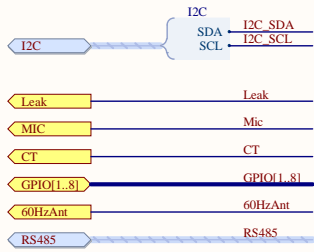


Title <b>Main</b>		
Size B	Number	Revision <b>1</b>
Date: 8/9/2017	Sheet of	
File: C:\Users\j\Main SchDoc	Drawn By: <u>Craig Hesline</u>	

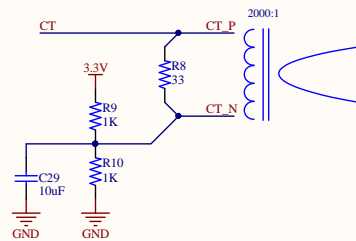
## Main Board Interface



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

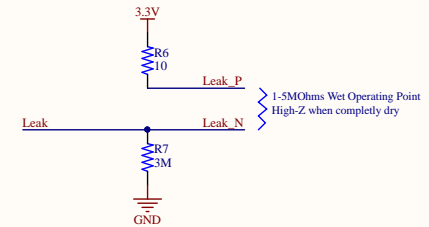
Other potentially useful protocols, like I2C, RS485, and sensor controls have also been exposed into the header.

## Current Transformer

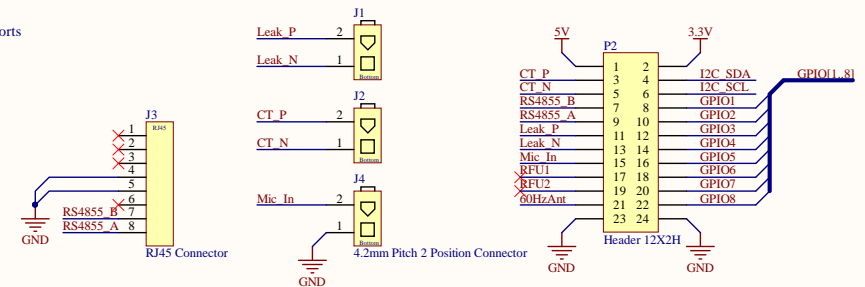


## Leak Detection Cable

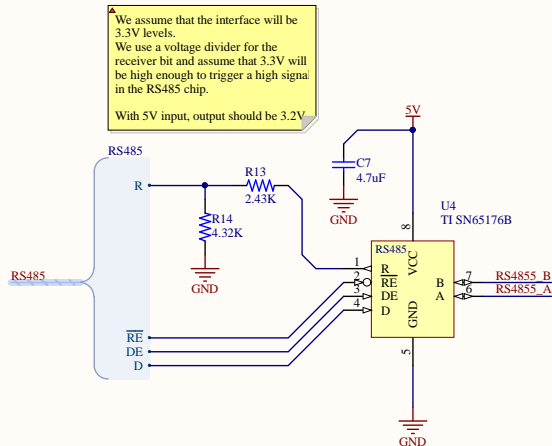
The cable seems to operate between 1 to 5MOhms  
Note that it goes high-Z when completely dry



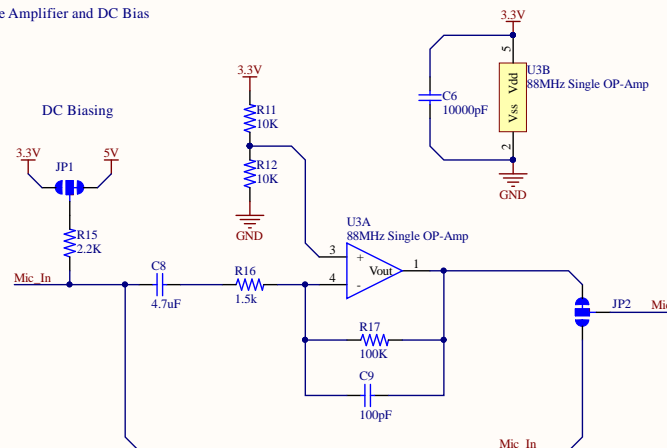
## Accessory Ports



## RS485 Transceiver



## Microphone Amplifier and DC Bias

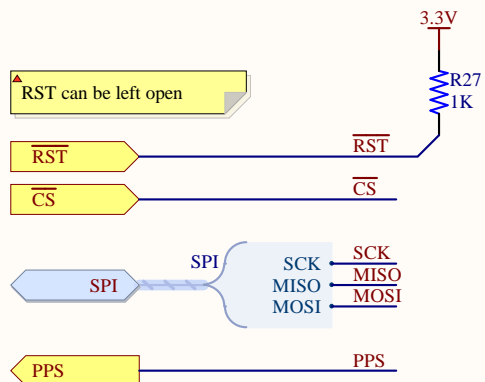


Cannot open file C:\Users\admin\Downloads\Rubber\_Duck\_(8374802487).jpg

By Eva Rinaldi - Rubber Duck, CC BY-SA 2.0.  
<https://commons.wikimedia.org/w/index.php?curid=24788549>

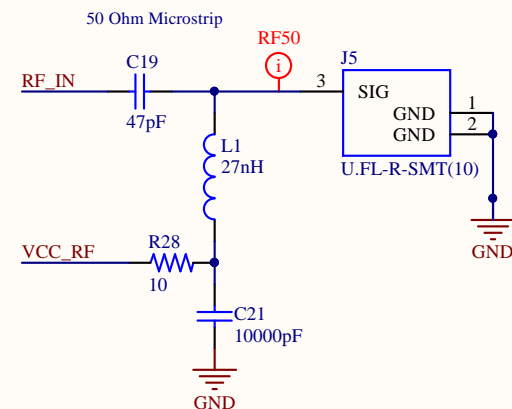
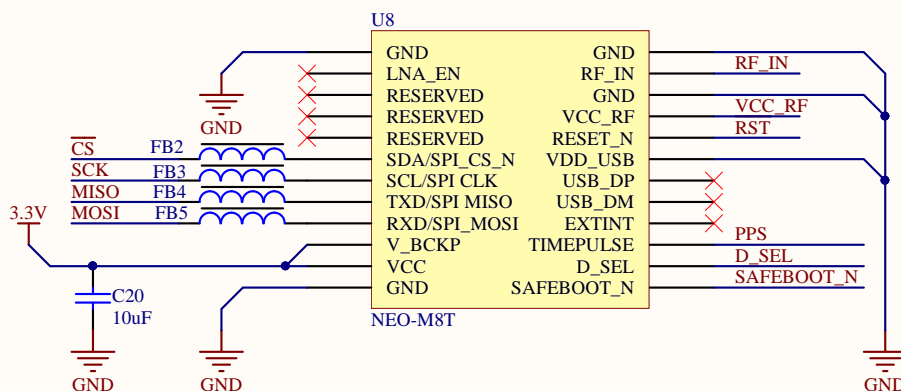
Title		
Accessories		
Size	Number	Revision
B		1
Date:	8/9/2017	Sheet of
File:	C:\Users\...\Accessories.SchDoc	Drawn By: Craig Hesling

A



B

▲ V\_BCKP:  
vcc = Unused  
Can use as coin  
cell battery backup



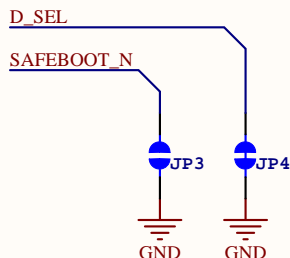
C

D

▲ D\_SEL:  
open = UART/DDC  
low = SPI

SAFEBOOT\_N:  
open = Unused  
(do not pull low on boot)

VDD\_USB:  
LDO'ed 3.3V = USB Active  
gnd = Unused



Title		
GPS		
Size	Number	Revision
A		1
Date:	8/9/2017	Sheet of
File:	C:\Users\...\GPS.SchDoc	Drawn By: Craig Hesling

A

B

C

D

A

A

B

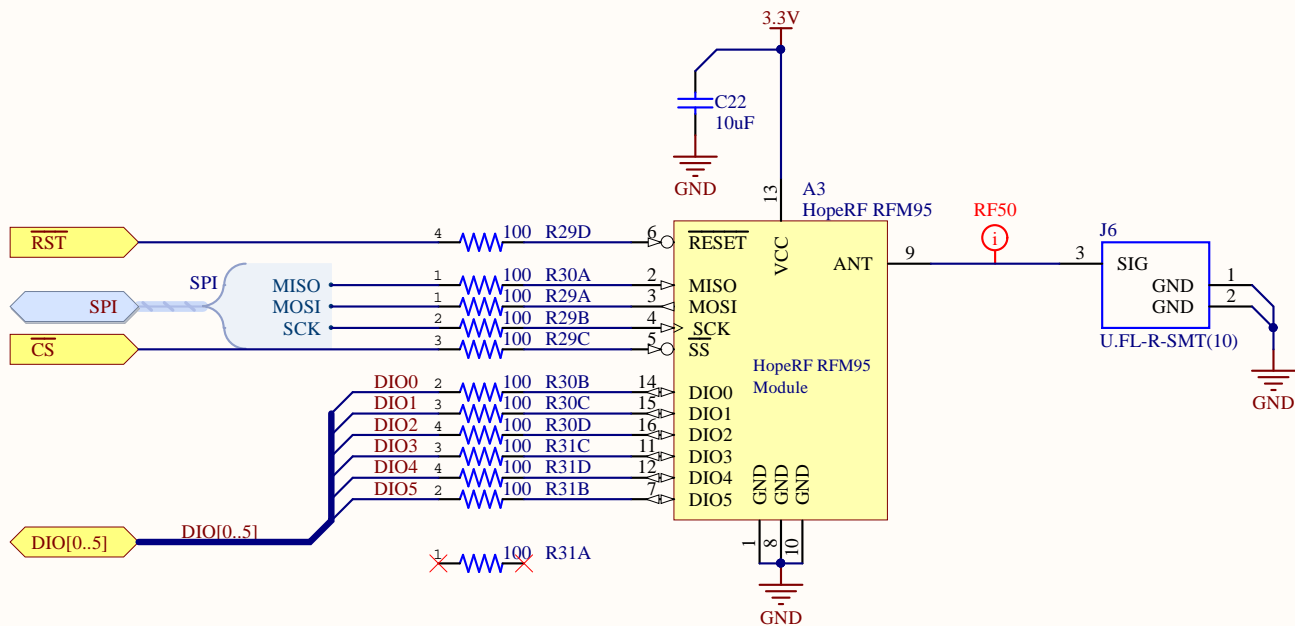
B

C

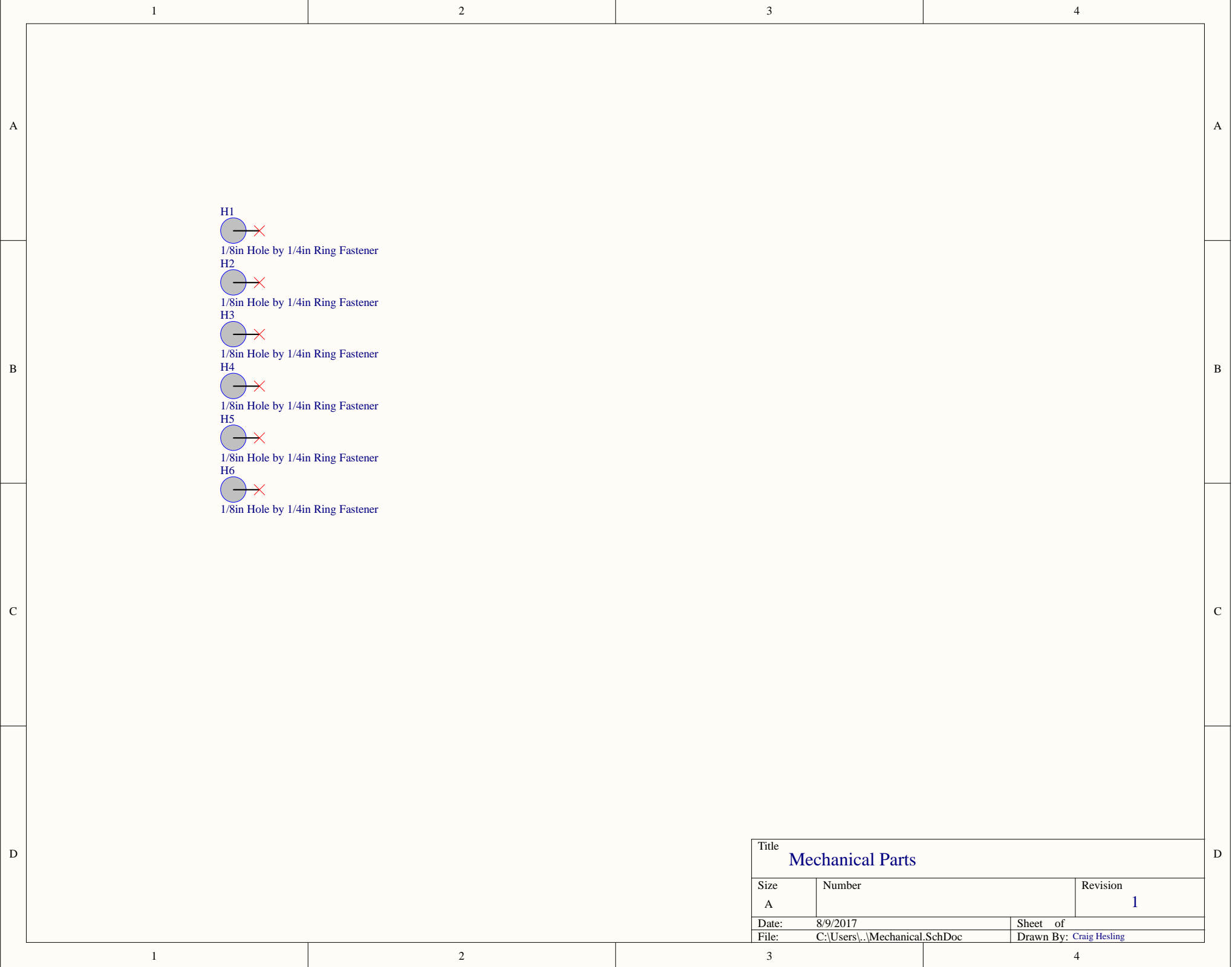
C

D

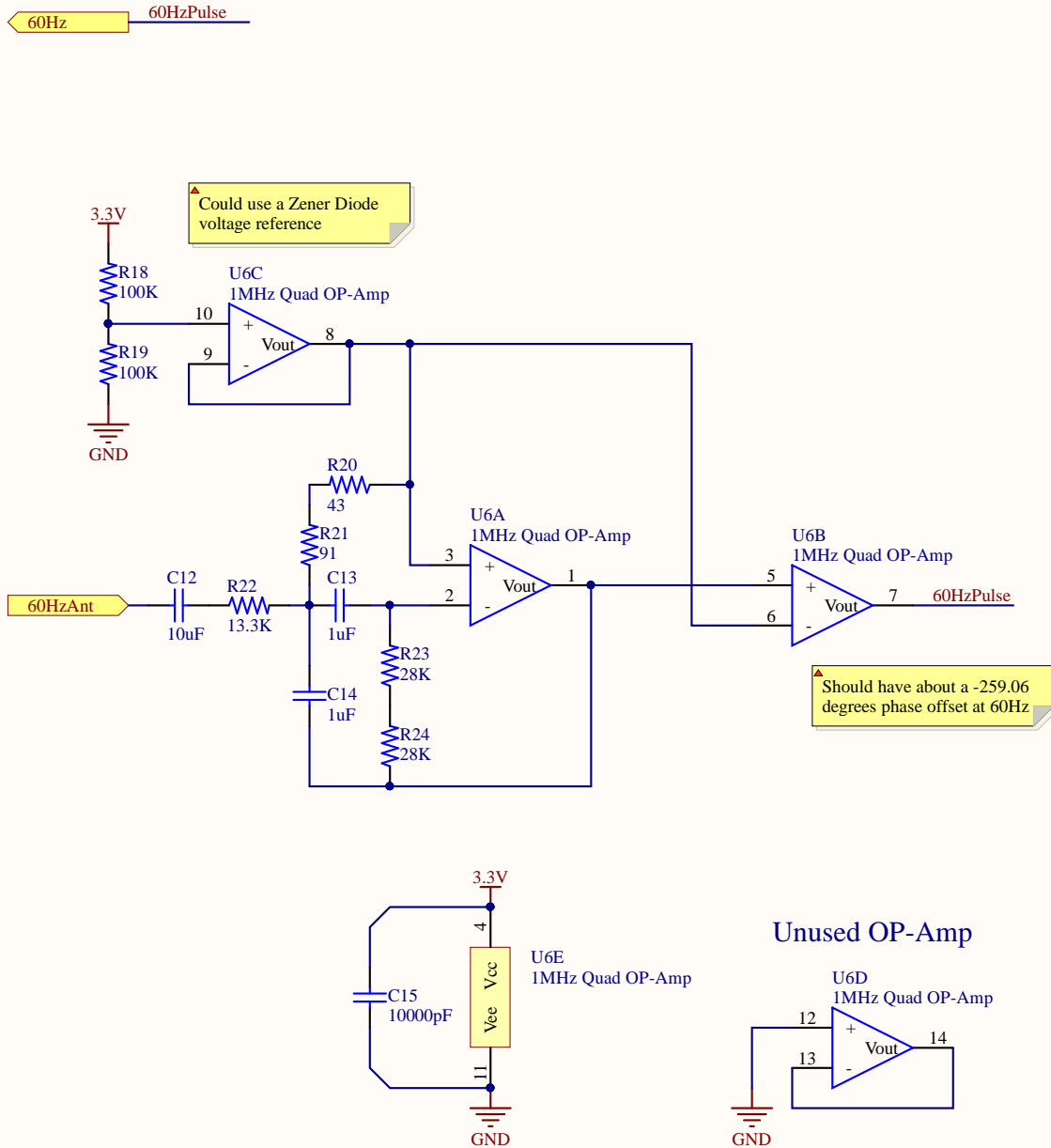
D



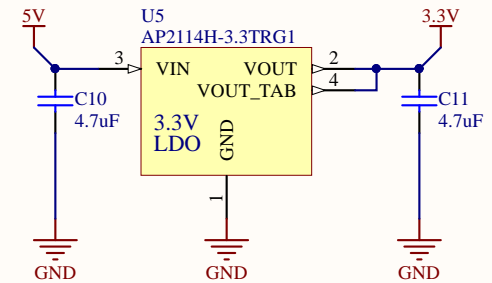
Title		
LoRa		
Size	Number	Revision
A		1
Date:	8/9/2017	Sheet of
File:	C:\Users\...\LoRa.SchDoc	Drawn By: Craig Hesling



## 60Hz Zero Crossing Pulse



## 3.3V Regulation

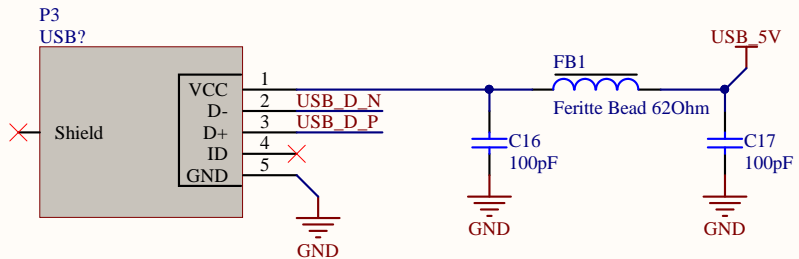


Title  
**Power**

Size	Number	Revision
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Date:	8/9/2017	Sheet of
File:	C:\Users\...\Power.SchDoc	Drawn By: Craig Hesling

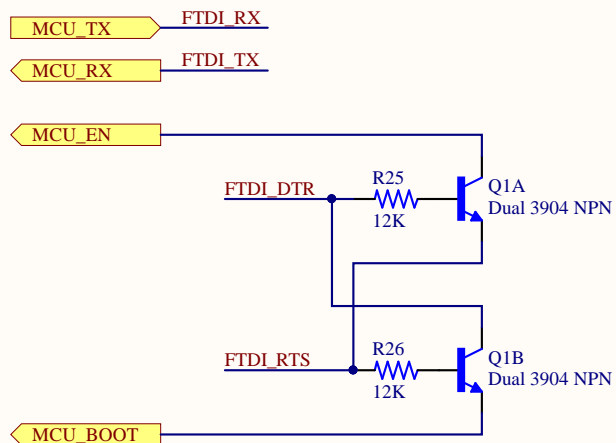
A

A



B

B

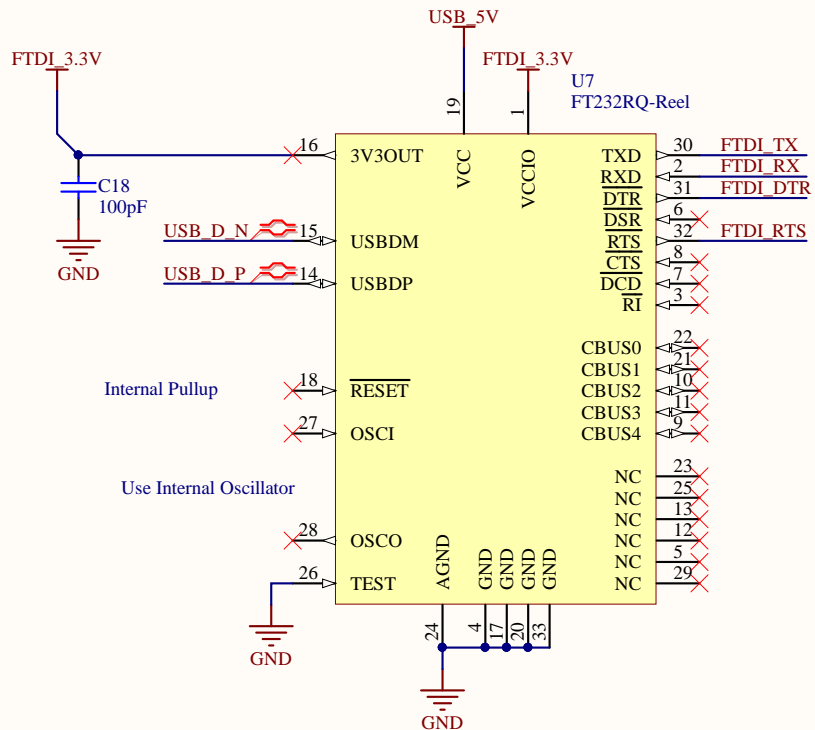


C

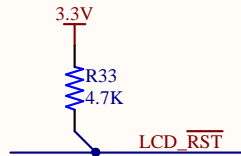
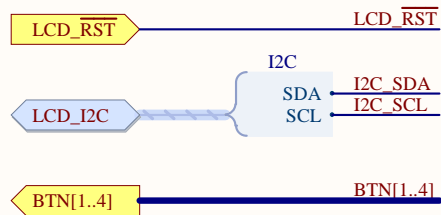
C

D

D



Title			
UART			
Size	Number		Revision
A			2
Date:	8/9/2017	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:

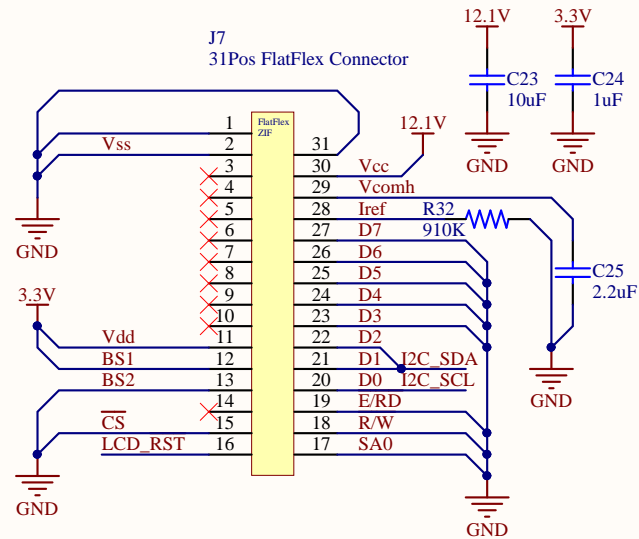
$$I_{ref\_min} = [(V_{out\_min} - 3V) - 0V] / (910k\Omega * (1+.01))$$

$$I_{ref\_min} = 9.66523 \mu A$$

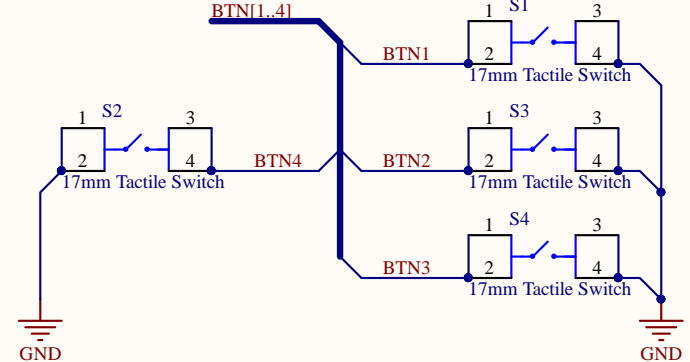
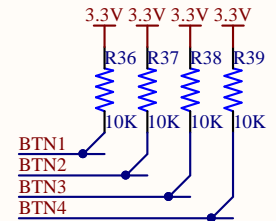
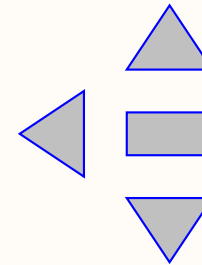
$$I_{ref\_max} = [(V_{out\_max} - 3V) - 0V] / (910k\Omega * (1-.01))$$

$$I_{ref\_max} = 10.3431 \mu A$$

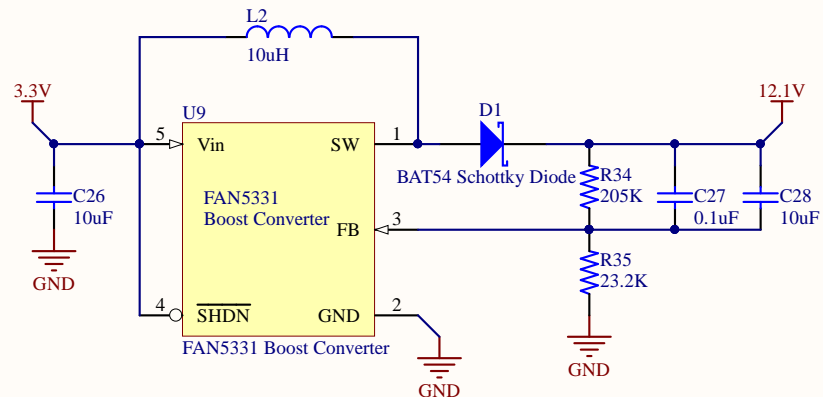
$I_{ref\_min}$  and  $I_{ref\_max}$  are within 10uA+-2uA.



### 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:

8/9/2017

File:

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

Revision

1

Sheet of

Drawn By: Craig Hesling

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