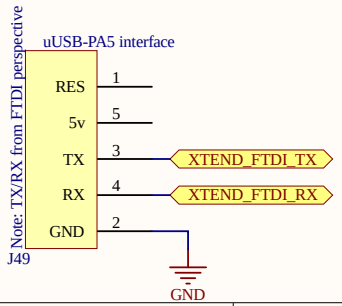


Note: Can be subsituted by 220 Ohm

USB To Serial IC (FTDI)

Note: Backup, do not populate unless onboard FTDI chips do not work





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Size: A4	Number: 4	Engineer: Nick McComb	
Date: 3/1/2016	Time: 12:41:08 PM	Sheet 4 of 7	
File: C:\Users\nrpic_000\Google Drive\PCB Designs\ROSSPowerDistribution\FTDI.SchDoc			

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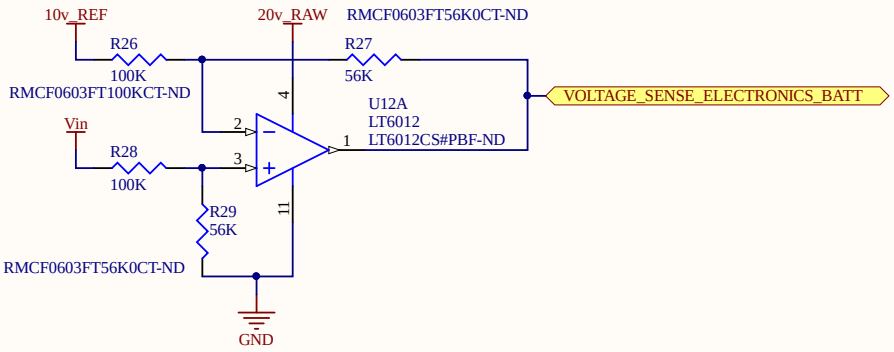
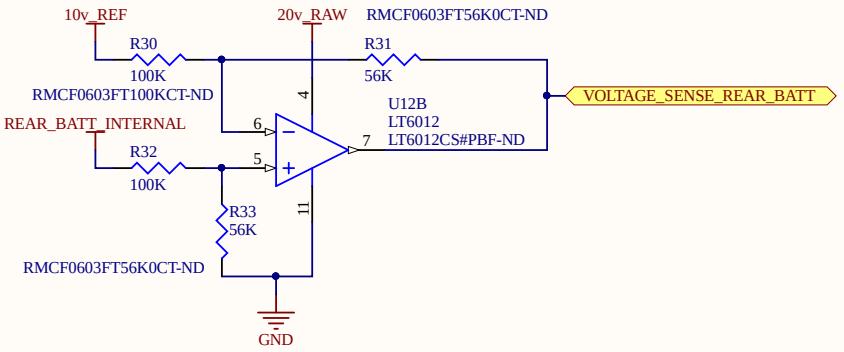
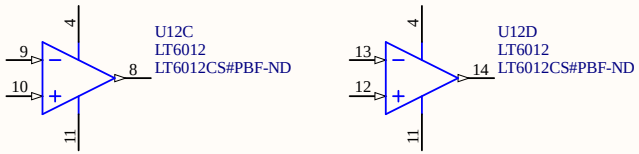
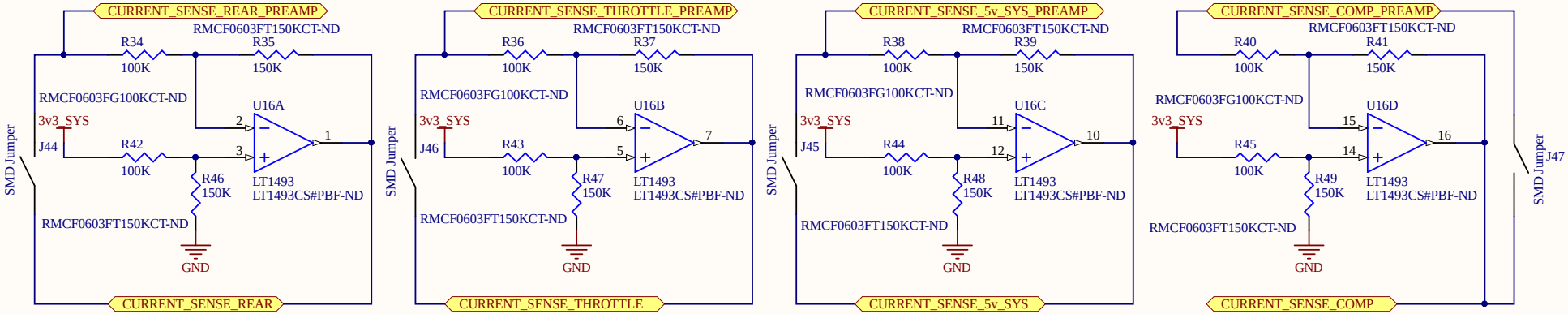


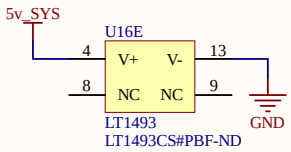
Note: VOLTAGE_SENSE_ELECTRONICS_BATT can be calculated as the following: VEBAT = (Vin - 10.0v) * .825



Note: VOLTAGE_SENSE_ELECTRONICS_BATT can be calculated as the following: VEBAT = (Vin - 10.0v) * .825







Title	SignalProcessing_Amplifiers.SchDoc		
Size: A4	Number: 5	Engineer: Nick McComb	
Date: 3/1/2016	Time: 12:41:08 PM	Sheet 5 of 7	
File: C:\Users\nrpic_000\Google Drive\PCB Designs\ROSSPowerDistribution\SignalProcessing_Amplifiers.SchDoc			

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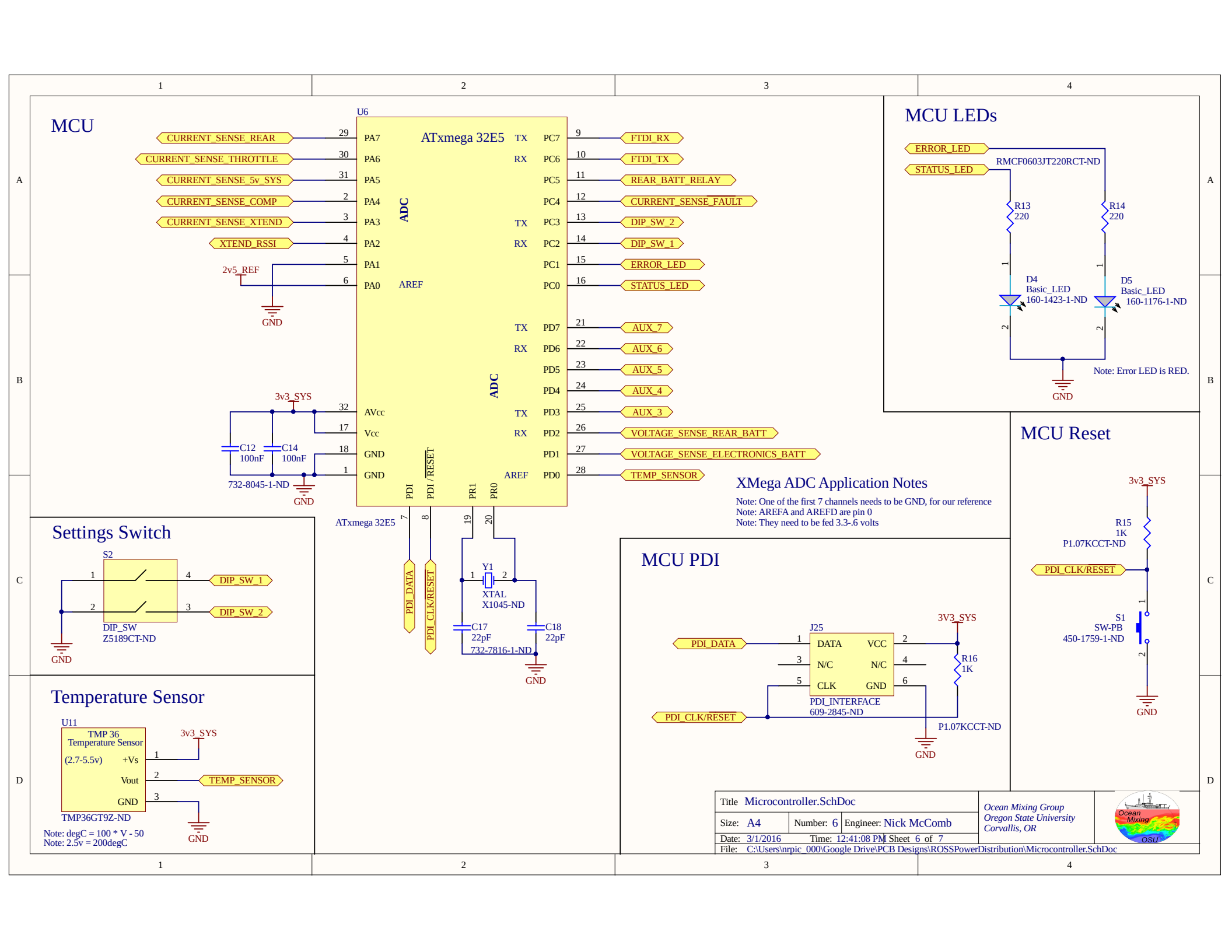
MCU
U6
ATxmega 32E5
CURRENT_SENSE_REAR
CURRENT_SENSE_THROTTLE
CURRENT_SENSE_5v_SYS
CURRENT_SENSE_COMP
CURRENT_SENSE_XTEND
XTEND_RSSI
2v5_REF
GND
3v3_SYS
C12
100nF
C14
100nF
732-8045-1-ND
PA7
PA6
PA5
PA4
PA3
PA2
PA1
PA0
AREF
AVcc
Vcc
GND
GND
ADC
TX
RX
PC7
PC6
PC5
PC4
PC3
PC2
PC1
PC0
FTDI_RX
FTDI_TX
REAR_BATT_RELAY
CURRENT_SENSE_FAULT
DIP_SW_2
DIP_SW_1
ERROR_LED
STATUS_LED
PD7
PD6
PD5
PD4
PD3
PD2
PD1
PD0
AUX_7
AUX_6
AUX_5
AUX_4
AUX_3
VOLTAGE_SENSE_REAR_BATT
VOLTAGE_SENSE_ELECTRONICS_BATT
TEMP_SENSOR
PDI
PDI / RESET
PR1
PR0
ATxmega 32E5
PDI_DATA
PDI_CLK/RESET
Y1
XTAL
X1045-ND
C17
22pF
C18
22pF
732-7816-1-ND
GND
MCU LEDs
ERROR_LED
STATUS_LED
RMCF0603JT220RCT-ND
R13
220
R14
220
D4
Basic_LED
160-1423-1-ND
D5
Basic_LED
160-1176-1-ND
Note: Error LED is RED.
GND
XMega ADC Application Notes
Note: One of the first 7 channels needs to be GND, for our reference
Note: AREFA and AREFD are pin 0
Note: They need to be fed 3.3-.6 volts
MCU Reset
3v3_SYS
R15
1K
P1.07KCCT-ND
PDI_CLK/RESET
S1
SW-PB
450-1759-1-ND
GND
Settings Switch
S2
DIP_SW_1
DIP_SW_2
DIP_SW
Z5189CT-ND
GND
MCU PDI
PDI_DATA
PDI_CLK/RESET
J25
DATA
VCC
N/C
N/C
CLK
GND
PDI_INTERFACE
609-2845-ND
3V3_SYS
R16
1K
P1.07KCCT-ND
GND
Temperature Sensor
U11
TMP 36
Temperature Sensor
(2.7-5.5v)
+Vs
Vout
GND
3v3_SYS
TEMP_SENSOR
TMP36GT9Z-ND
Note: degC = 100 * V - 50
Note: 2.5v = 200degC
GND
Title Microcontroller.SchDoc
Size: A4
Number: 6
Engineer: Nick McComb
Date: 3/1/2016
Time: 12:41:08 PM
Sheet 6 of 7
File: C:\Users\nrpic_000\Google Drive\PCB Designs\ROSSPowerDistribution\Microcontroller.SchDoc
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Oregon State University
Corvallis, OR
Ocean Mixing
OSU

Mounting Hardware

J32
Mounting Hole
MountingHoles

J33
Mounting Hole
MountingHoles

J38
Mounting Hole
MountingHoles

J34
Mounting Hole
MountingHoles

J35
Mounting Hole
MountingHoles

Title	Hardware.SchDoc		
Size: A4	Number: 7	Engineer: Nick McComb	
Date: 3/1/2016	Time: 12:41:08 PM	Sheet 7 of 7	
File:	C:\Users\nrpic_000\Google Drive\PCB Designs\ROSSPowerDistribution\Hardware.SchDoc		

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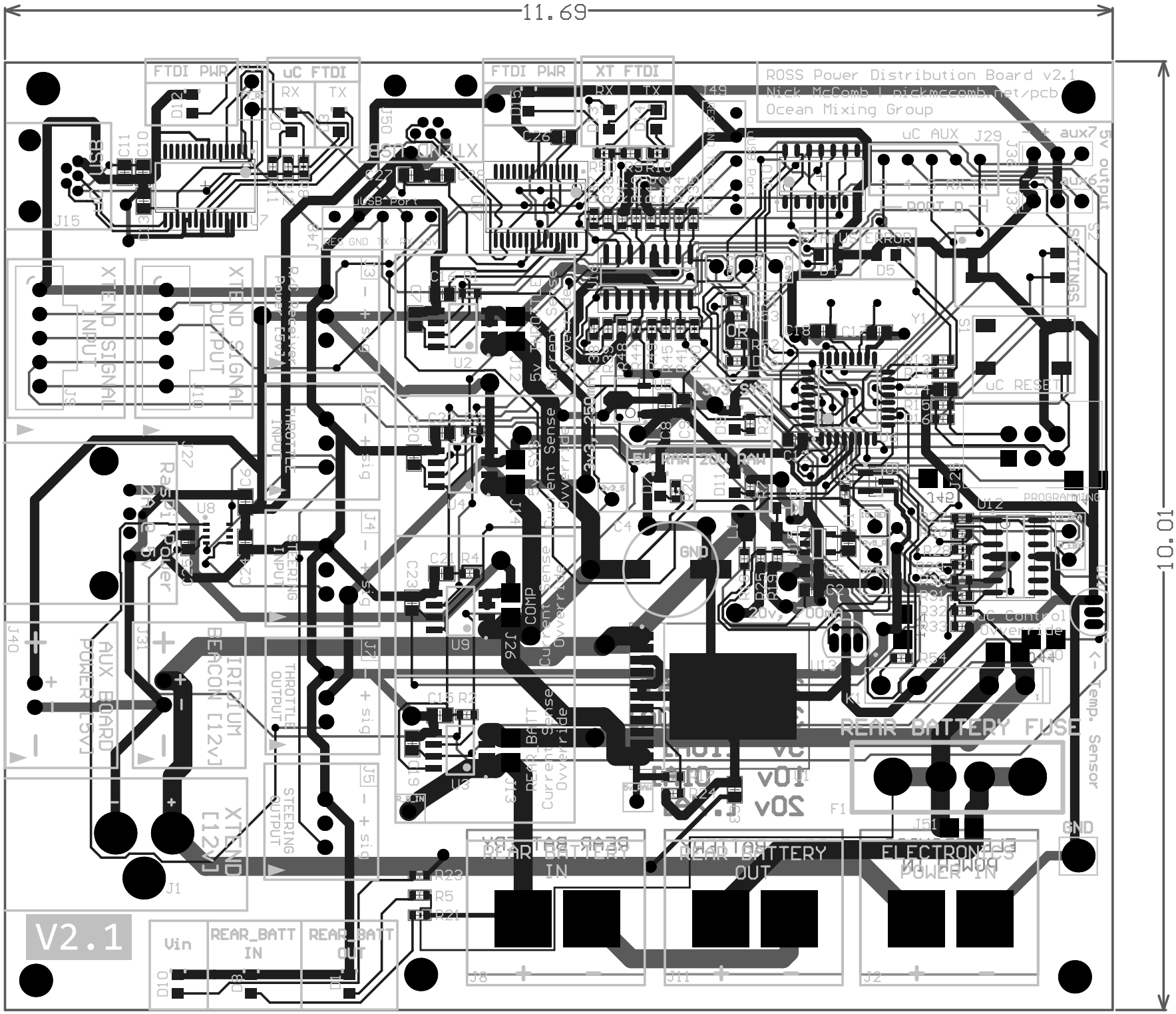
11.69
10.01
ROSS Power Distribution Board v2.1
Nick McComb | nickmccomb.net/pcb
Ocean Mixing Group
FTDI PWR
uC FTDI
FTDI PWR
XT FTDI
uC AUX J29
aux7
5v output
XTEND SIGNAL INPUT
XTEND SIGNAL OUTPUT
Radio Power
AUX BOARD POWER [5V]
IRIDIUM BEACON [12v]
XTEND [12V]
REAR BATTERY FUSE
REAR BATTERY IN
REAR BATTERY OUT
ELECTRONICS POWER IN
Vin
REAR_BATT IN
REAR_BATT OUT
V2.1