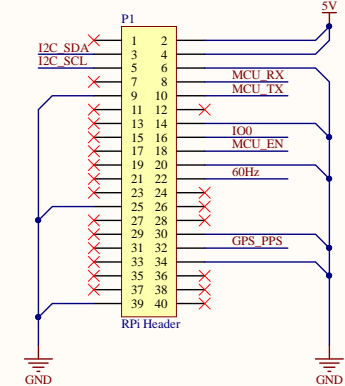
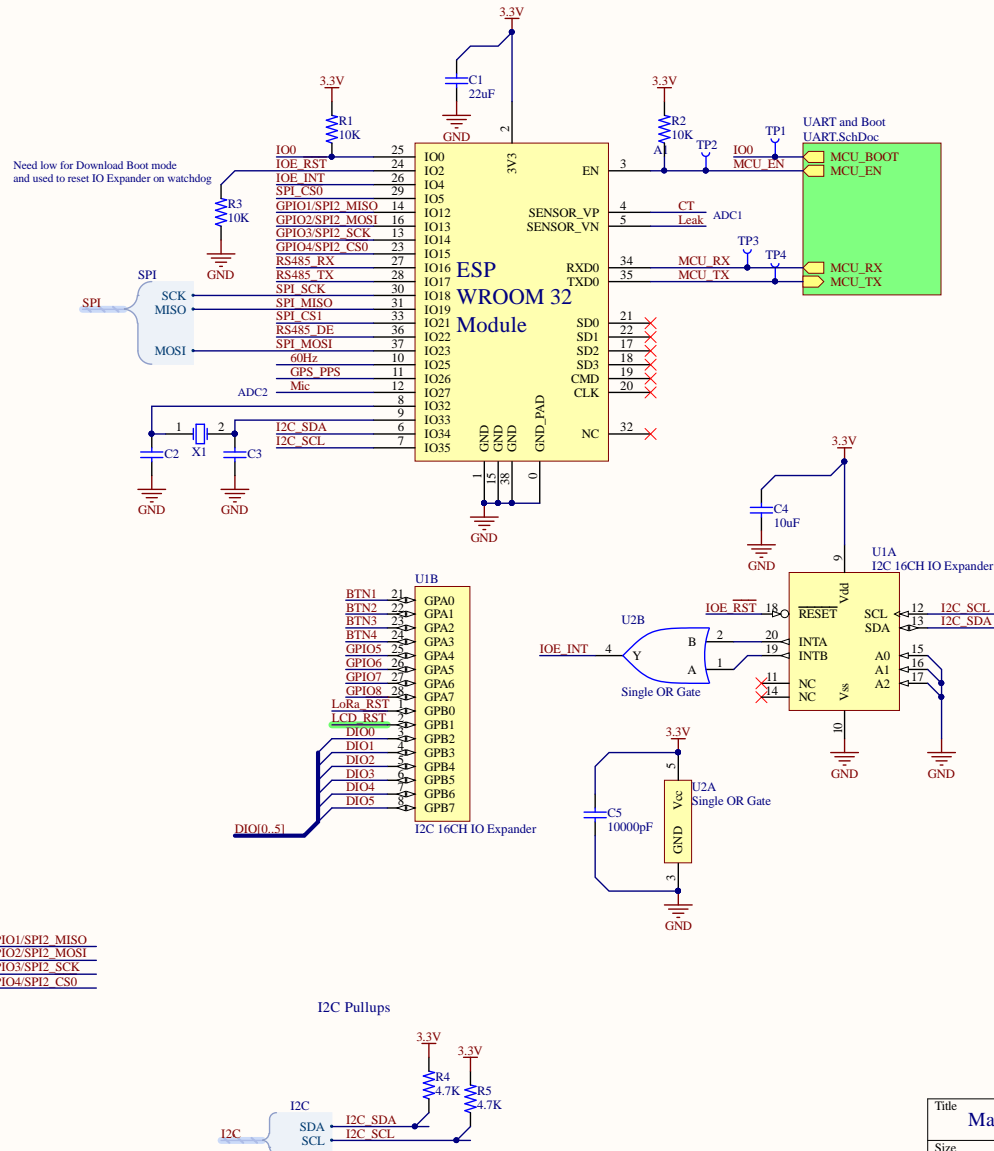


Peripherals Mapping  
 U0(UART 0) - Debug/Prgrm  
 U2(UART 2) - RS485 CEA2045  
 VSPi(SPI3) - GPS and LCD (can do UART to GPS if desired)

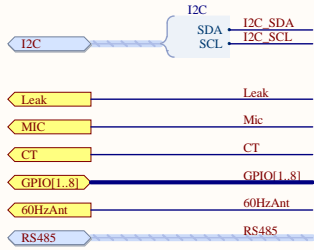
TODO:  
 \* Replace Crystal and crystal caps with own part - check crystal caps values



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 -

Title Main		
Size B	Number	Revision 1
Date: 7/31/2017	Sheet of	
File: C:\Users\Main\SchDoc	Drawn By: Craig Hesling	

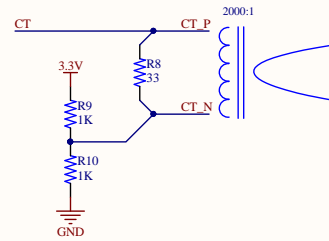
## Main Board Interface



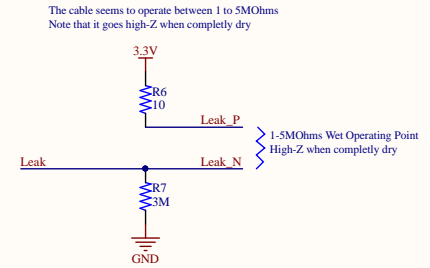
The accessories interface was designed around being able to run a CTA2045 Low Power interface (SPI + 2 IO pins) and two relays.

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

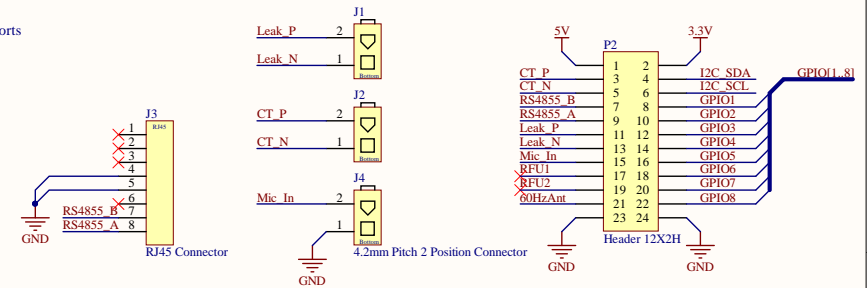
## Current Transformer



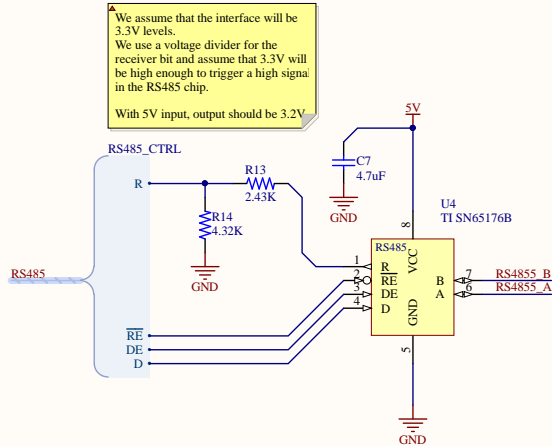
## Leak Detection Cable



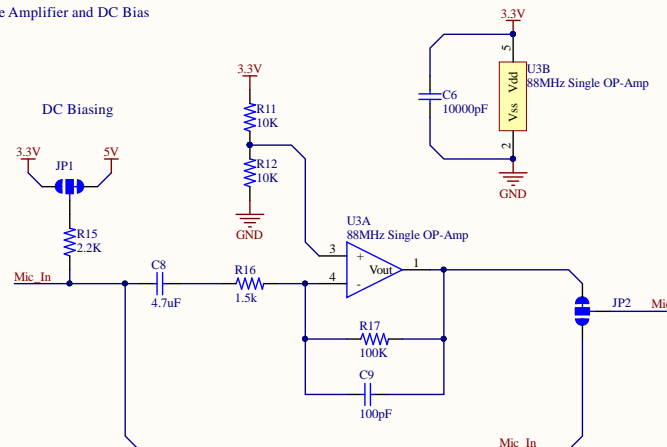
## Accessory Ports



## RS485 Transceiver



## Microphone Amplifier and DC Bias

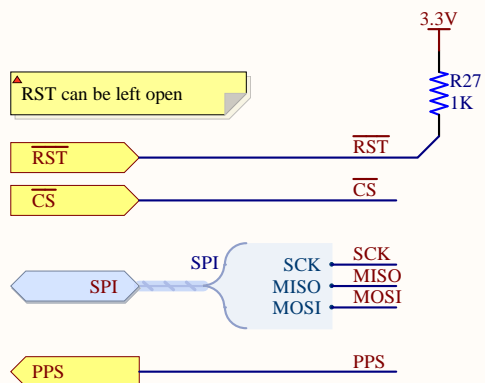


By Eva Rinaldi - Rubber Duck, CC BY-SA 2.0.  
<https://commons.wikimedia.org/w/index.php?curid=24788549>

Title <b>Accessories</b>		
Size B	Number	Revision <b>1</b>
Date: 7/31/2017	Sheet of	
File: C:\Users\...\Accessories.SchDoc	Drawn By: Craig Hesling	

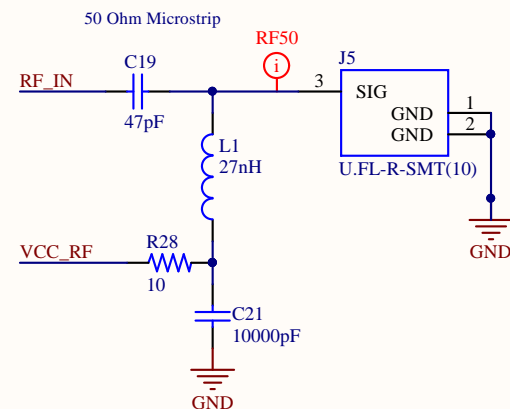
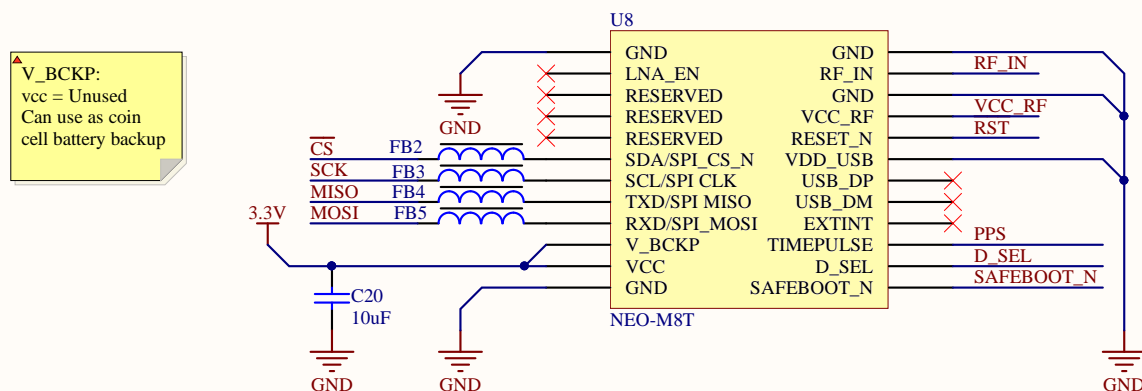
A

A



B

B

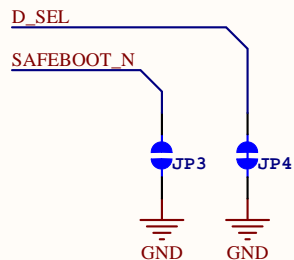
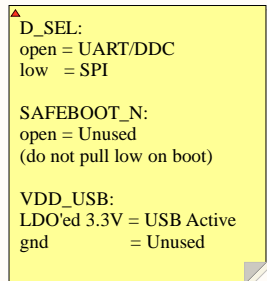


C

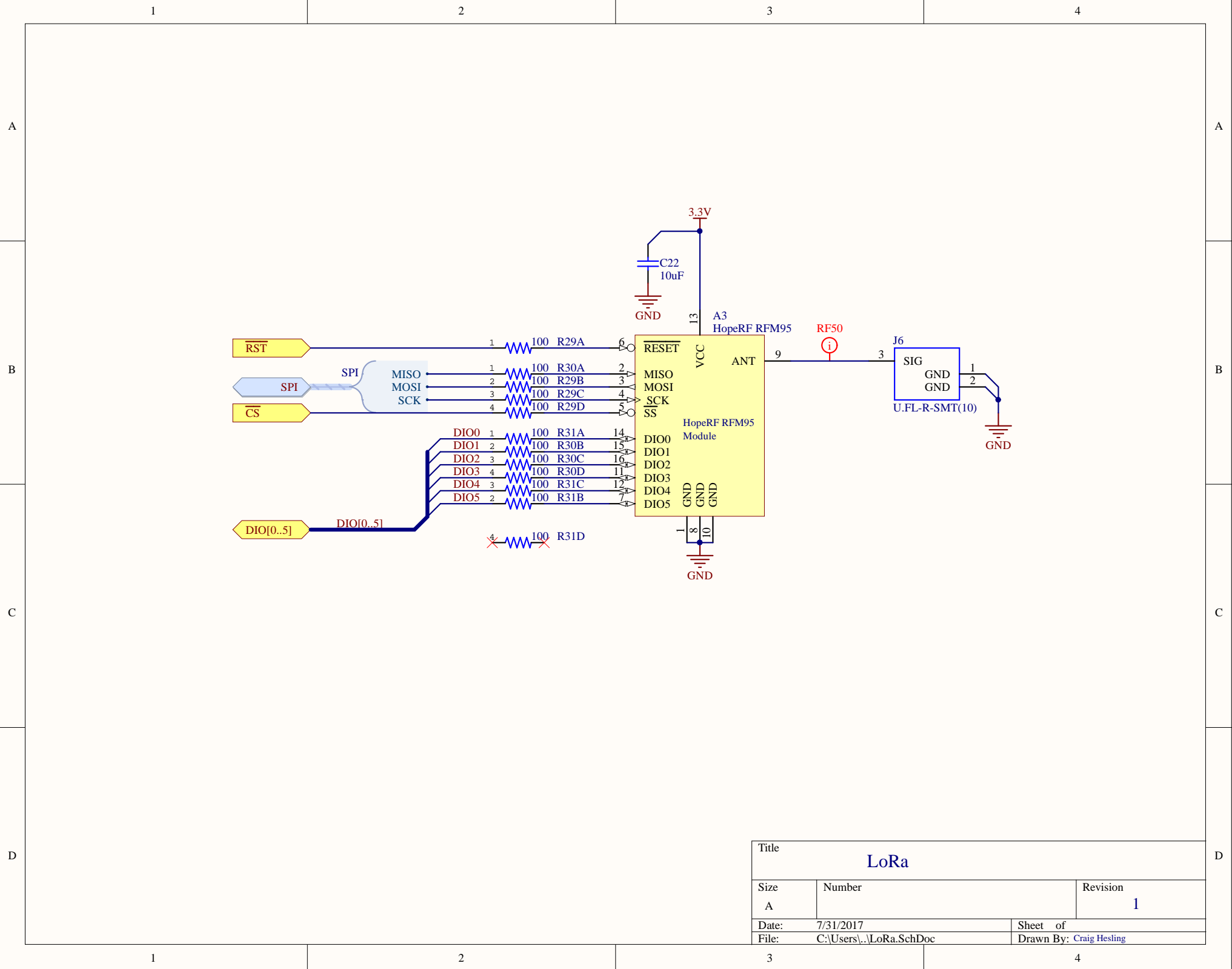
C

D

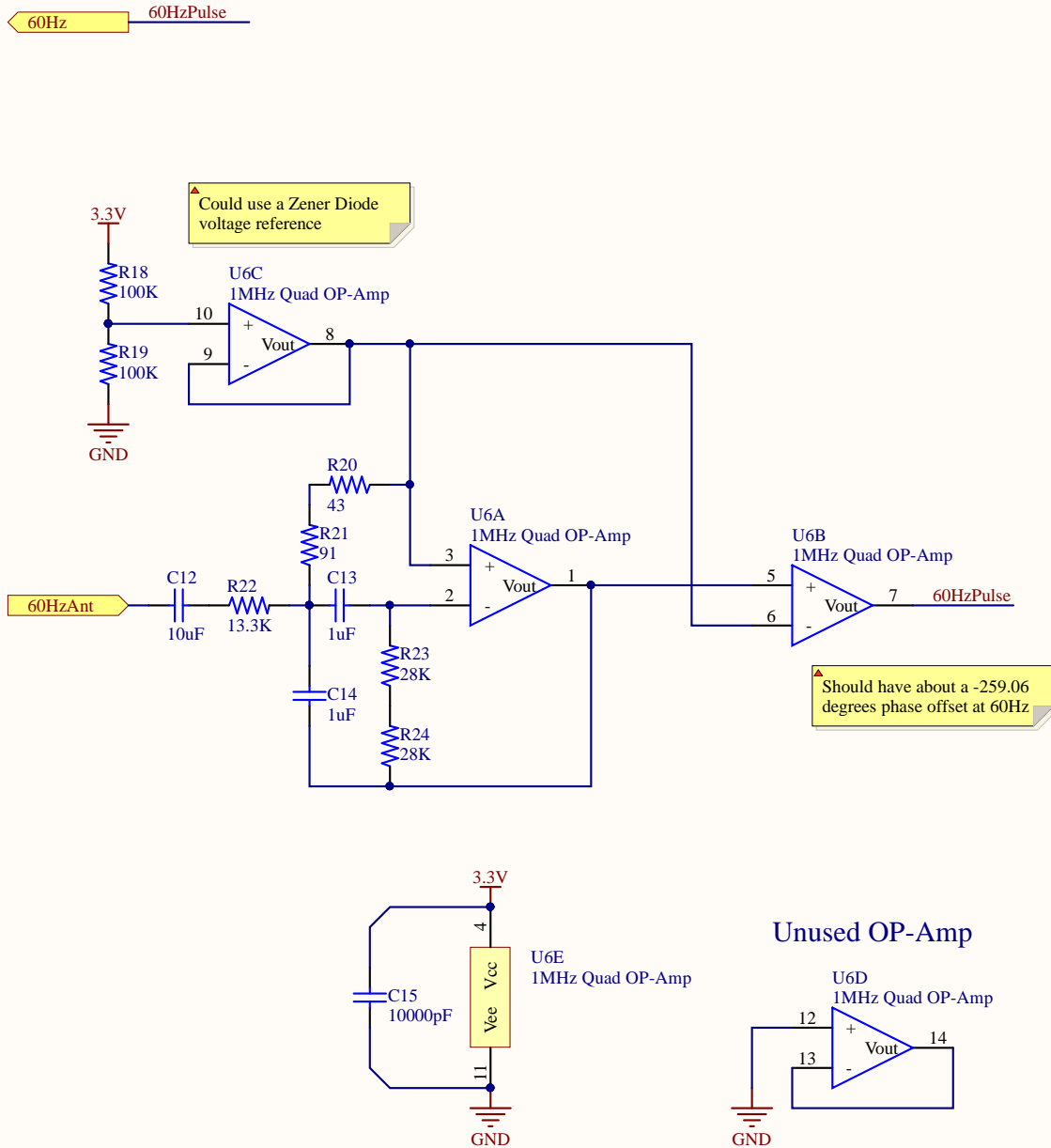
D



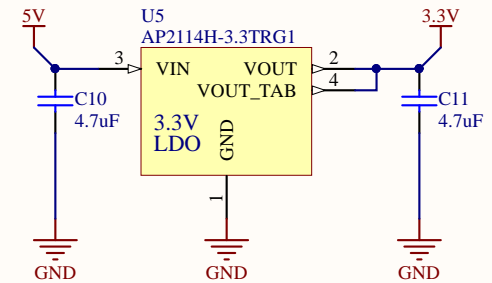
Title GPS		
Size A	Number	Revision 1
Date:	7/31/2017	Sheet of
File:	C:\Users\...\GPS.SchDoc	Drawn By: Craig Hesling



## 60Hz Zero Crossing Pulse



## 3.3V Regulation



Title

Power

Size

A

Number

Revision

1

Date: 7/31/2017

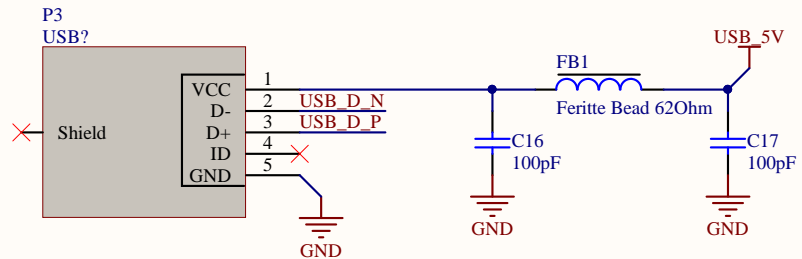
Sheet of

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

Drawn By: Craig Hesling

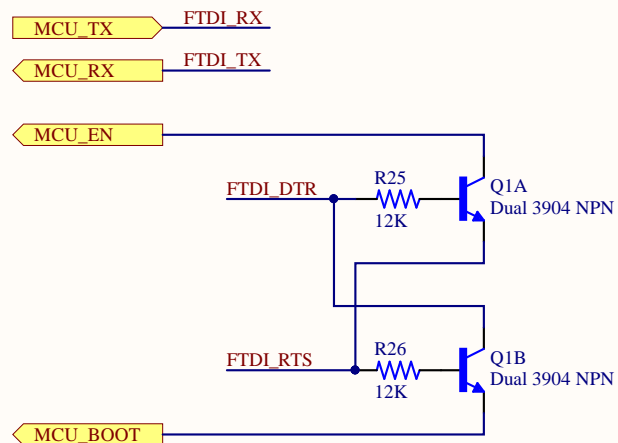
A

A



B

B

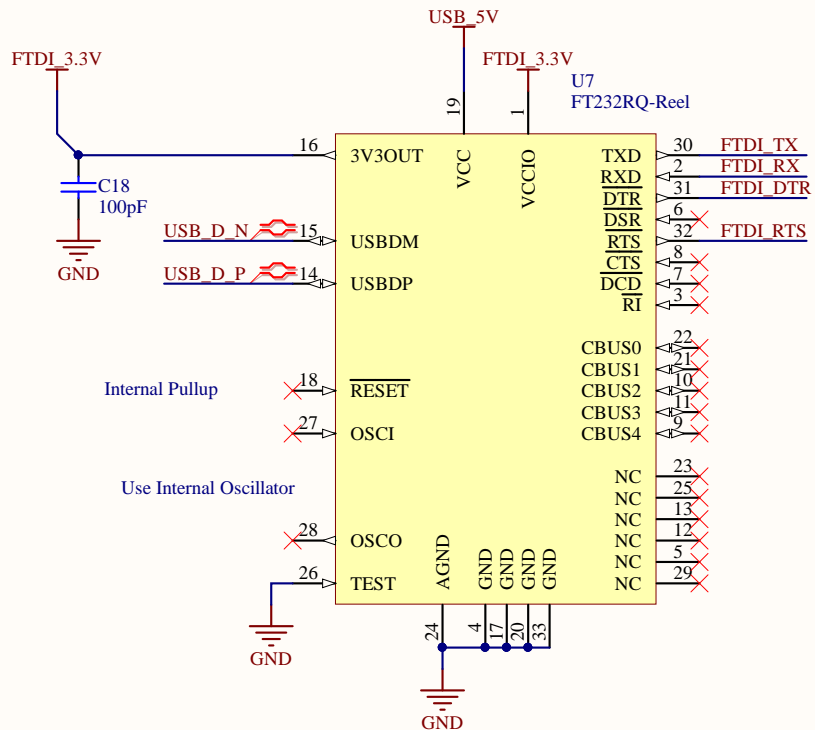


C

C

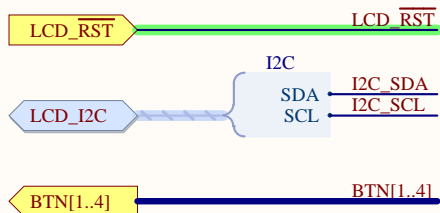
D

D



Title  
UART

Size	Number	Revision
A		2
Date:	7/31/2017	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:

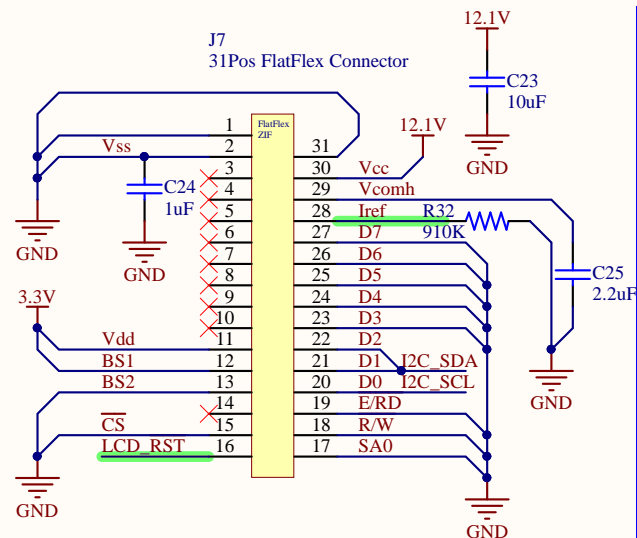
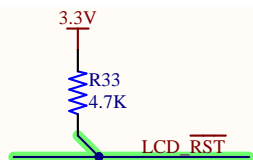
$$I_{ref\_min} = [(V_{out\_min} - 3V) - 0V] / (910k\Omega * (1+.01))$$

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

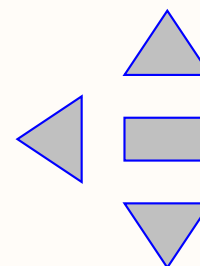
$$I_{ref\_max} = [(V_{out\_max} - 3V) - 0V] / (910k\Omega * (1-.01))$$

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

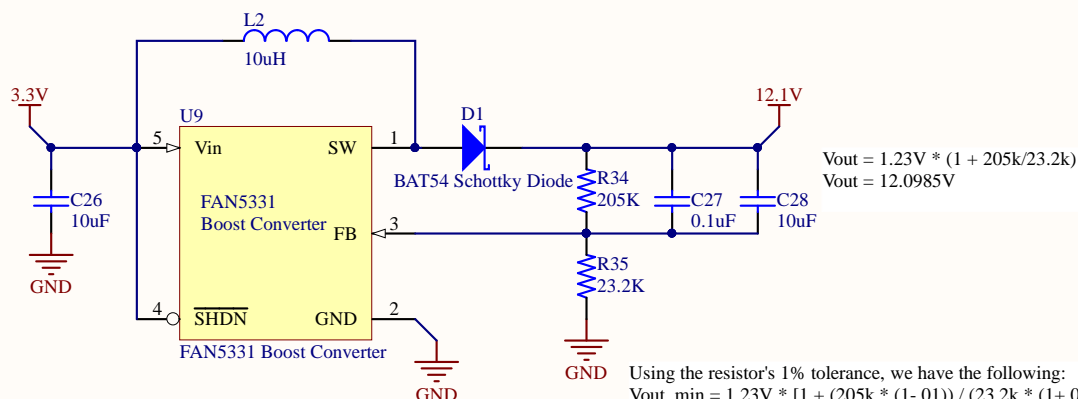
$I_{ref\_min}$  and  $I_{ref\_max}$  are within  $10\mu A \pm 2\mu A$ .



Display Navigation Buttons



This is the boost converter for the OLED 13V display voltage.



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

$$V_{out} = 12.0985V$$

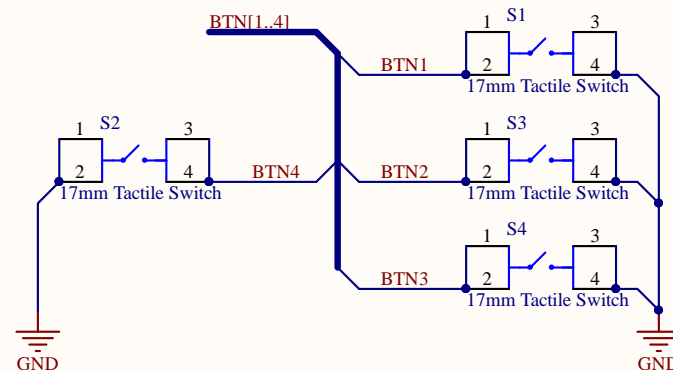
Using the resistor's 1% tolerance, we have the following:

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

$$V_{out\_min} = 11.8833V$$

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

$$V_{out\_max} = 12.3181V$$



Title

User Interface

Size

Number

Revision

1

Date: 7/31/2017

Sheet of

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

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