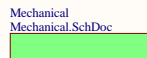
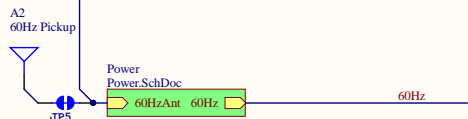
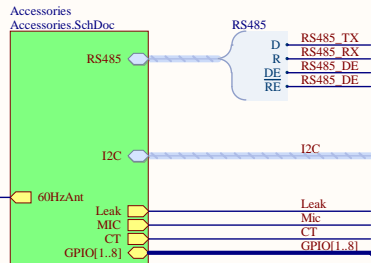
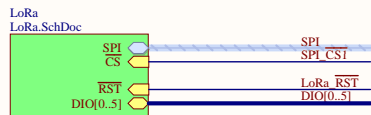
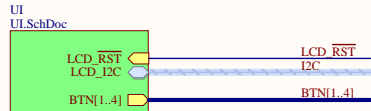
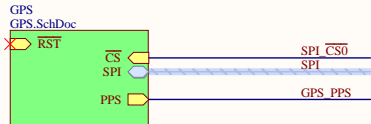
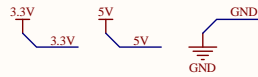
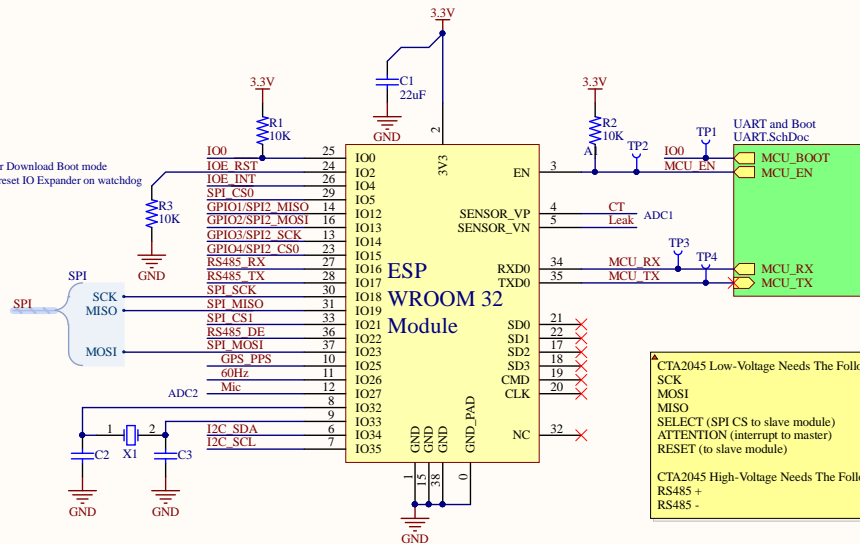


Peripherals Mapping
 U0(UART 0) - Debug/Prgrm
 U2(UART 2) - RS485 CEA2045
 VSP1(SPI3) - GPS and LCD (can do UART to GPS if desired)

Naming The Power Nets



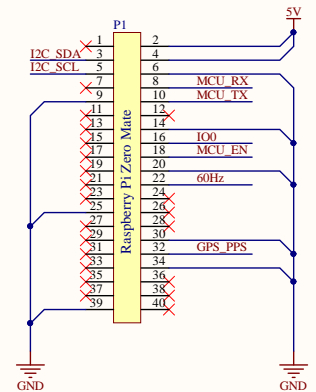
Need low for Download Boot mode
 and used to reset IO Expander on watchdog



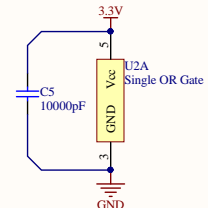
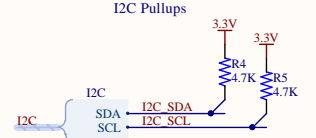
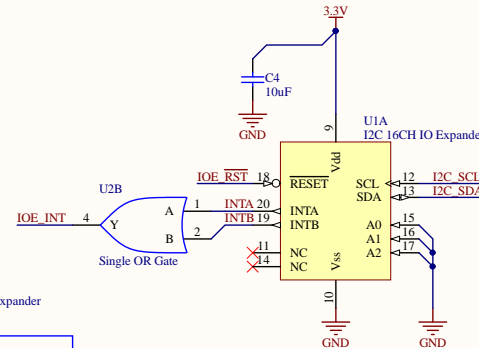
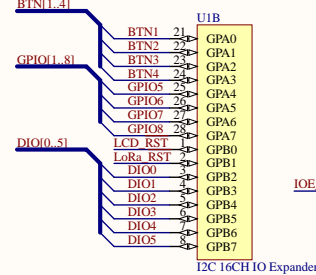
CTA2045 Low-Voltage Needs The Following:
 SCK
 MOSI
 MISO
 SELECT (SPI CS to slave module)
 ATTENTION (interrupt to master)
 RESET (to slave module)

CTA2045 High-Voltage Needs The Following:
 RS485 +
 RS485 -

TODO:
 * Replace Crystal and crystal caps with own part - check crystal caps values

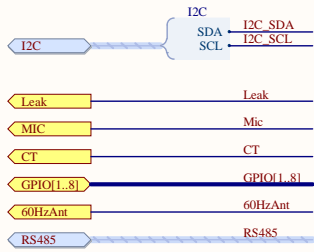


IO Expander



Title		
Main		
Size	Number	Revision
B		1
Date:	8/17/2017	Sheet of
File:	C:\Users\Main\SchDoc	Drawn By: Craig Hesling

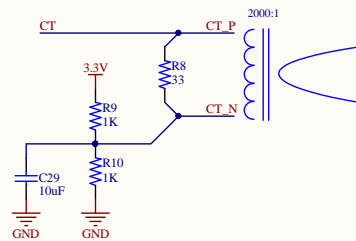
Main Board Interface



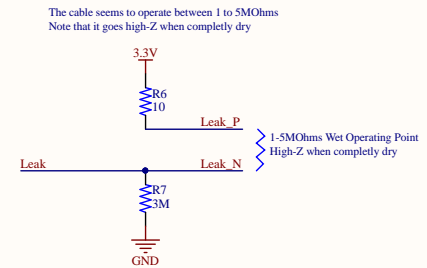
The accessories interface was designed around being able to run a CTA2045 Low Power interface (SPI + 2 IO pins) and two relays.

Other potentially useful protocols, like I2C, RS485, and sensor controls have also been exposed into the header.

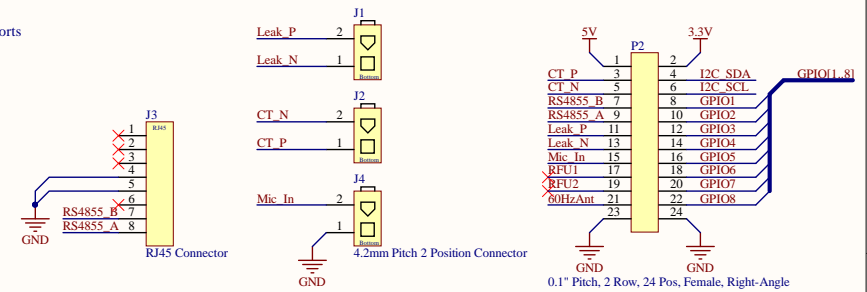
Current Transformer



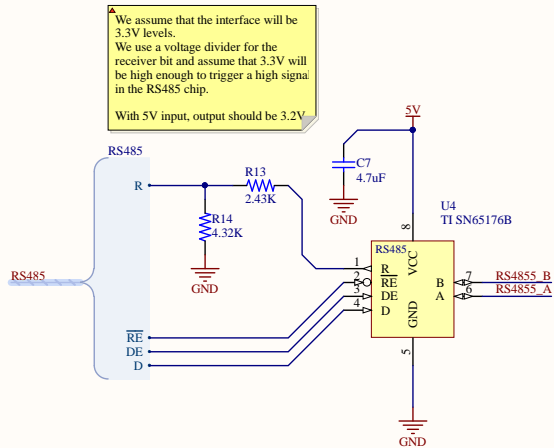
Leak Detection Cable



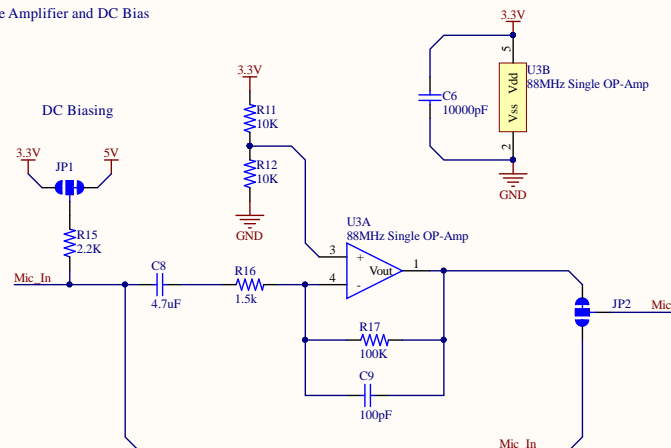
Accessory Ports



RS485 Transceiver



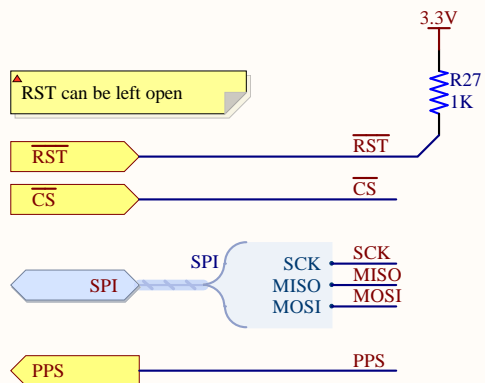
Microphone Amplifier and DC Bias



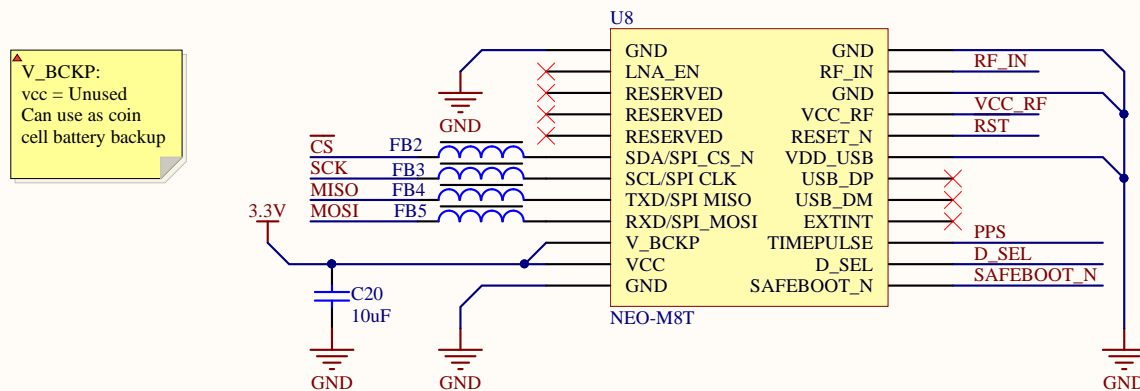
JASON COHN/REUTERS

Title Accessories			
Size B	Number	Revision 1	
Date: 8/17/2017	Sheet of		1
File: C:\Users\...\Accessories.SchDoc	Drawn By: Craig Hesling		

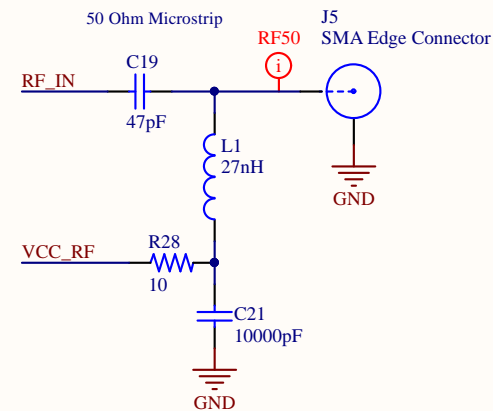
A



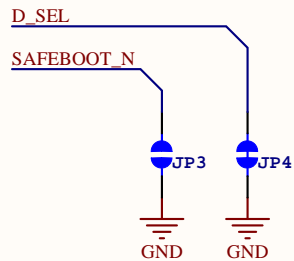
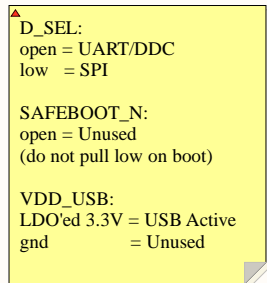
B



C



D



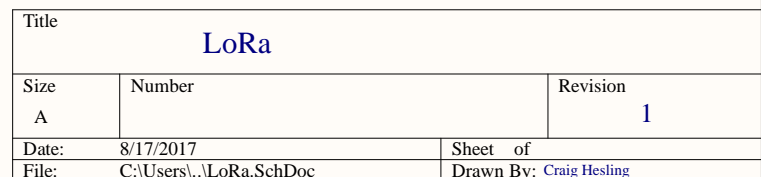
Title GPS		
Size A	Number	Revision 1
Date:	8/17/2017	Sheet of
File:	C:\Users\...\GPS.SchDoc	Drawn By: Craig Hesling

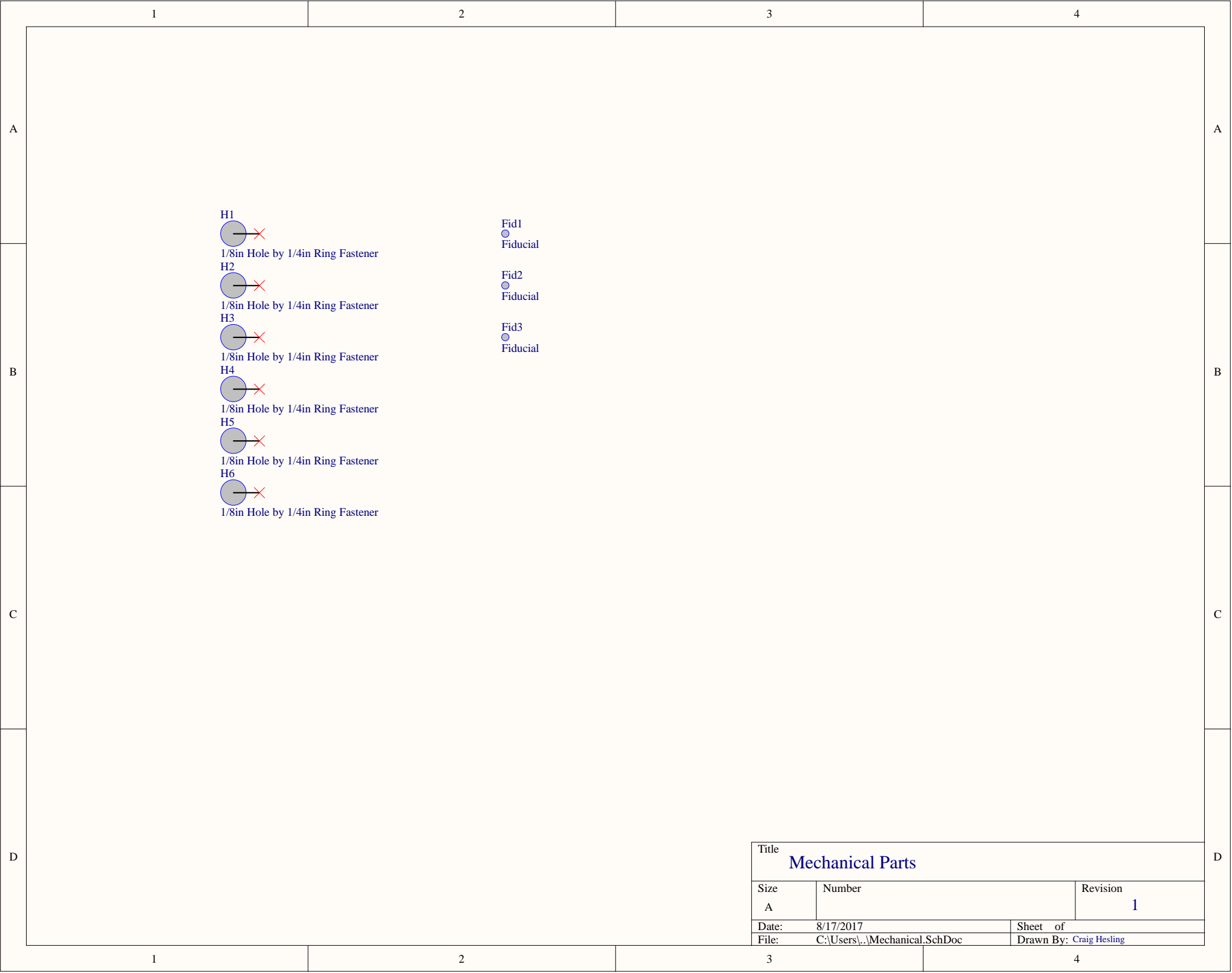
A

B

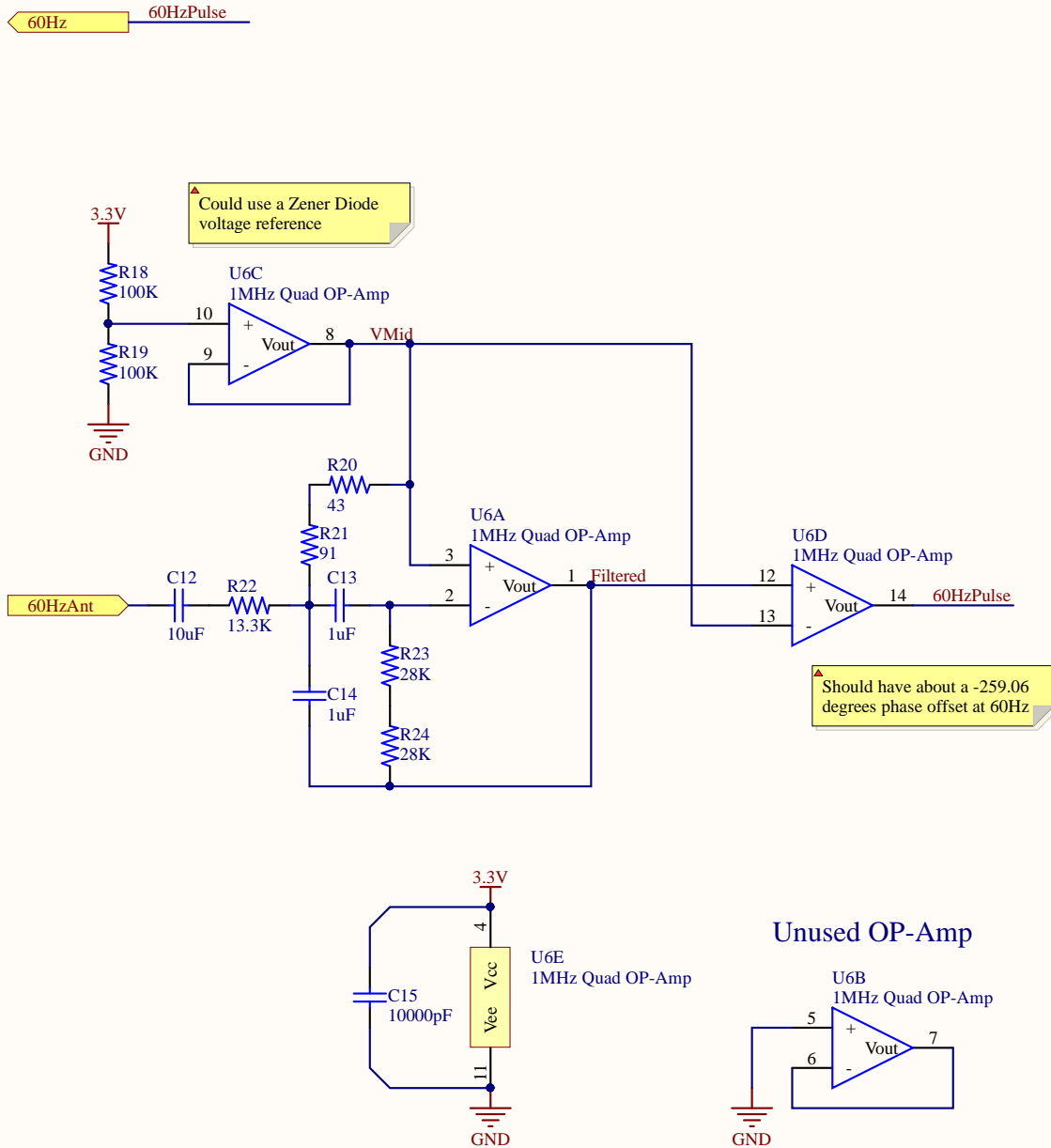
C

D

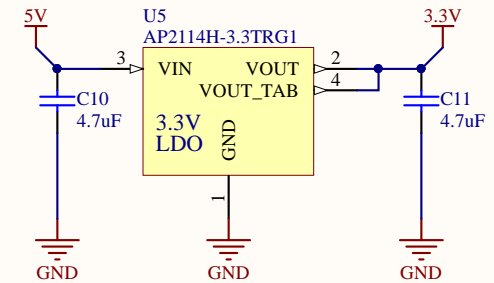




60Hz Zero Crossing Pulse



3.3V Regulation



Title

Power

Size

A

Number

Revision

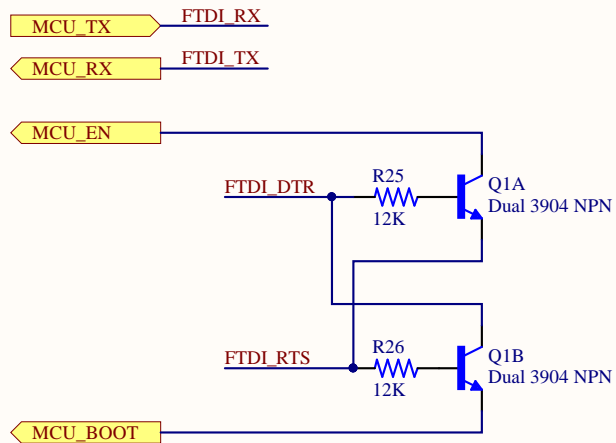
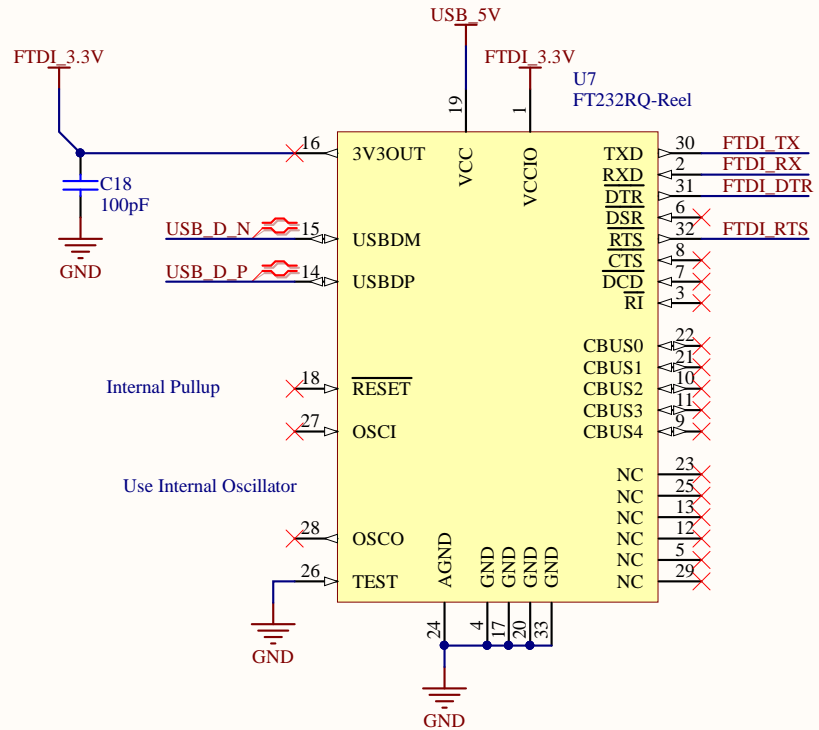
1

Date: 8/17/2017

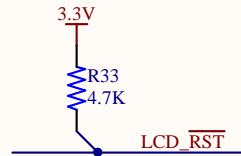
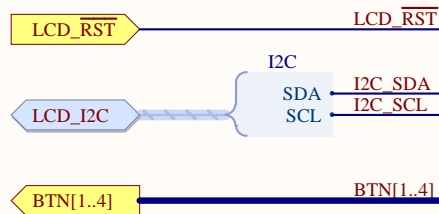
Sheet of

File: C:\Users\...\Power.SchDoc

Drawn By: Craig Hesling



Title			UART		
Size	Number			Revision	
A				2	
Date:	8/17/2017			Sheet	of
File:	C:\Users\...\UART.SchDoc			Drawn By:	Craig Hesling



$$R1 = [(V_{out} - 3V) - 0V] / 10\mu A$$

$$R1 = [(12.0985V - 3V) - 0V] / 10\mu A$$

$$R1 = 909.853k\Omega$$

Using V_{out_min} , V_{out_max} , and the 910kOhm 1% tolerance, we have the following:

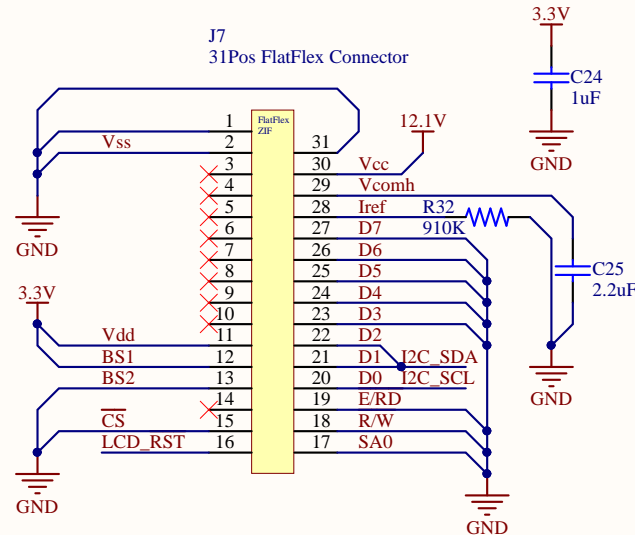
$$I_{ref_min} = [(V_{out_min} - 3V) - 0V] / (910k\Omega * (1+.01))$$

$$I_{ref_min} = 9.66523 \mu A$$

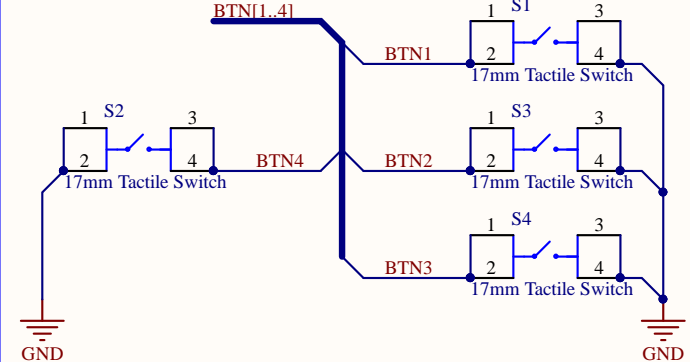
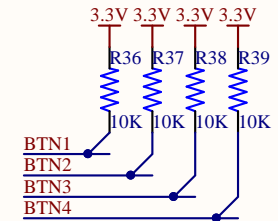
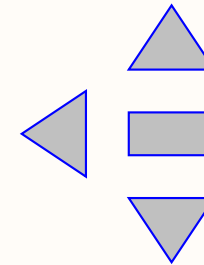
$$I_{ref_max} = [(V_{out_max} - 3V) - 0V] / (910k\Omega * (1-.01))$$

$$I_{ref_max} = 10.3431 \mu A$$

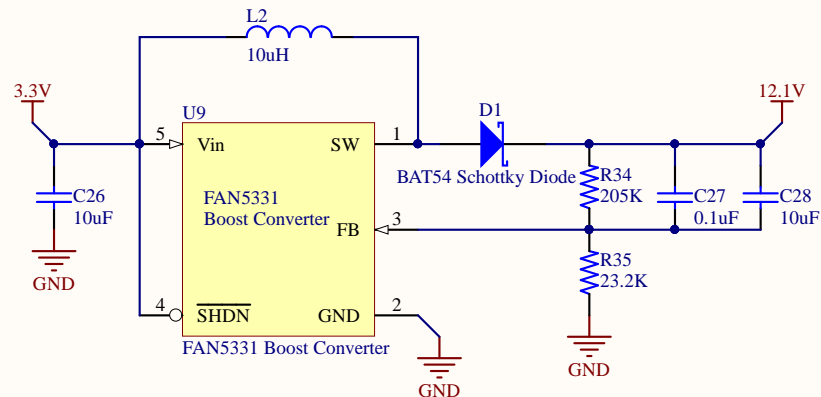
I_{ref_min} and I_{ref_max} are within 10uA+-2uA.



Display Navigation Buttons



This is the boost converter for the OLED's display 12.1V supply.



$$V_{out} = 1.23V * (1 + 205k / 23.2k)$$

$$V_{out} = 12.0985V$$

Using the resistor's 1% tolerance, we have the following:

$$V_{out_min} = 1.23V * [1 + (205k * (1-.01)) / (23.2k * (1+.01))]$$

$$V_{out_min} = 11.8833V$$

$$V_{out_max} = 1.23V * [1 + (205k * (1+.01)) / (23.2k * (1-.01))]$$

$$V_{out_max} = 12.3181V$$

Title

User Interface

Size

A

Number

Date: 8/17/2017

File: C:\Users\...\UI.SchDoc

Revision

1

Sheet of

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<https://learn.adafruit.com/assets/27580>

