

Figure 33. Supply Current vs. Supply Voltage,  $V_S$  at  $25^\circ\text{C}$

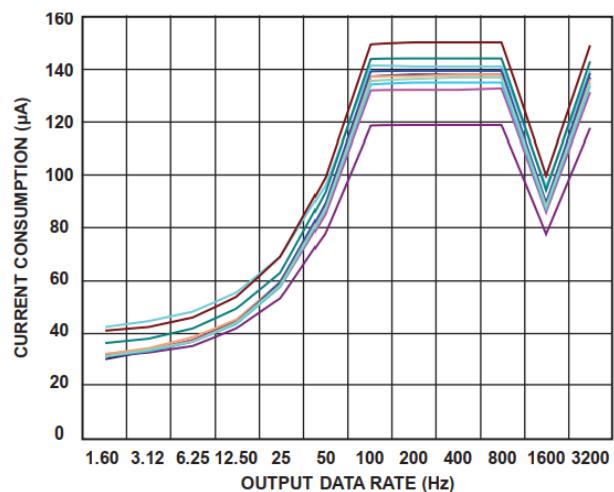
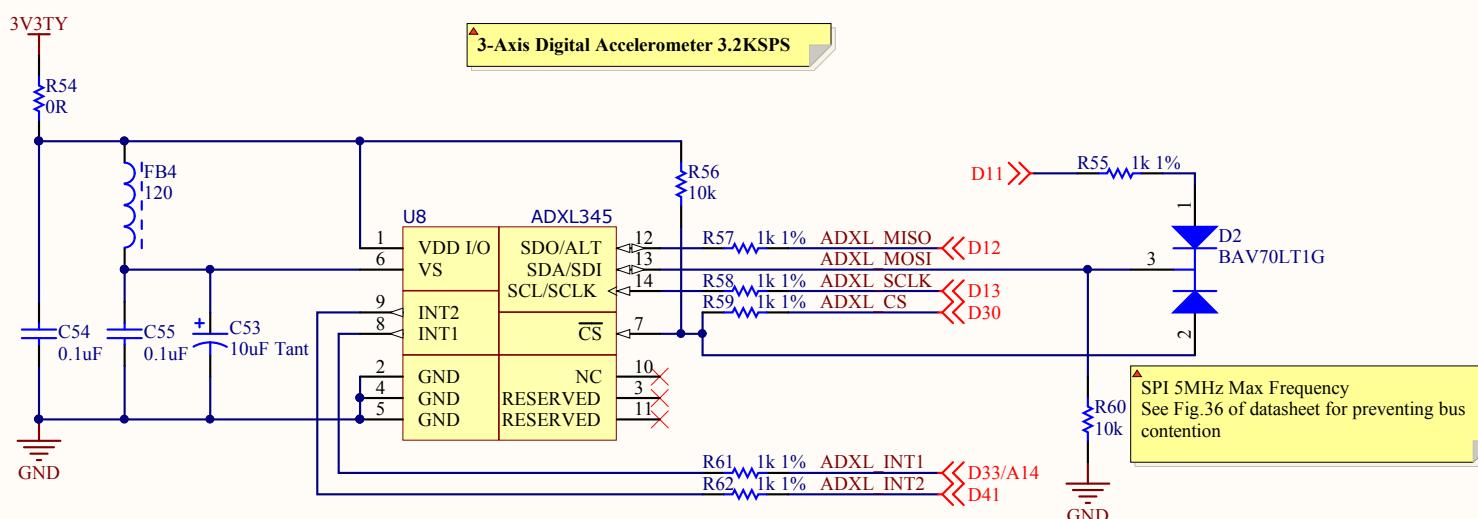


Figure 32. Current Consumption vs. Output Data Rate at  $25^\circ\text{C}$ —10 Parts,  
 $V_S = 2.5\text{ V}$



PREVIOUSLY TESTED AND VERIFIED

Title Accelerometer			CardioKit
Size A	Number		Revision 0.1
Date: 4/10/2020		Sheet of	
File: Accelerometer.SchDoc		Drawn By:	Nathan Volman

A

A

B

B

C

C

D

D

**Small Through-Hole Pads for Soldering in Future Mixed-Signal Daughter Board**

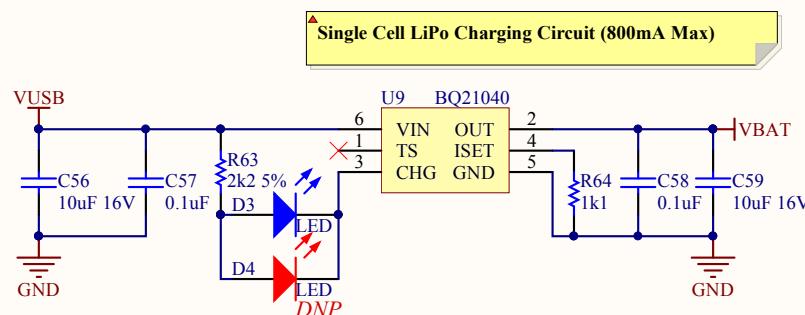
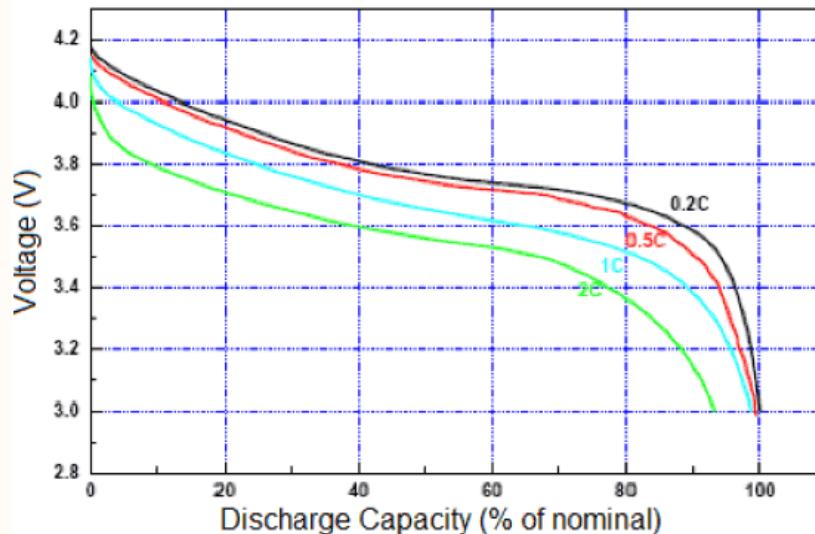
TP102 o 3V3TY  
TP103 o 3V3TY  
TP104 o 5V  
TP105 o -5V

TP106 o AGND  
TP107 o

**FUTURE ADDITION**

Title		CardioKit
Analog Expander		
Size	Number	Revision
A		0.1
Date:	4/10/2020	Sheet of
File:	Analog Expander.SchDoc	Drawn By: Nathan Volman

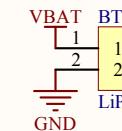
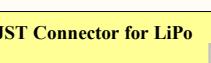
## Discharge Profile



R3 changes with LiPo capacity  
Datasheet wrong for TS connection  
R<sub>set</sub> = K<sub>iset</sub>/I<sub>out</sub> : K<sub>iset</sub> = 540 A\*Ohm  
R<sub>set</sub> = 1k1 : I<sub>out</sub> = 400mA

CHG FET pulls to ground during charging

VIN Range: 4.45V to 6.45V with 28V tolerance



## PREVIOUSLY TESTED AND VERIFIED

Title		
Battery Charging		CardioKit
Size	Number	Revision
A		0.1
Date:	4/10/2020	Sheet of
File:	Battery Charging.SchDoc	Drawn By: Nathan Volman

A

A

B

B

C

C

D

D

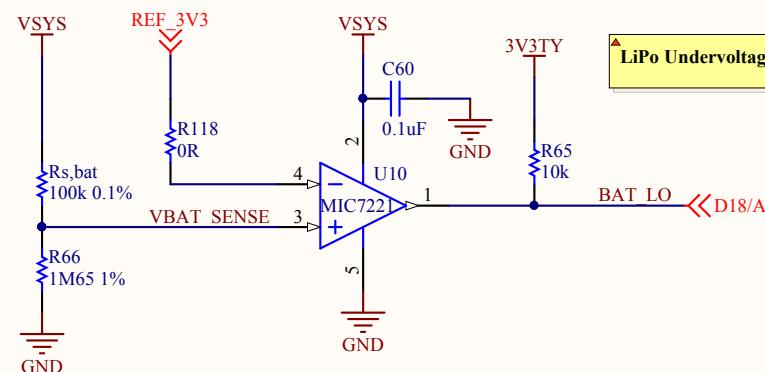
**Rs,bat**

for 3.5V Low Voltage Detect  
100k/1.65M divider yields 3.3V  
RT0402BRE07100KL

for 3.45V Low Voltage Detect  
75k/1.65M divider yields 3.3V  
RMCF0402FT75K0

$300k \parallel 100K$  yields 75k

**VBAT\_SENSE** can go to 6V  
regardless of supply voltage



**LiPo Undervoltage Detect**

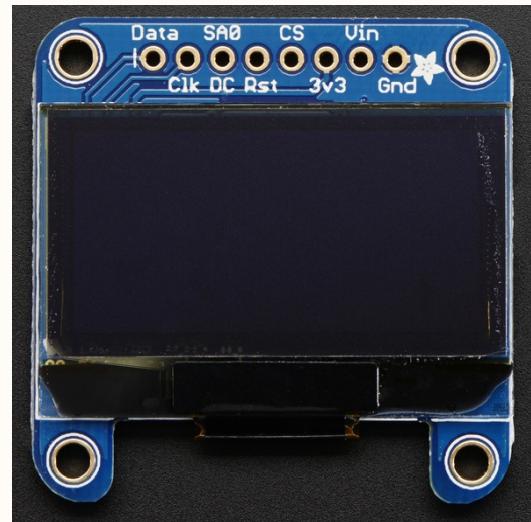
Attach falling edge interrupt on D18. BAT\_LO High to Low transition marks VBAT falling below  $V_{bat,min}$  of 3.45V or 3.5V set by  $R_{S,bat}$

Can also not populate TLV7081 and short VBAT\_SENSE to BAT\_LO and use the ADC to sense the voltage directly.

## PREVIOUSLY TESTED AND VERIFIED

Title		
Battery Voltage Sense		CardioKit
Size	Number	Revision
A		0.1
Date:	4/10/2020	Sheet of
File:	Battery Voltage Sense.SchDoc	Drawn By: Nathan Volman

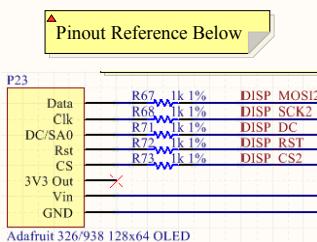
A



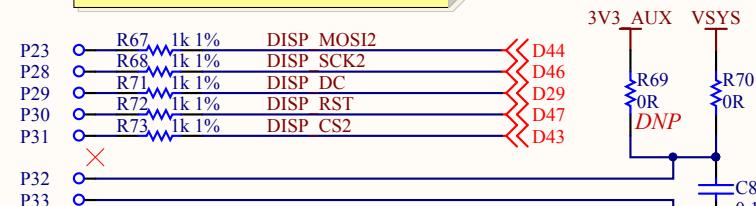
A

B

B



**0.96" or 1.3" Monochrome OLED Display**



If space constrained: use smaller custom wire-to-board connector

20mA @ 3.3V max current load

0.96" <https://www.adafruit.com/product/326>  
1.3" <https://www.adafruit.com/product/938>

1.3" in stock at Arrow only

SSD1306  
<https://makeradvisor.com/tools/wemos-lolin32-esp32-oled/>  
[https://www.pjrc.com/teensy/td\\_libs\\_SSD1306.html](https://www.pjrc.com/teensy/td_libs_SSD1306.html)

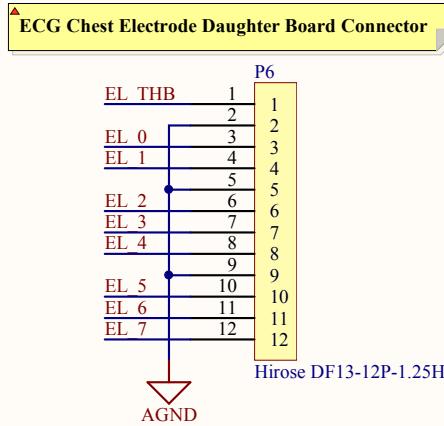
CS any digital out  
DC/SA0 any digital out  
Rst any digital out  
CLK SCLK2 for SPI D46 on Teensy  
DATA MOSI2 for SPI D44 on Teensy  
MISO is unused, not broken out on daughter board

Use multiple SPI hardware ports on Teensy by calls to SPI1.begin() or SPI2.begin(). For OLED, change &SPI to &SPI1 or &SPI2  
<https://forum.pjrc.com/threads/45994-Using-multiple-spi-hardware-controllers-on-teensy>

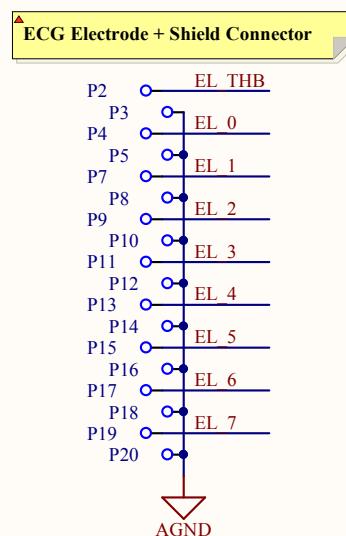
**PREVIOUSLY TESTED AND VERIFIED**

Title			CardioKit
Size	Number	Revision	0.1
A		Date:	4/10/2020
		File:	Display.SchDoc
			Drawn By: Nathan Volman

A



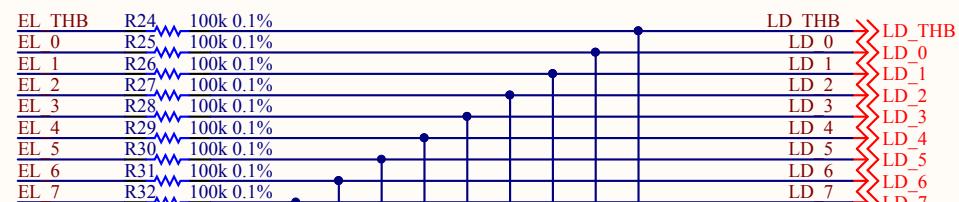
This connector is here in case a harness-to-board solution is possible. Default solution is direct soldering wire-to-board



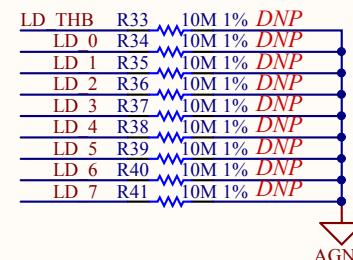
**Flying Lead Ground ECG Connector**



Crimp Socket Contact: Molex 0500588000  
Female Board Receptacle: Molex 22057025  
Wire-to-Board Connector: Molex 50375023



**Optional Bias Current Bleeder Resistors**



## PREVIOUSLY TESTED AND VERIFIED

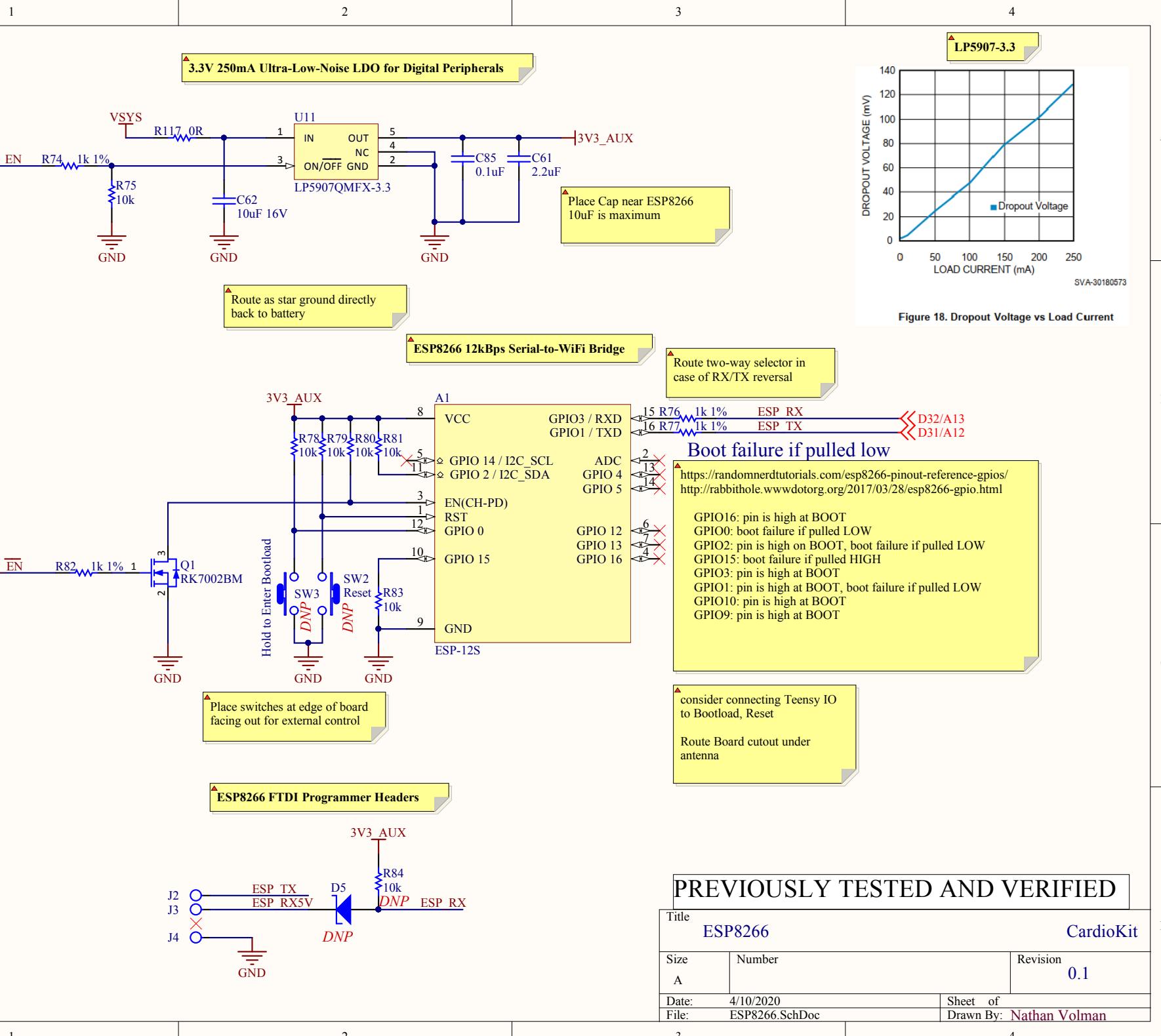
Title		
ECG Electrode Interface		CardioKit
Size	Number	Revision
A		0.1
Date:	4/10/2020	Sheet of
File:	ECG Electrode Interface.SchDoc	Drawn By: Nathan Volman

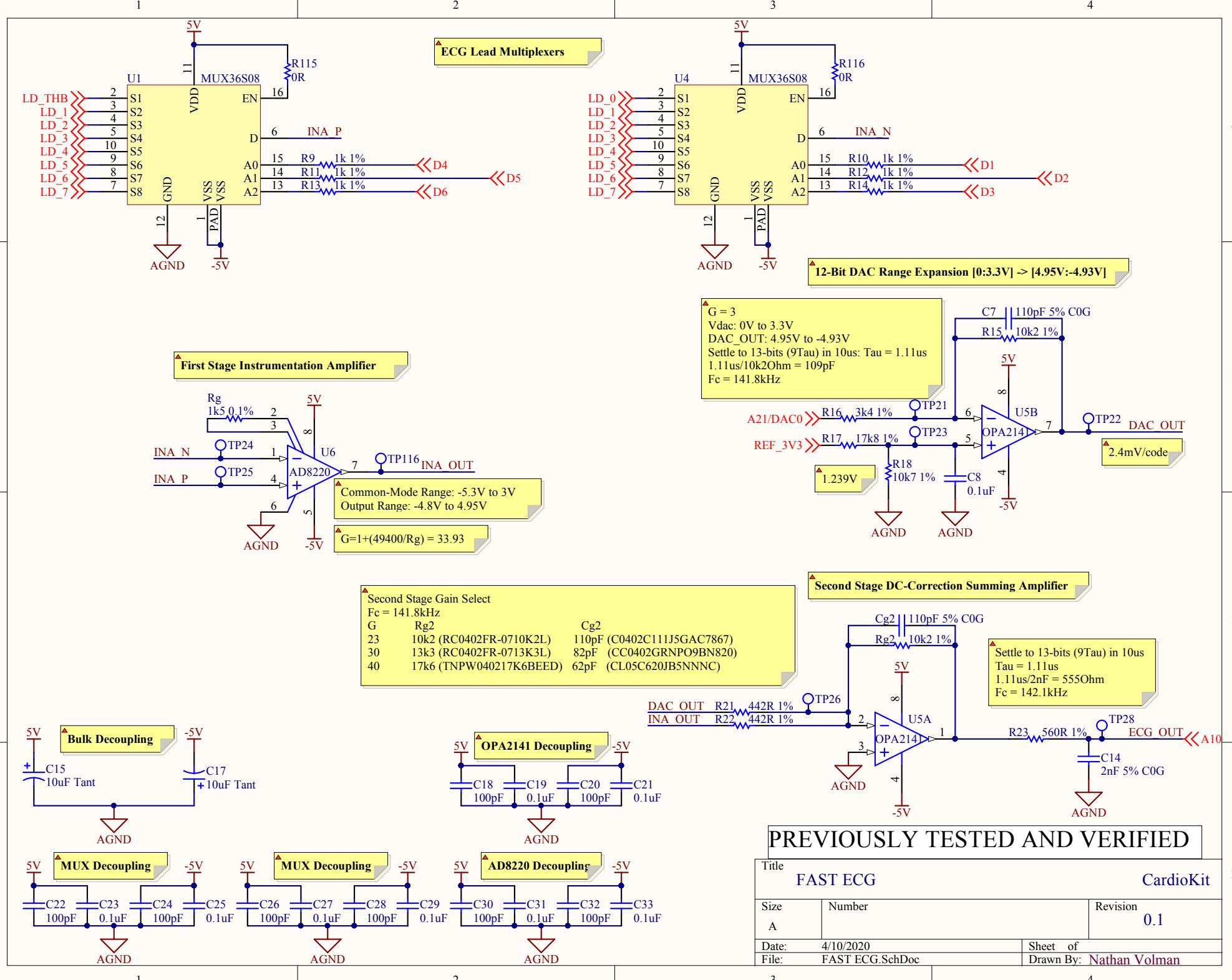
A

B

C

D

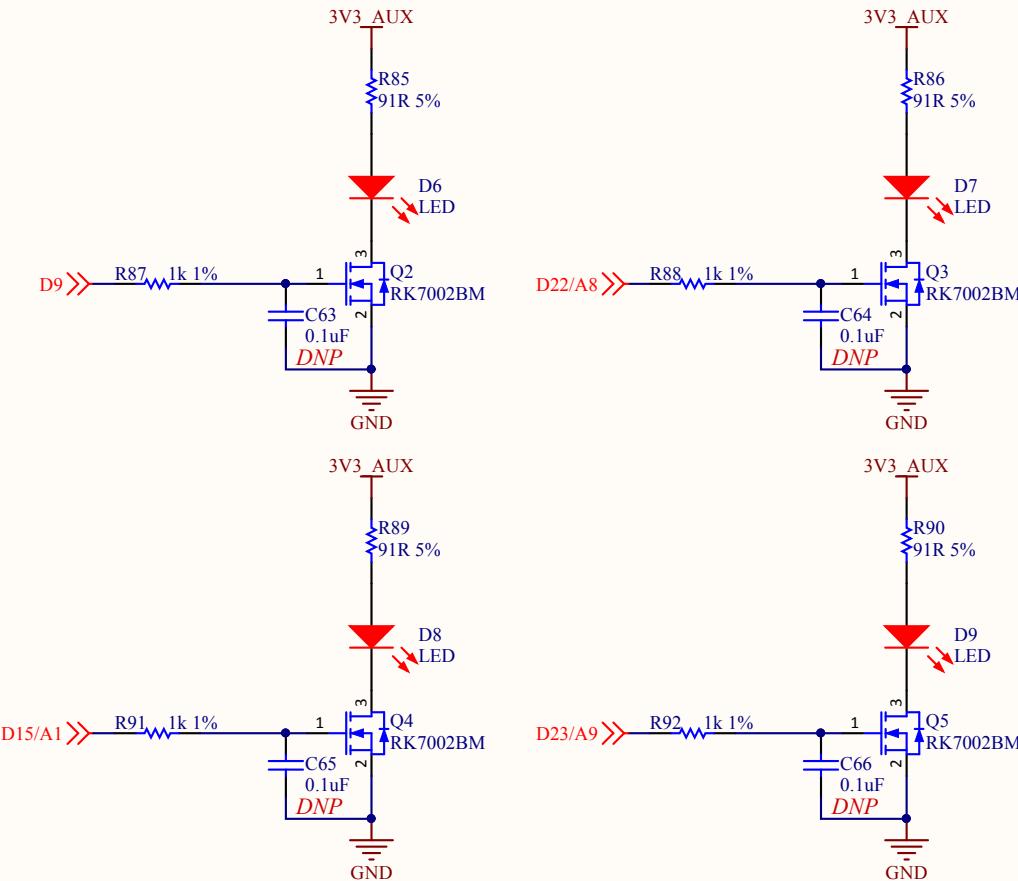




A

A

General Purpose / Beacon LEDs



B

B

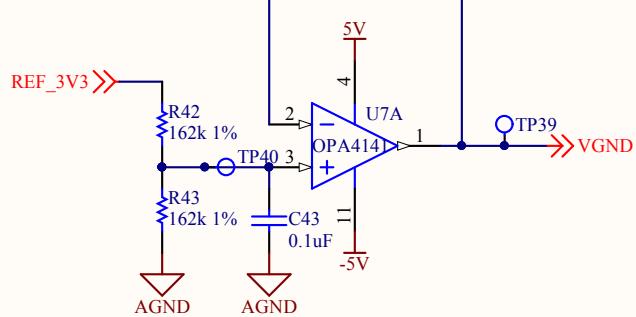
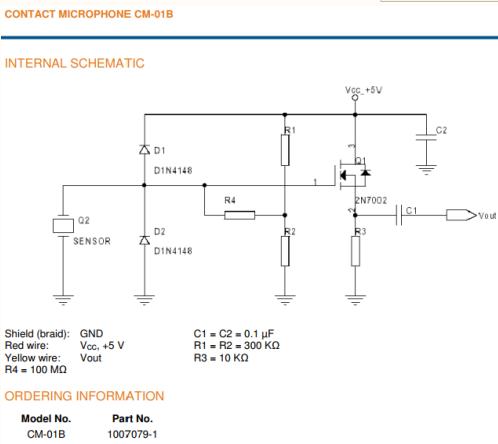
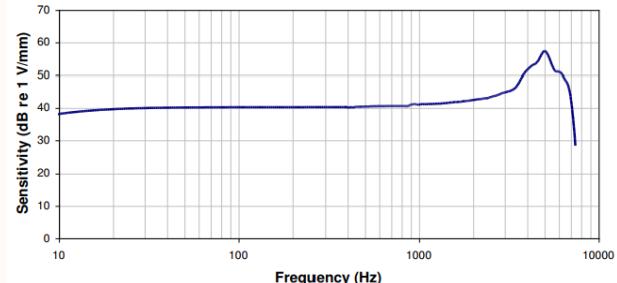
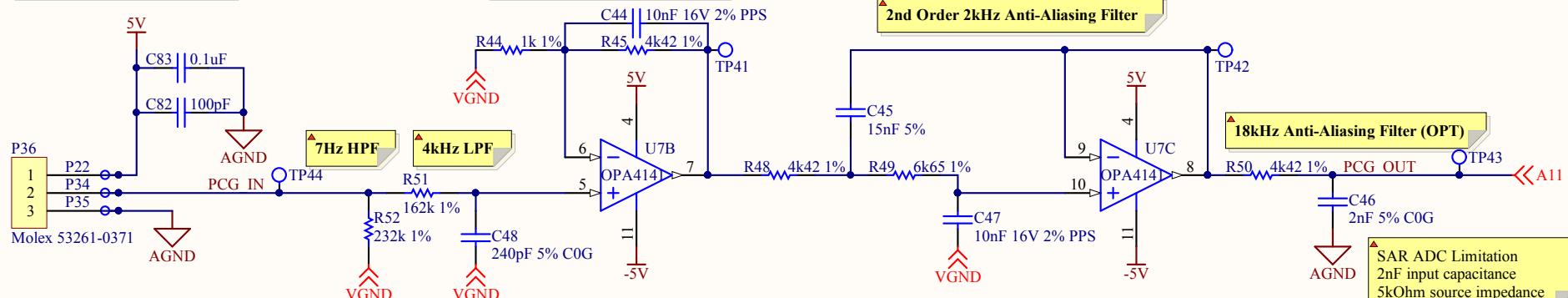
I<sub>led,max</sub> = 20mA  
 V<sub>supply</sub> - V<sub>led</sub> = V<sub>r</sub>  
 V<sub>ds</sub> negligible  
 3.3V - 1.7V = 1.8V  
 1.8V / 20mA = 90Ohms  
 (1.8V)<sup>2</sup>/90Ohm = 36mW dissipated

C

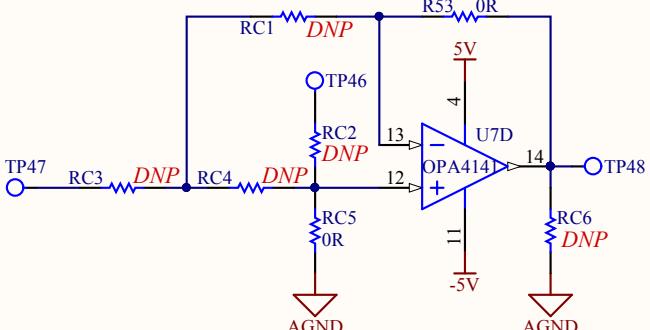
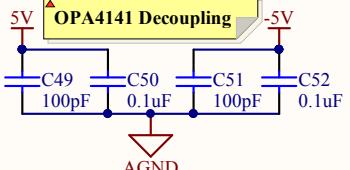
C

PREVIOUSLY TESTED AND VERIFIED

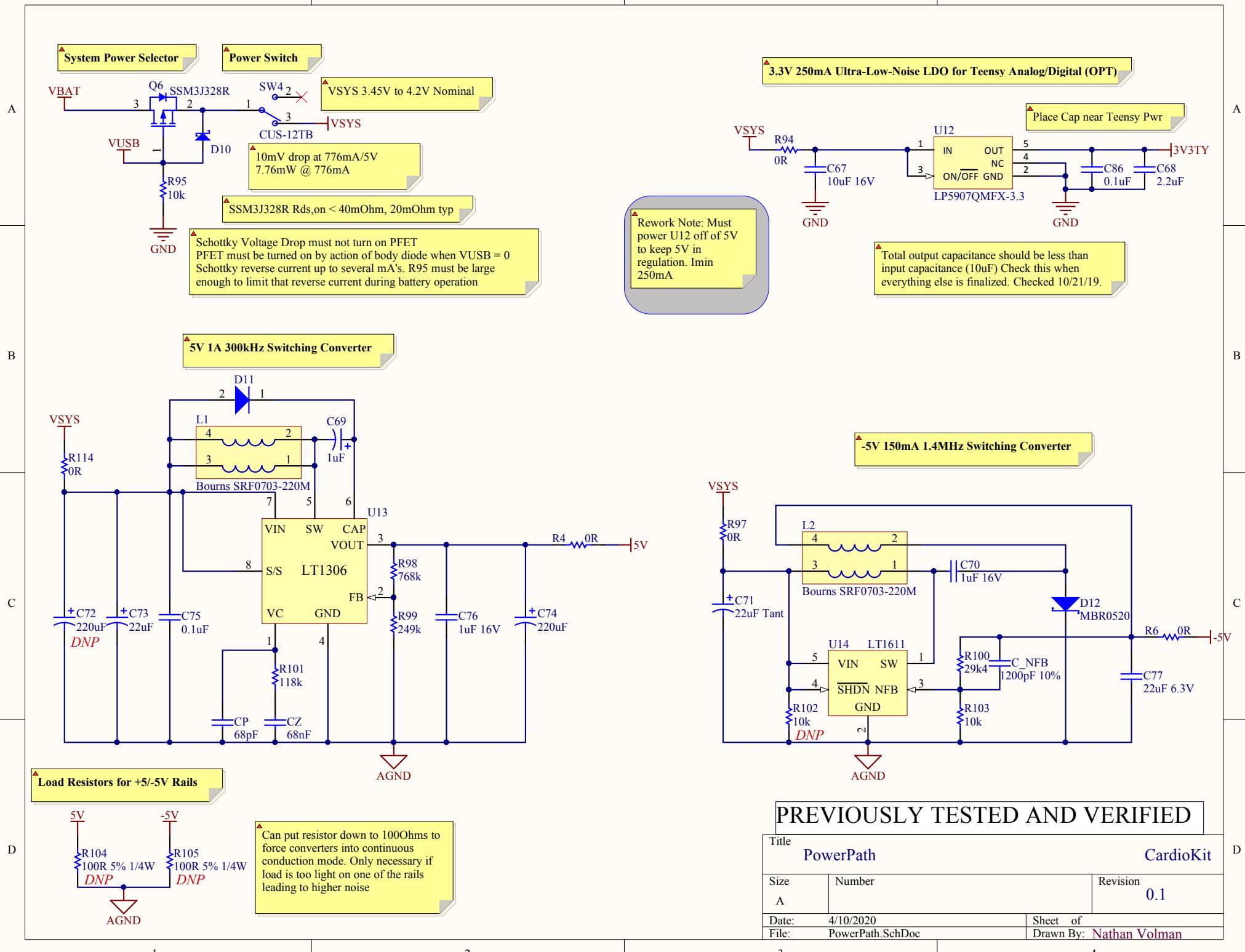
Title		
LEDs		CardioKit
A	Number	0.1
Date:	4/10/2020	Sheet of
File:	LEDs.SchDoc	Drawn By: Nathan Volman

**VGND (1.65V) Buffer**

**CM-01B Contact Microphone**

**Typical Frequency Response**

**CM-01B Contact Microphone**


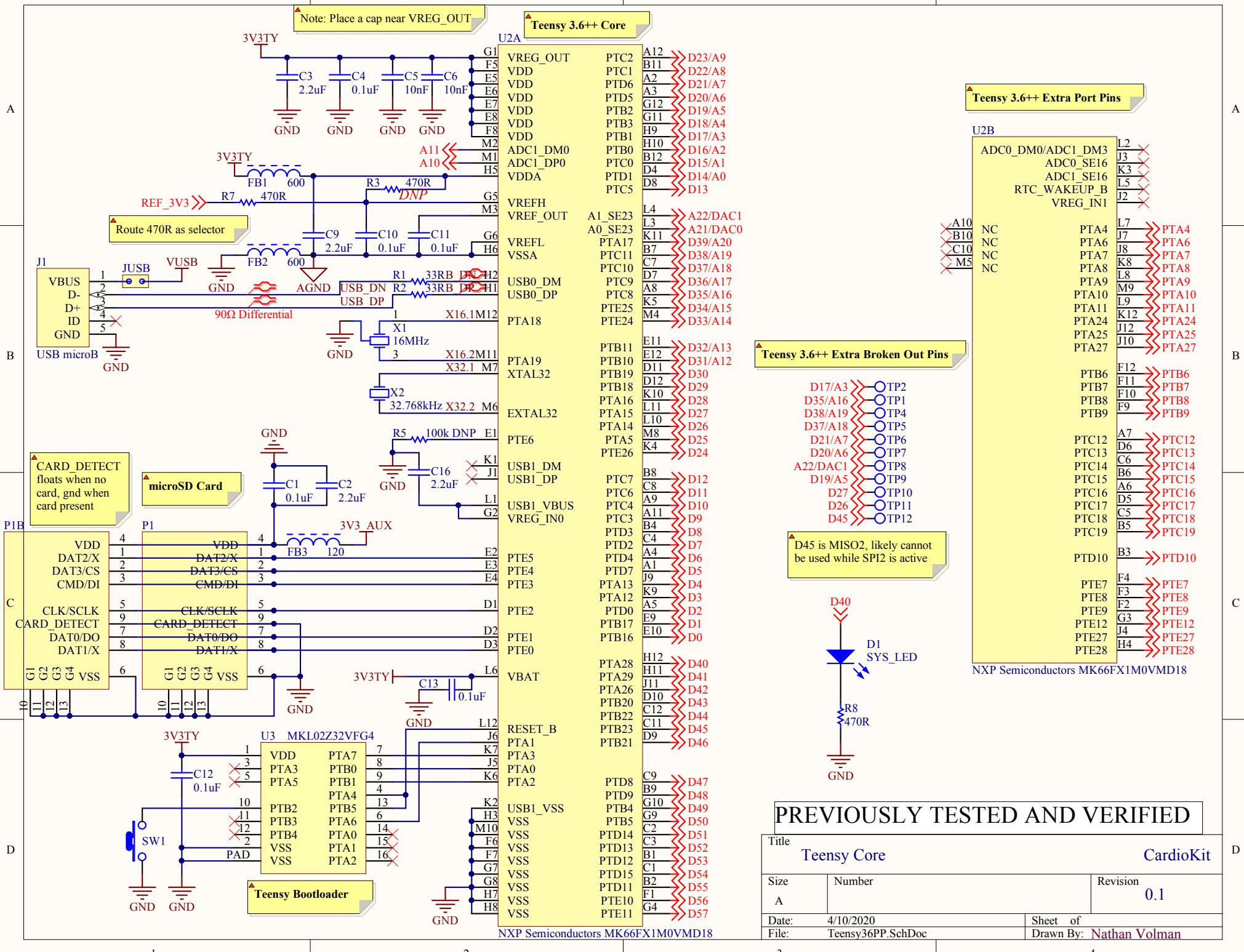
**Connector Part Numbers**  
Header Pin: MOLEX 0507528200  
Wire Housing: MOLEX 0511630300  
Board Connector: MOLEX 0534260310  
For space constraint: MOLEX 0781710003

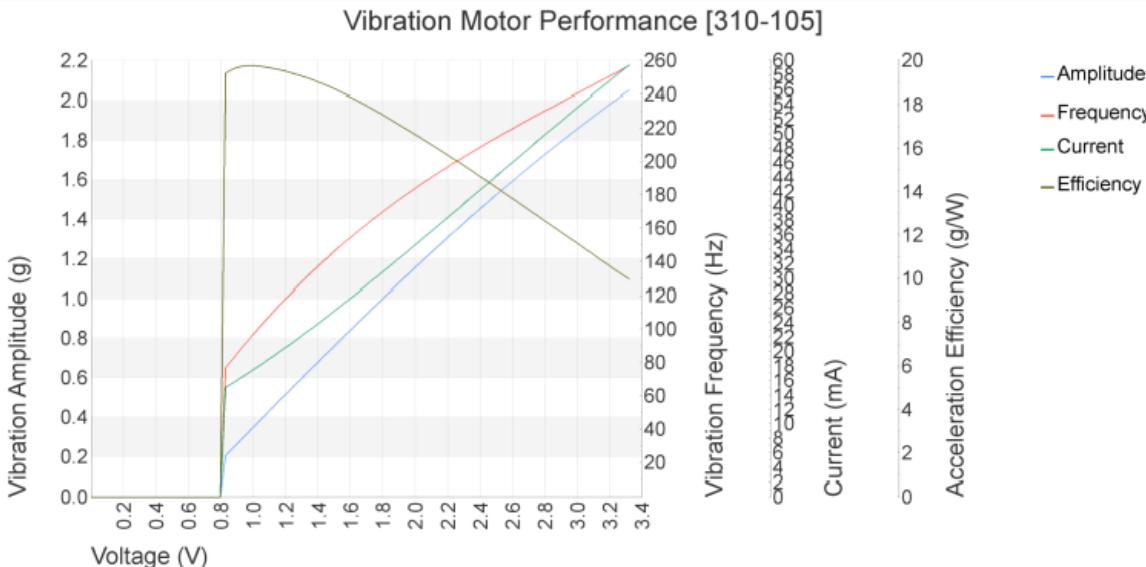
**Spare Op-Amp RRIO 10MHz GBW**

**OPA4141 Decoupling**

**PREVIOUSLY TESTED AND VERIFIED**

Title		CardioKit
PCG		
Size	Number	Revision
A		0.1
Date:	4/10/2020	Sheet of
File:	PCG.SchDoc	Drawn By: Nathan Volman

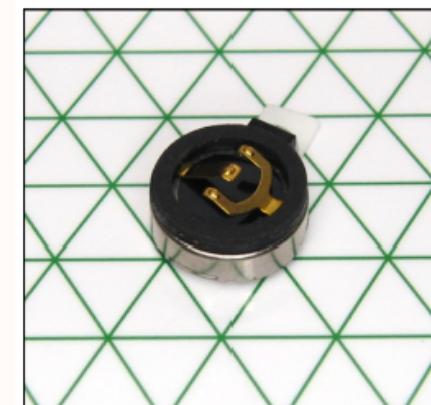
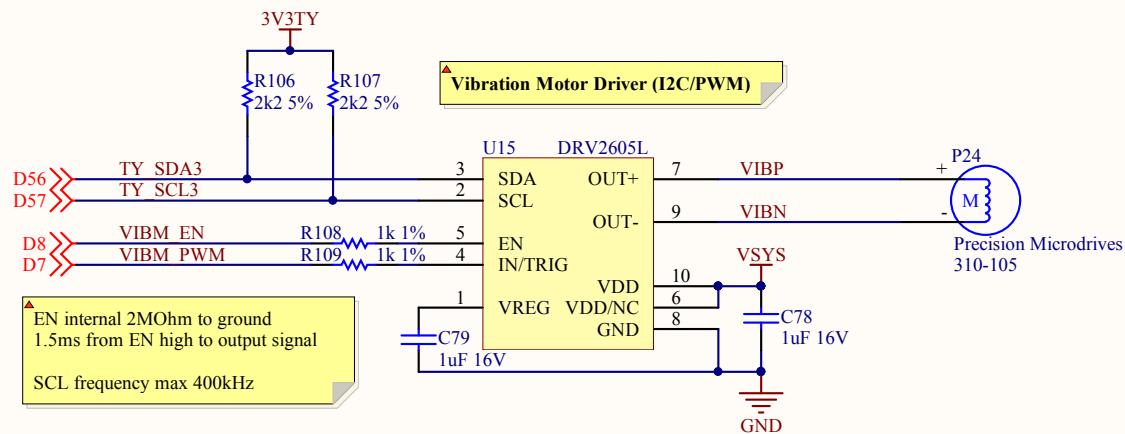


1 2 3 4





<b>Body Diameter:</b>	10 mm [+/- 0.1]
<b>Body Length:</b>	4 mm [+/- 0.2]
<b>Rated Operating Voltage:</b>	3 V
<b>Rated Vibration Speed:</b>	12,200 rpm [+/- 3,000]
<b>Typical Rated Operating Current:</b>	58 mA
<b>Typical Norm. Amplitude:</b>	1.3 G



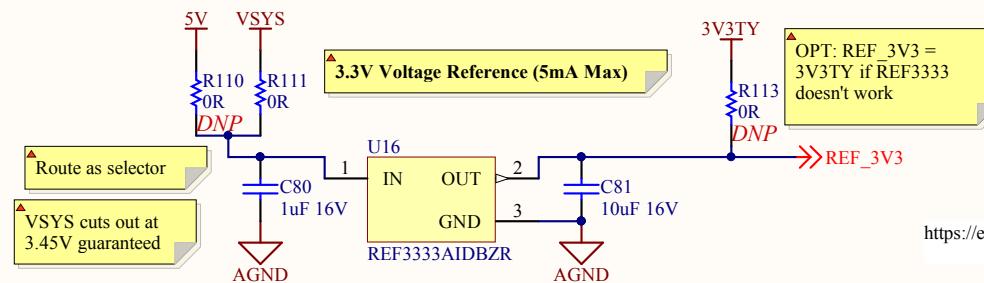
**Solder Pads for Remote Vibration Motor Connection**



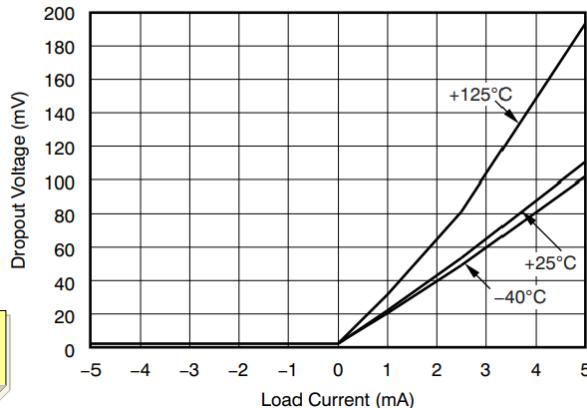
**PREVIOUSLY TESTED AND VERIFIED**

Title		Vibration Motor	CardioKit
Size	Number		Revision
A			0.1
Date:	4/10/2020	Sheet of	
File:	Vibration Motor.SchDoc	Drawn By:	Nathan Volman

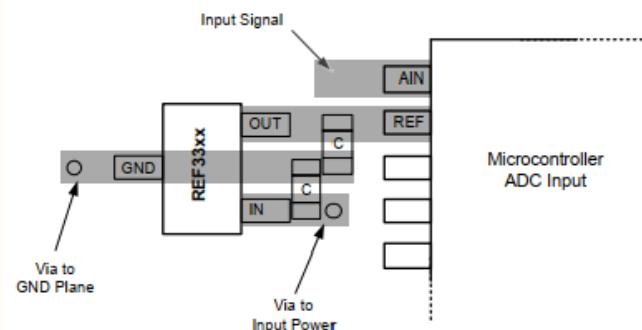
A



Dropout Voltage vs Load Current



<https://electronics.stackexchange.com/questions/32321/lipoly-battery-when-to-stop-draining>



## PREVIOUSLY TESTED AND VERIFIED

Title		
Voltage Reference		CardioKit
Size	Number	Revision
A		0.1
Date:	4/10/2020	Sheet of
File:	VoltageReference.SchDoc	Drawn By: Nathan Volman

A

B

C

D

### 9.2.2 Application for Wired Charging

The application discussed below will cover the same requirements as the first example and will add a DC supply with a secondary charger. This solution covers using a standard DC supply or a USB port as the supply.

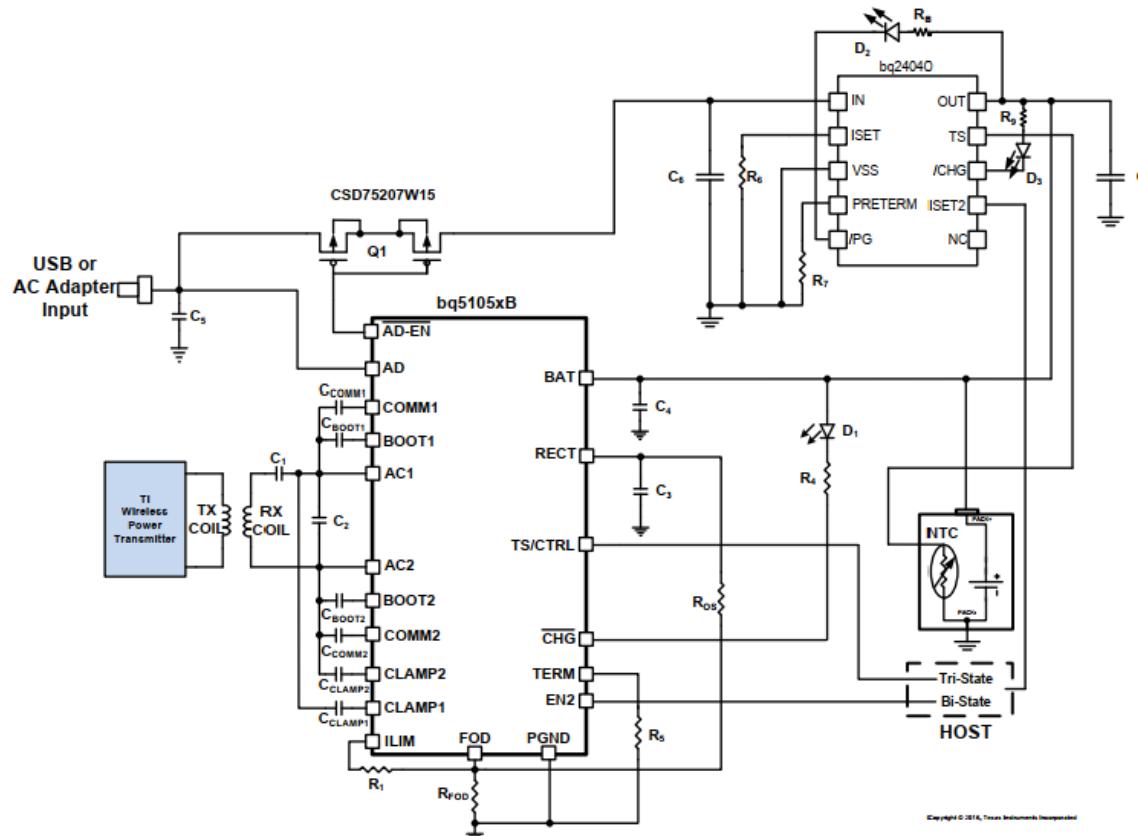


Figure 37. bq51050B Wireless Power Receiver and Wired Charger

Solder Pads for Off-Board Wireless Charger

P27      GND

FUTURE ADDITION

Title		
Wireless Charging		CardioKit
Size A	Number	Revision 0.1
Date: 4/10/2020	Sheet of 1	
File: Wireless Charging.SchDoc	Drawn By: Nathan Volman	

