

Click | Here  
V

This sheet: index

Sheet: Charger/OTG



Charger/OTG

File: charger.sch

Sheet: Battery



Battery

File: battery.sch

Sheet: Modem Power



Modem Power

File: modempwr.sch

Sheet: 3G/4G Modem



3G/4G Modem

File: modem.sch

Sheet: SIM cards and switch



SIM cards and switch

File: sims.sch

Sheet: Modem Antennas



Modem Antennas

File: ants.sch

Sheet: WLAN, Bluetooth, FM



WLAN, Bluetooth, FM

File: wlan.sch

Sheet: Sensors



Sensors

File: sensors.sch

Sheet: Audio Codec



Audio Codec

File: codec.sch

Sheet: Audio Headset, ECI



Audio Headset, ECI

File: jack.sch

Sheet: Misc



Misc

File: misc.sch

Click | Here  
V

Sheet: RFID/NFC



RFID/NFC

File: nfc.sch

Sheet: Infrared



Infrared

File: ir.sch

Sheet: B2B LOWER-UPPER



B2B LOWER-UPPER

File: b2b.sch

Sheet: Hackerbus



Hackerbus

File: hb.sch

Sheet: uSD Breakout Board



uSD Breakout Board

File: bob.sch

Sheet: Keypad and buttons



Keypad and buttons

File: keys.sch

Sheet: Display



Display

File: display.sch

Sheet: Cameras



Cameras

File: cams.sch

Sheet: LEDs



LEDs

File: leds.sch

Click | Here  
V

Sheet: Adaptation (v2 only)



Adaptation (v2 only)

File: v2.sch

Sheet: BB-xM Adapter (CPU)



BB-xM Adapter (CPU)

File: bbcpu.sch

Sheet: BB-xM Adapter (DISP)



BB-xM Adapter (DISP)

File: bbdisp.sch

Sheet: BB-xM Adapter (CAM)



BB-xM Adapter (CAM)

File: bbcam.sch

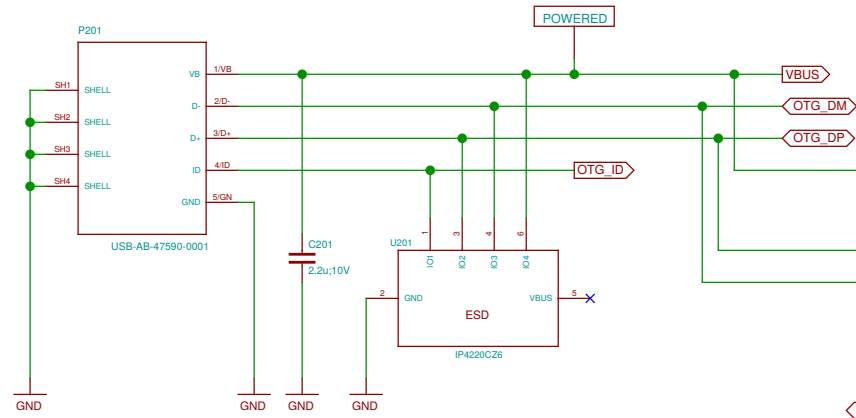
Circuits that exist in the v2 prototype only  
and that will not be part of the final design.

Note regarding I2C addresses:  
Addresses in the schematics are provided for convenience.  
The authoritative source is  
<https://neo900.org/git/misc/tree/i2c>

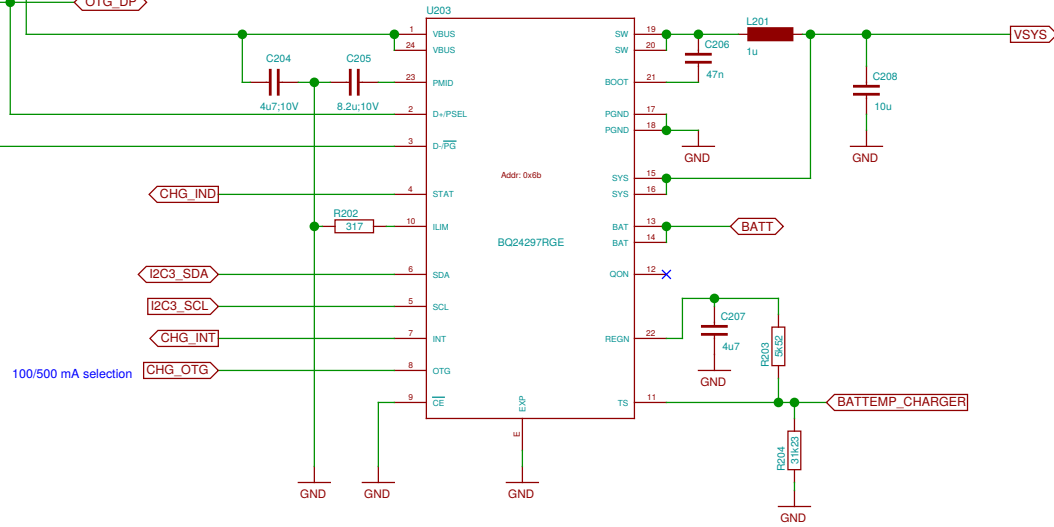
Signals that exist on both LOWER and UPPER (and maybe also BOB)  
have a \_U suffix on UPPER. No suffix is needed to distinguish  
between LOWER and BOB because all BOB components are on  
the same sheet and wires connecting them use sheet-local labels.

Sheet: /			
File: neo900.sch			
Title: Neo900			
Size: A3	Date: 2016-11-18 15:49:26	Rev:	
Plotted by eeshow e90e612+ 20161120-16:10Z			Id: 1/25

### USB OTG connector

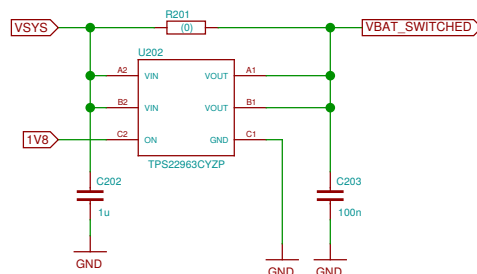


### Battery charger with USB OTG

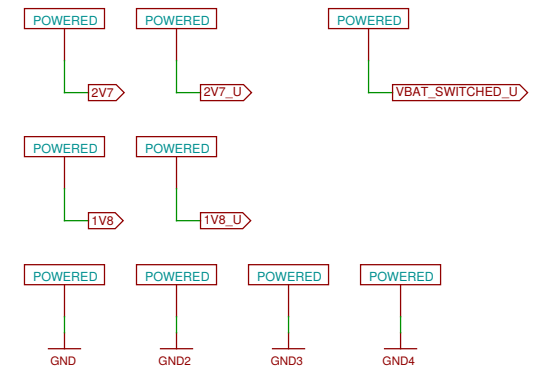


### Power distribution and sequencing

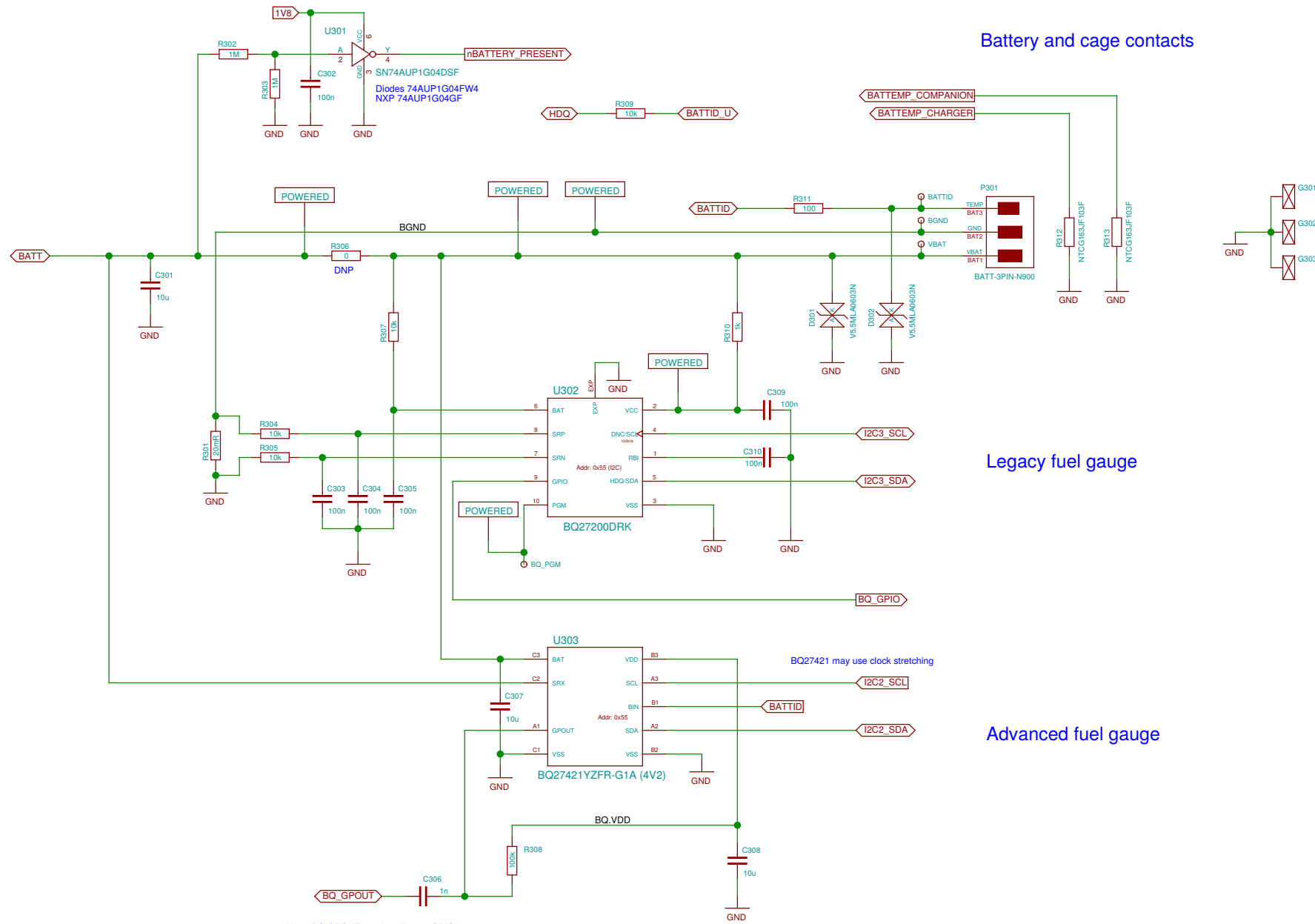
Most high-current consumers are on VBAT\_SWITCHED.  
1V8 signals that the regulators on UPPER are operational.



### KiCad bureaucracy

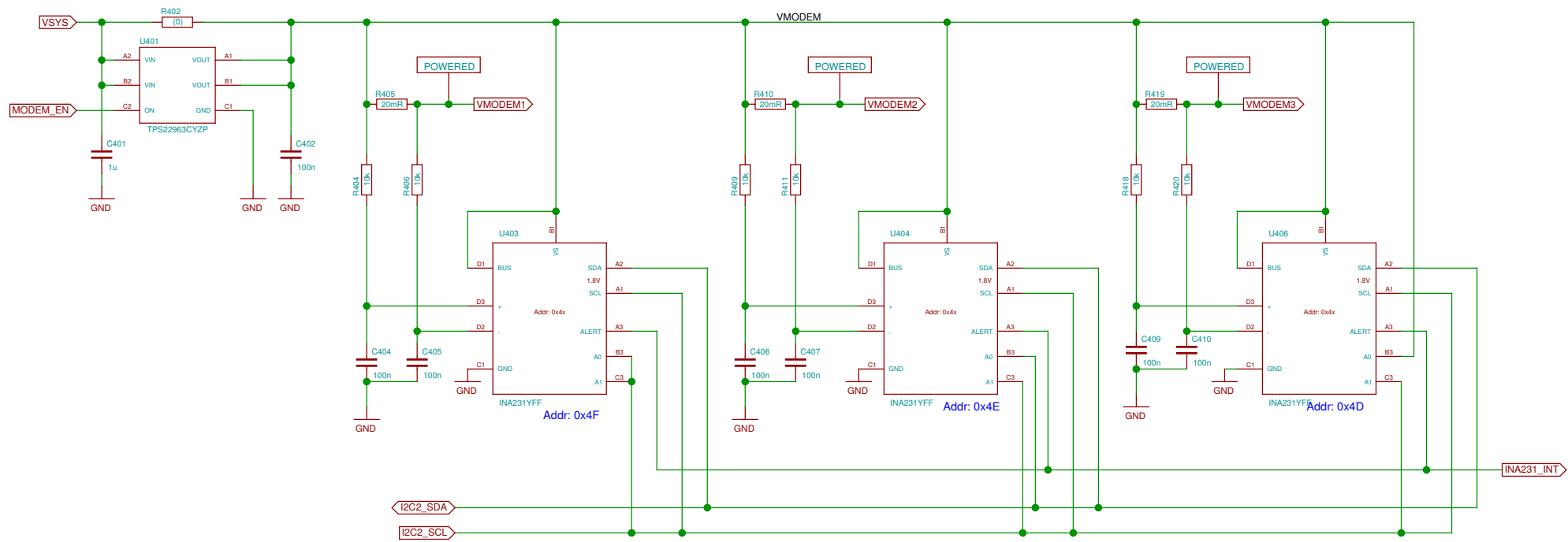


Sheet: /Charger/OTG/		File: charger.sch	
Title: Charger/OTG			
Size: A3	Date: 2016-11-18 15:49:26	Rev:	
Plotted by eeshow e90e612+ 20161120-16:10Z		Id: 2/25	

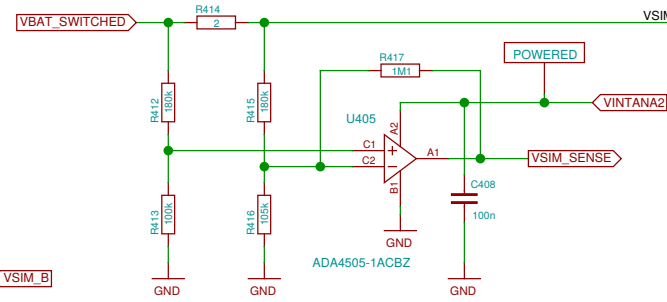


Sheet: /Battery/ File: battery.sch	
Title: Battery	
Size: A3	Date: 2016-11-22 19:57:21
Plotted by: eeshow e90e612+ 20161120-16:10Z	Rev: 3/25

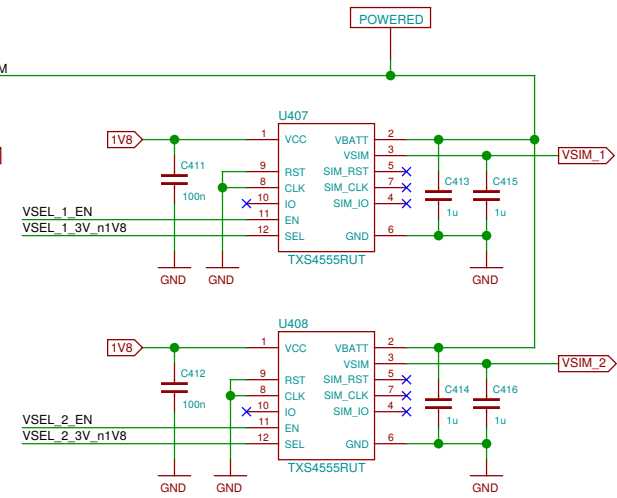
### Modem current monitor



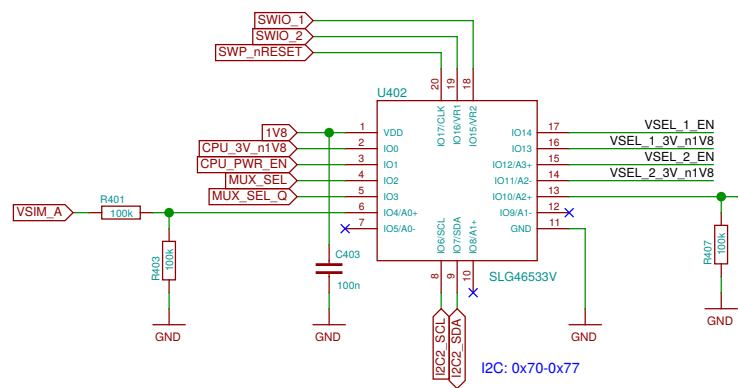
### SIM current sensing



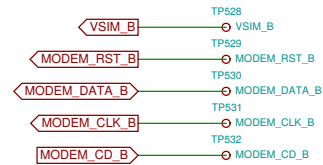
### SIM power supply



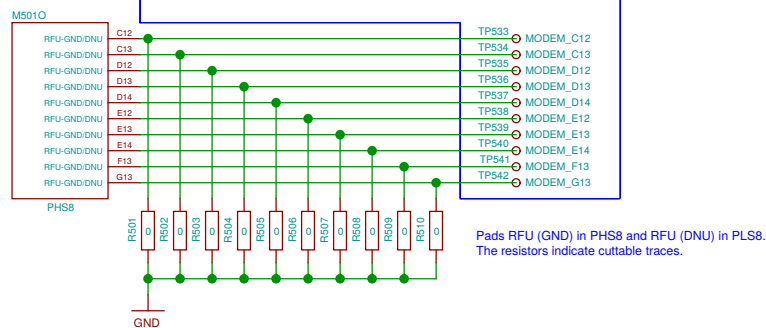
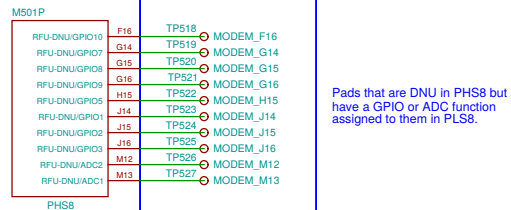
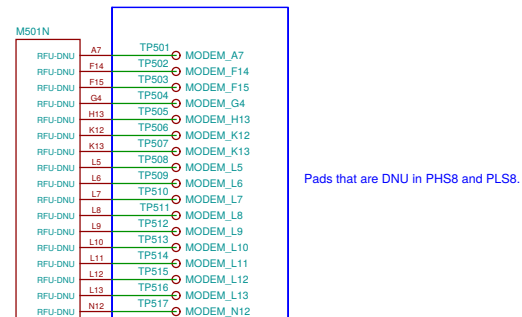
### SIM power selection



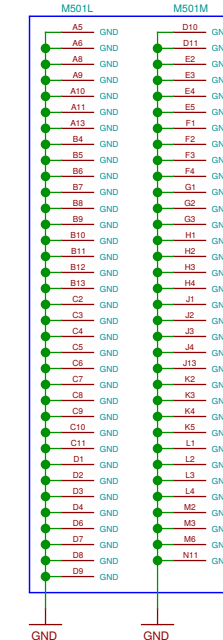
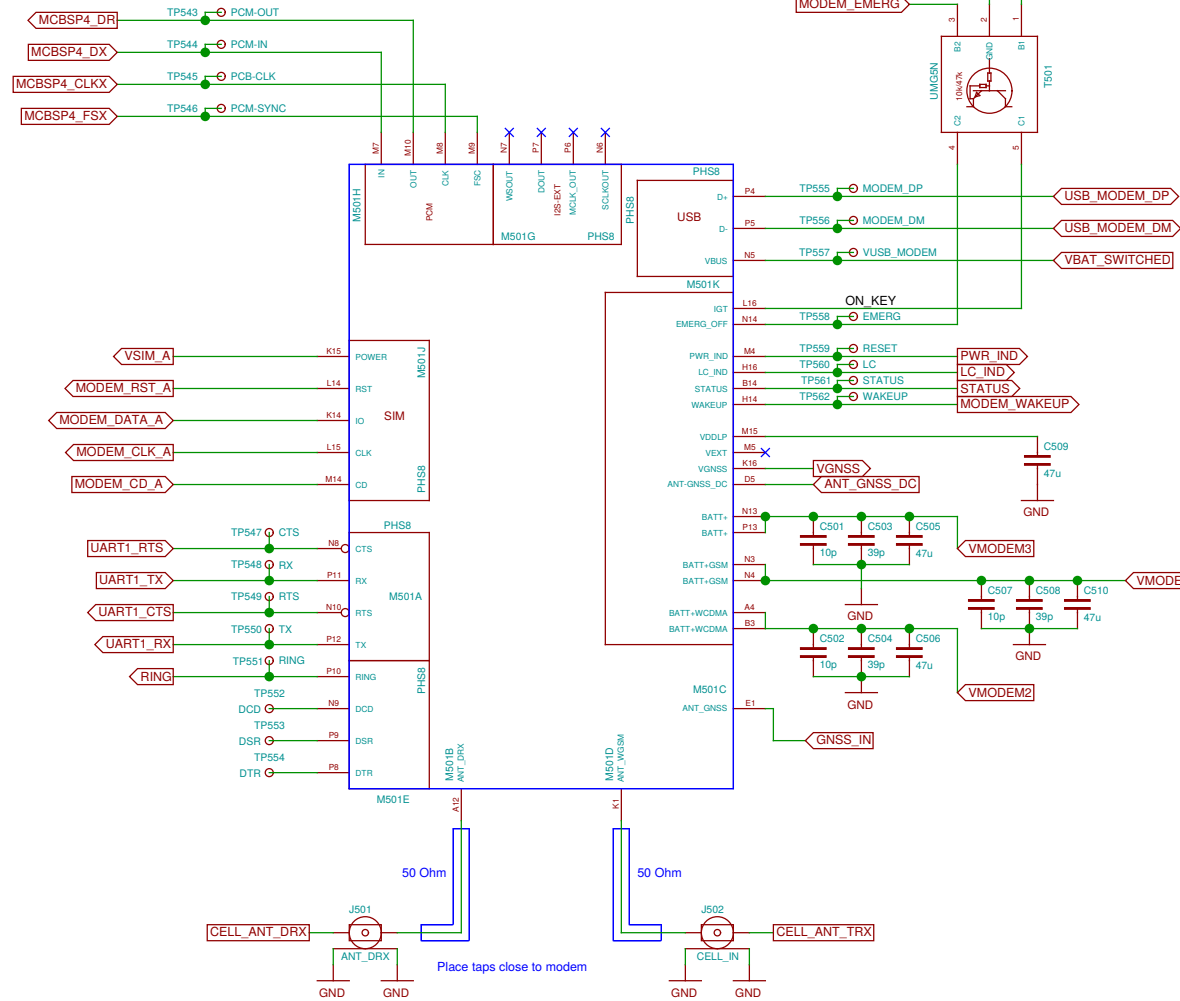
### SIM B bus



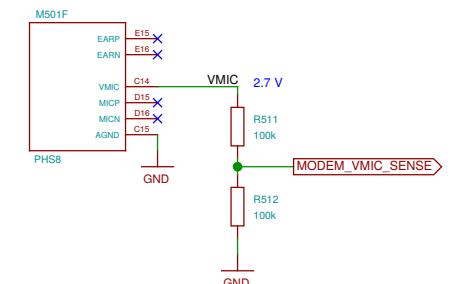
17+10+10 = 37 test points. PCB space permitting, to be arranged in a 6 x 6 + 1 grid with 1.0 mm pitch. This patch field is to be placed adjacent to the SIM B bus test points.

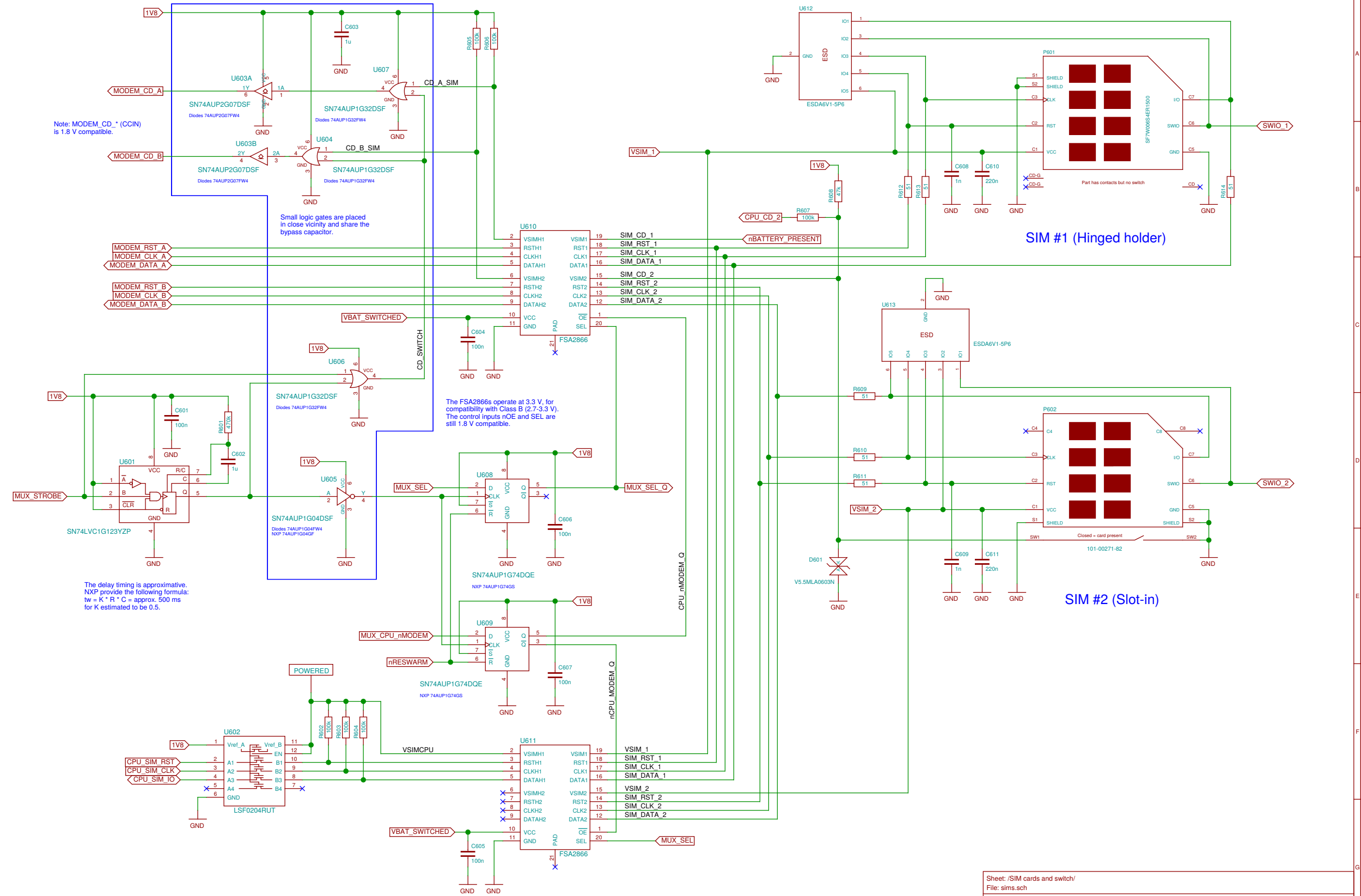


### Modem (module)



### Anti-eavesdropping





Note: MODEM\_CD\_\* (CCIN) is 1.8 V compatible.

Small logic gates are placed in close vicinity and share the bypass capacitor.

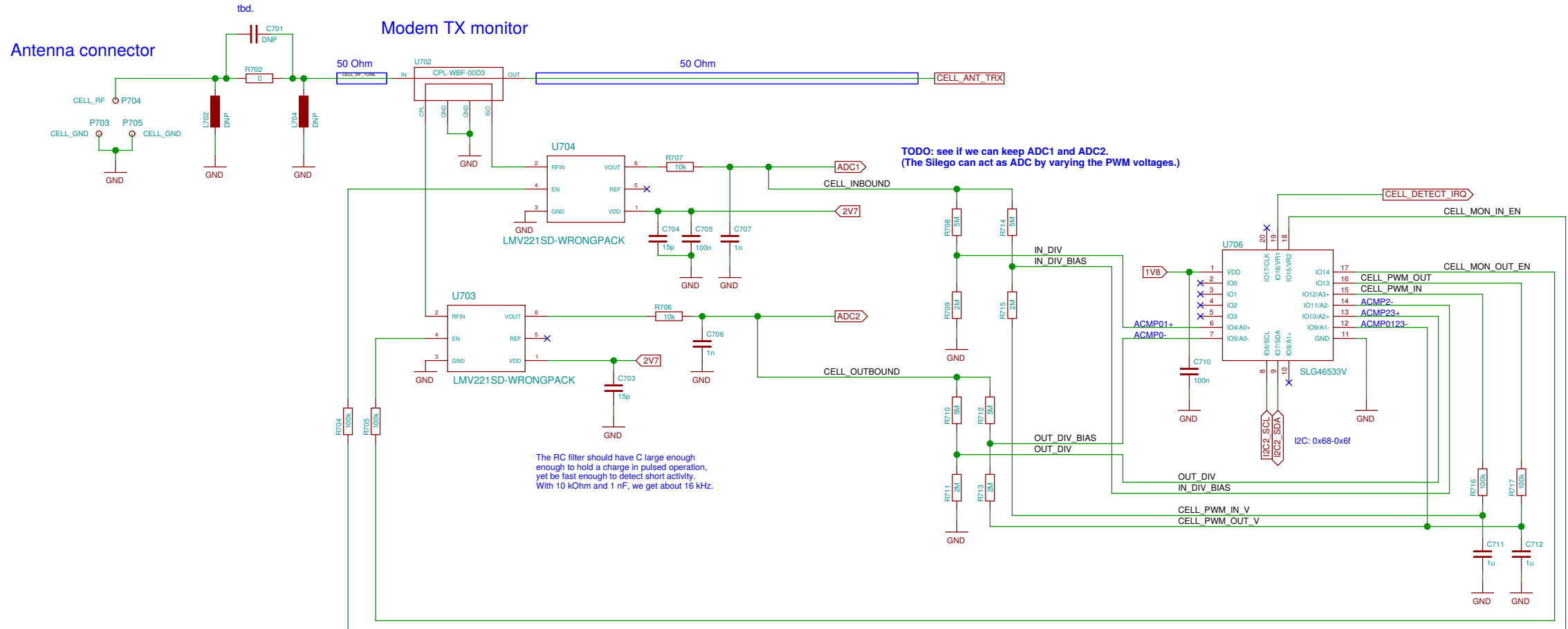
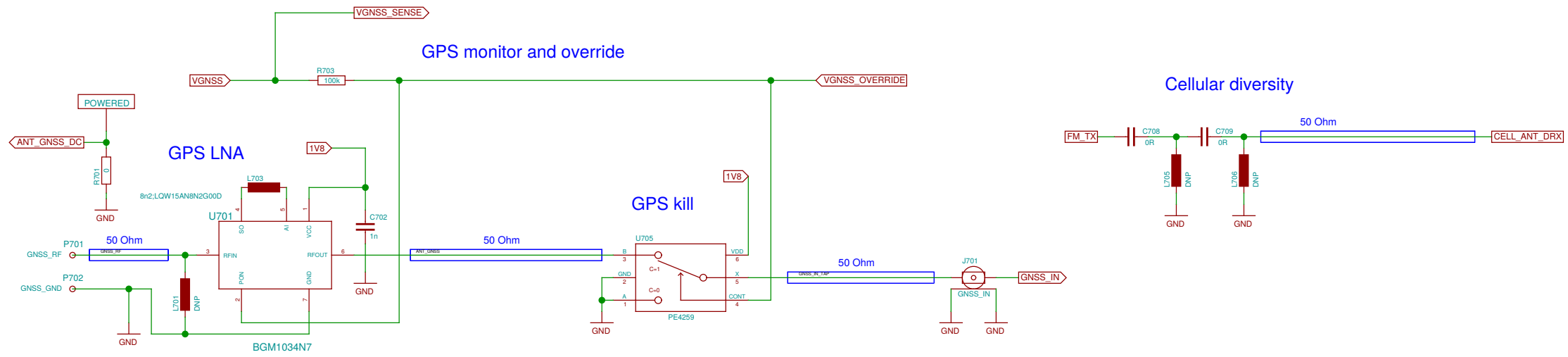
The FSA2866s operate at 3.3 V, for compatibility with Class B (2.7-3.3 V). The control inputs nOE and SEL are still 1.8 V compatible.

The delay timing is approximative. NXP provide the following formula:  $t_w = K * R * C = \text{approx. } 500 \text{ ms}$  for K estimated to be 0.5.

SIM #1 (Hinged holder)

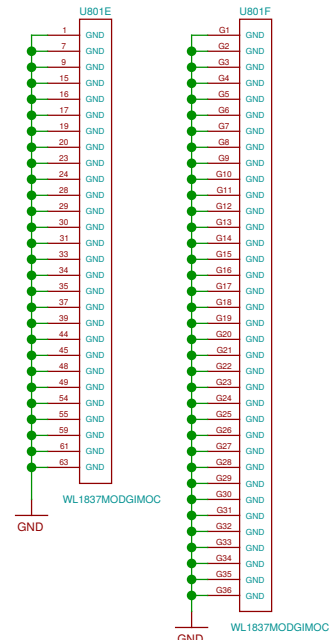
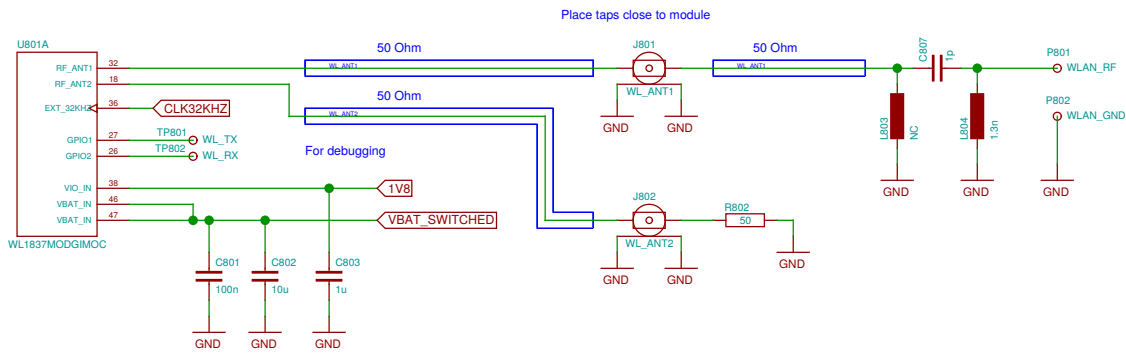
SIM #2 (Slot-in)

Sheet: /SIM cards and switch/ File: sims.sch		
Title: SIM cards and switch		
Size: A3	Date: 2016-11-21 23:56:50	Rev: 6/25
Plotted by eeshow e90e812+ 20161120-16:10Z		

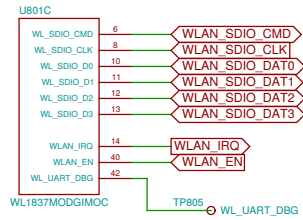


TODO: assign footprints for c-spring contacts

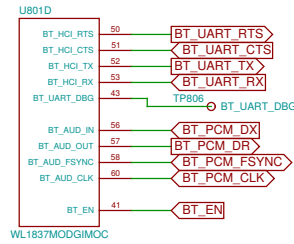
### WLAN/BT antenna



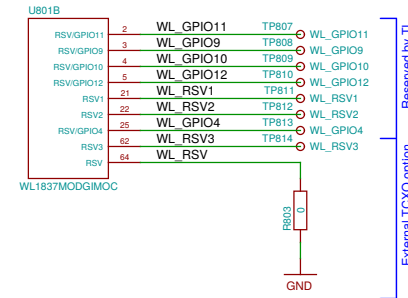
### WLAN



### Bluetooth

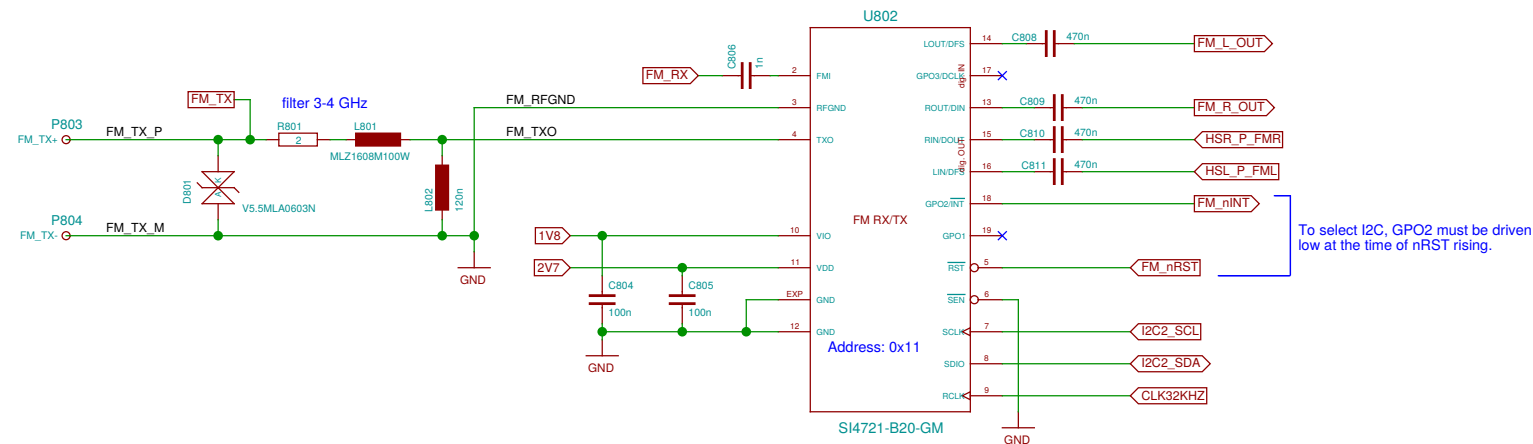


### Reserved / Debugging



### FM Radio (TX/RX)

#### FM TX antenna



SI4705 is pin compatible (mostly) but RX-only

Sheet: /WLAN, Bluetooth, FM/

File: wlan.sch

Title: WLAN, Bluetooth, FM

Size: A3

Date: 2016-11-20 21:45:03

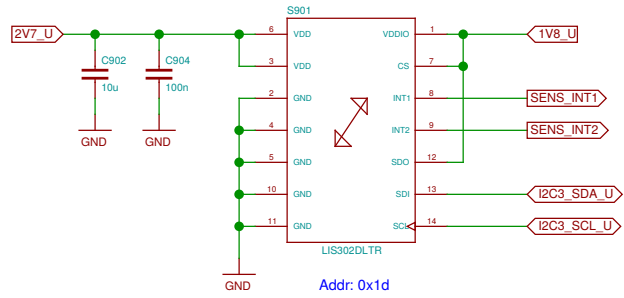
Rev:

Plotted by eeshow e90e612+ 20161120-16:10Z

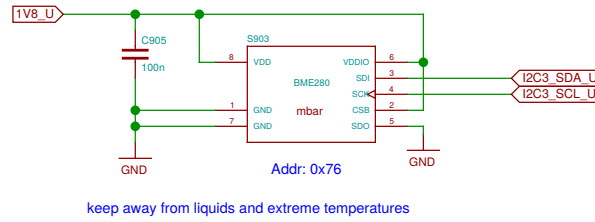
Id: 8/25



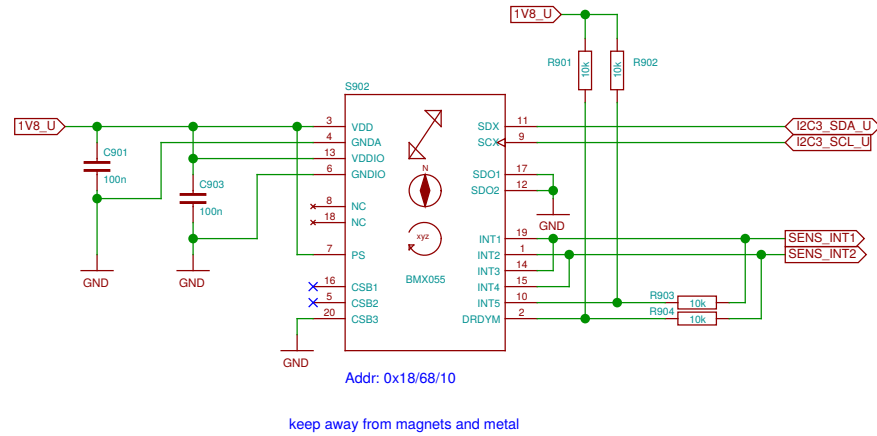
### Acceleration (legacy)



### Pressure, humidity

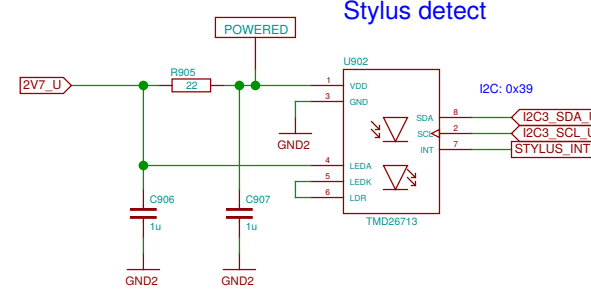


### 9-axis (acceleration, gyroscope, magnetometer)

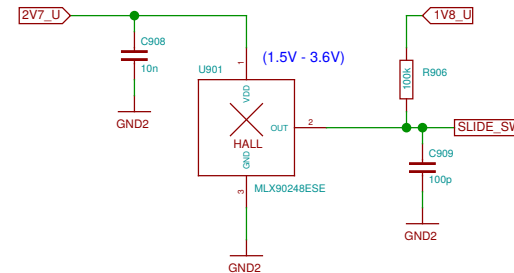


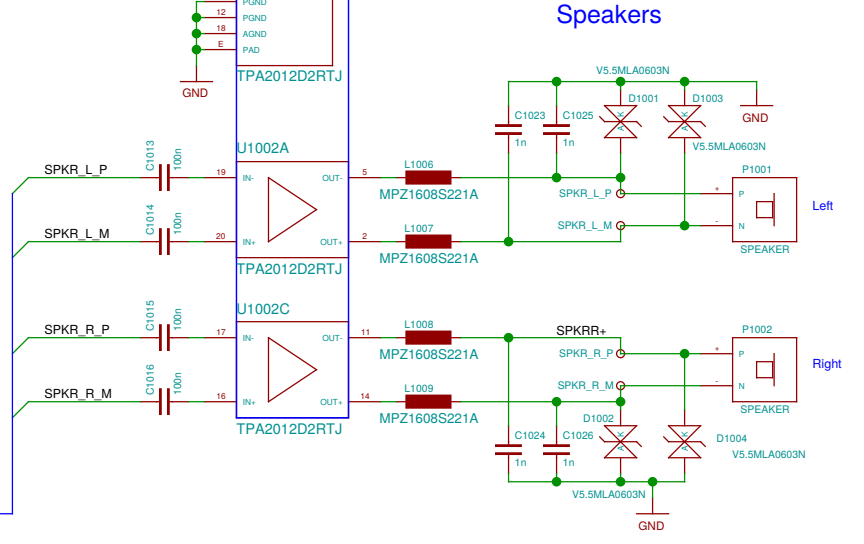
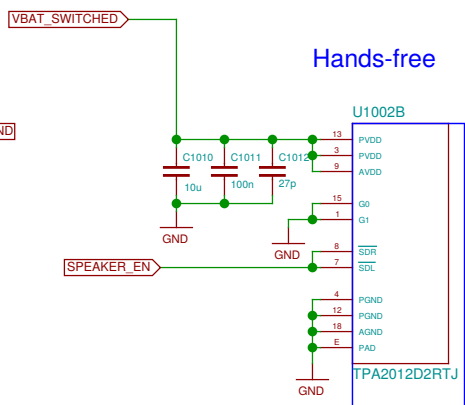
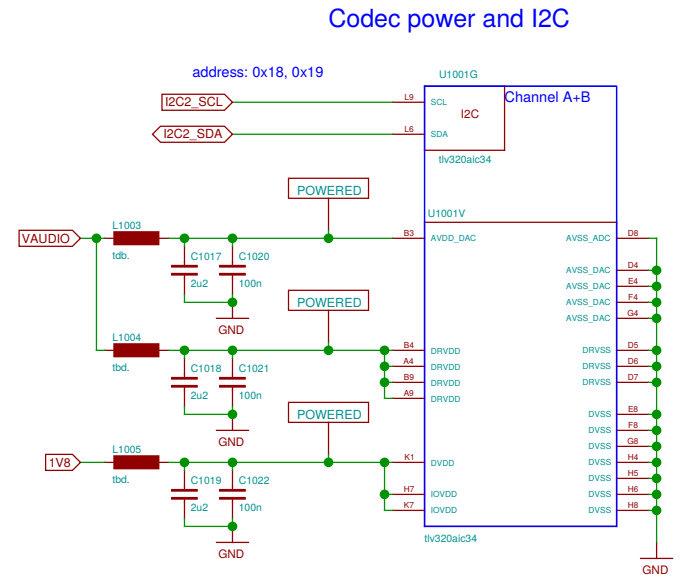
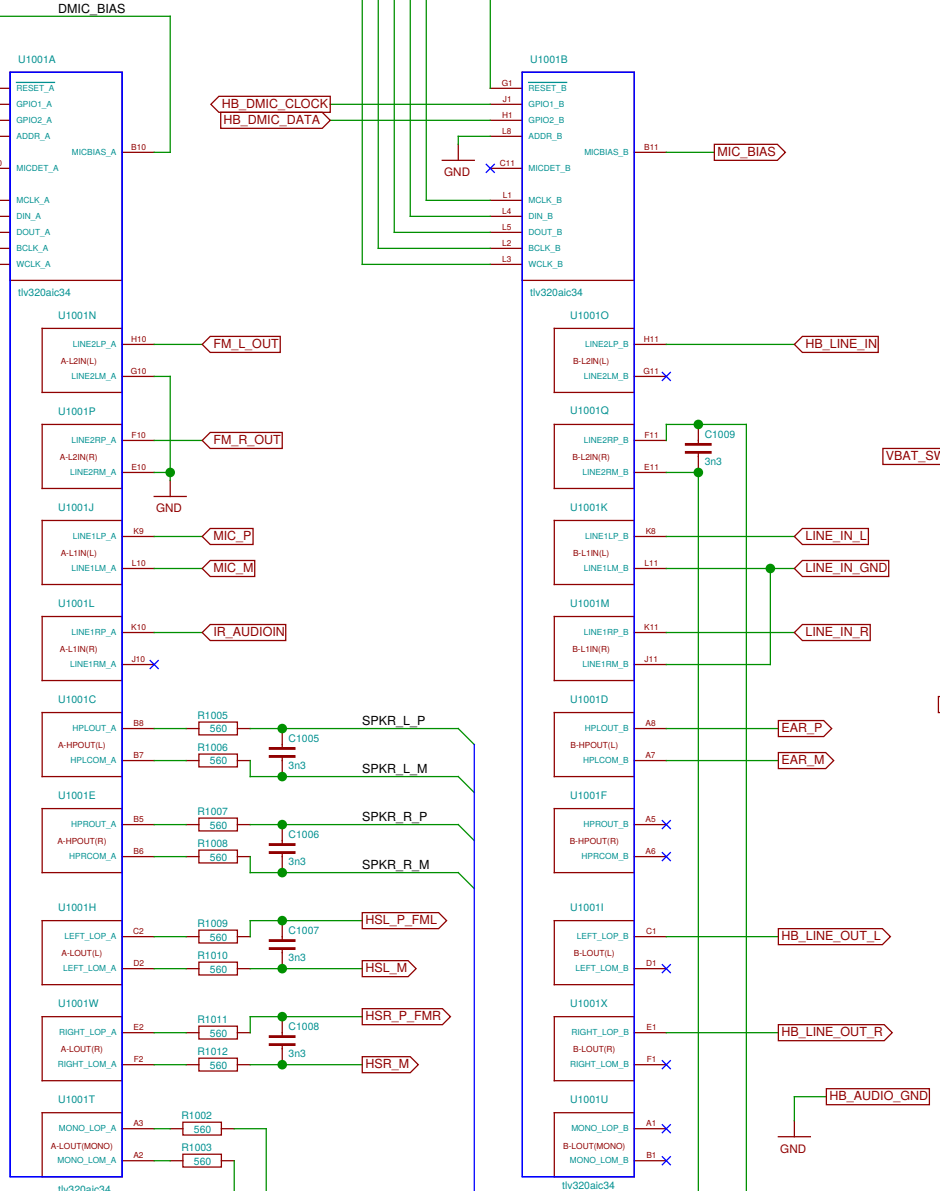
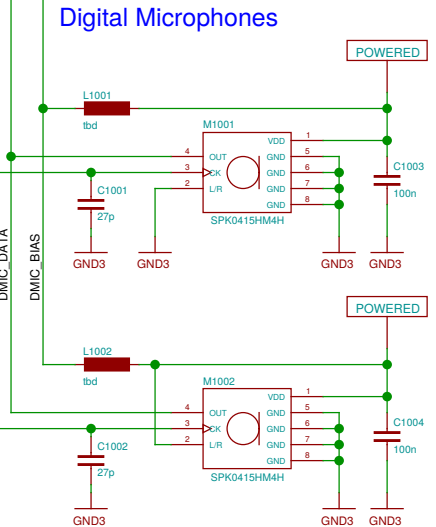
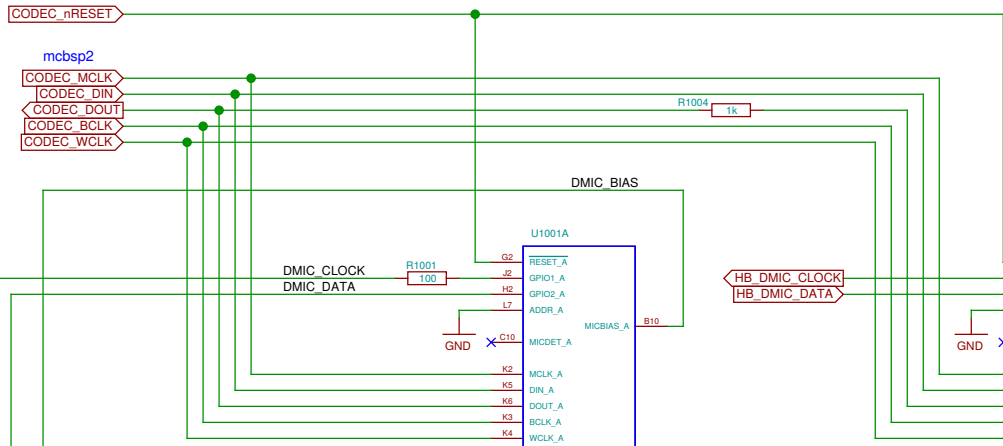
UPPER  
LOWER

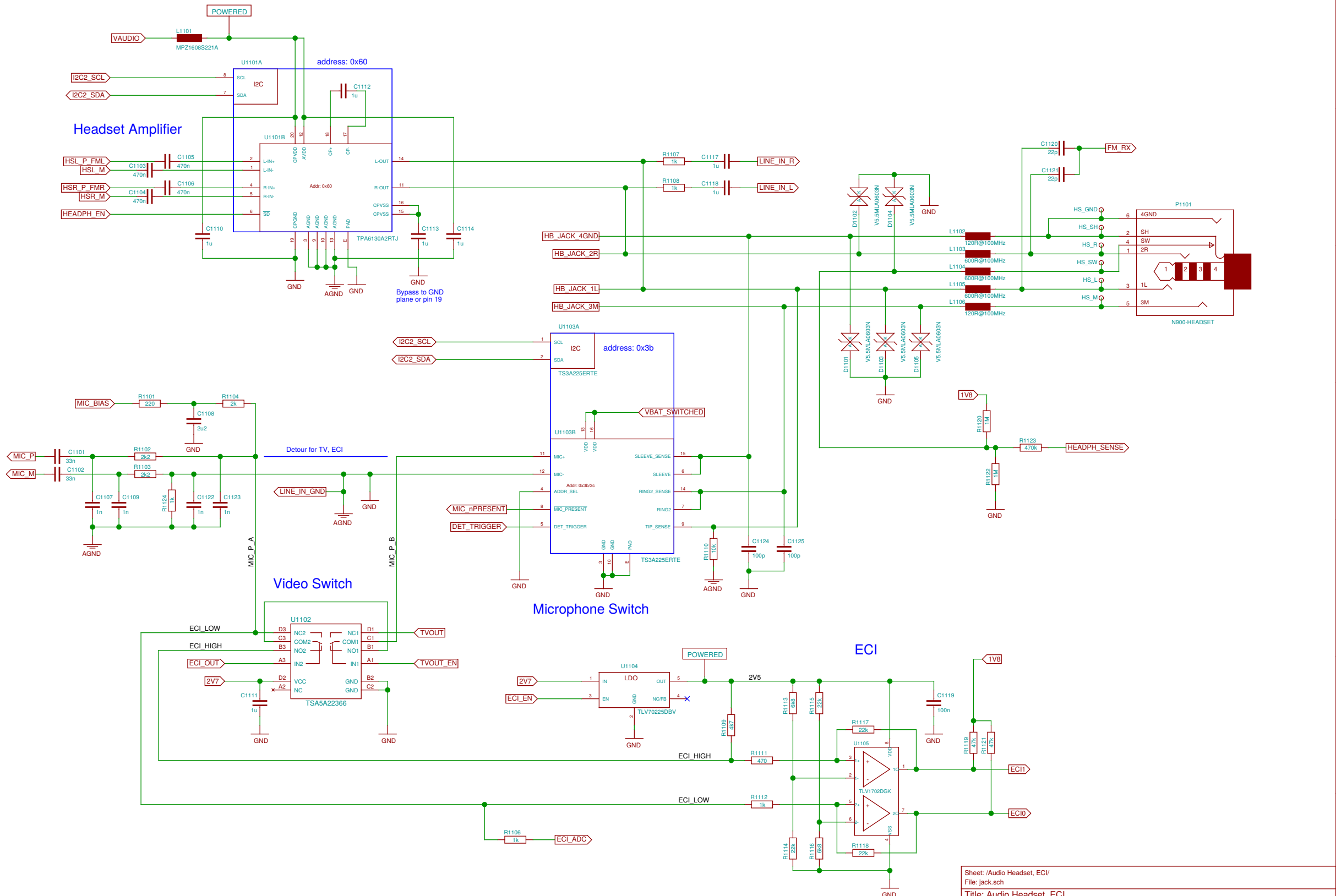
### Stylus detect



### Slide sensor

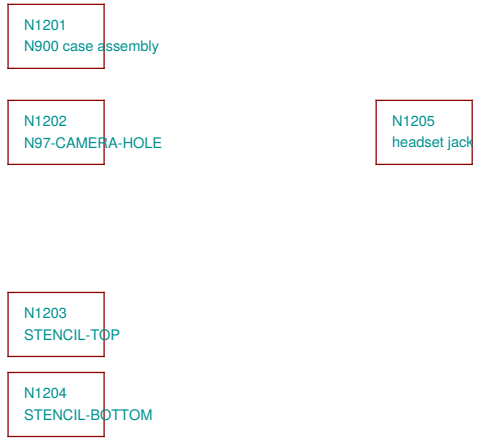




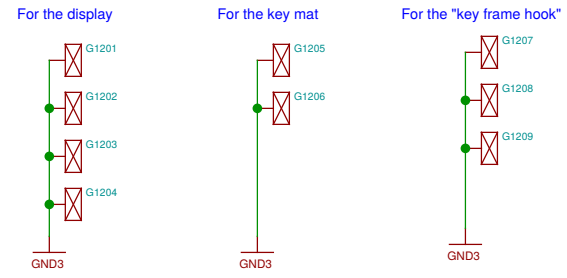


Sheet: /Audio Headset, ECI/		File: jack.sch	
Title: Audio Headset, ECI			
Size: A3	Date: 2016-11-18 15:49:26	Rev:	
Plotted by: eeshow e90e812*		20161120-16:10Z	
Id: 11/25			

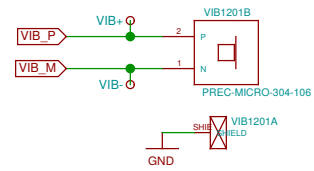
### No-Solder Components



### Shield Contacts on UPPER



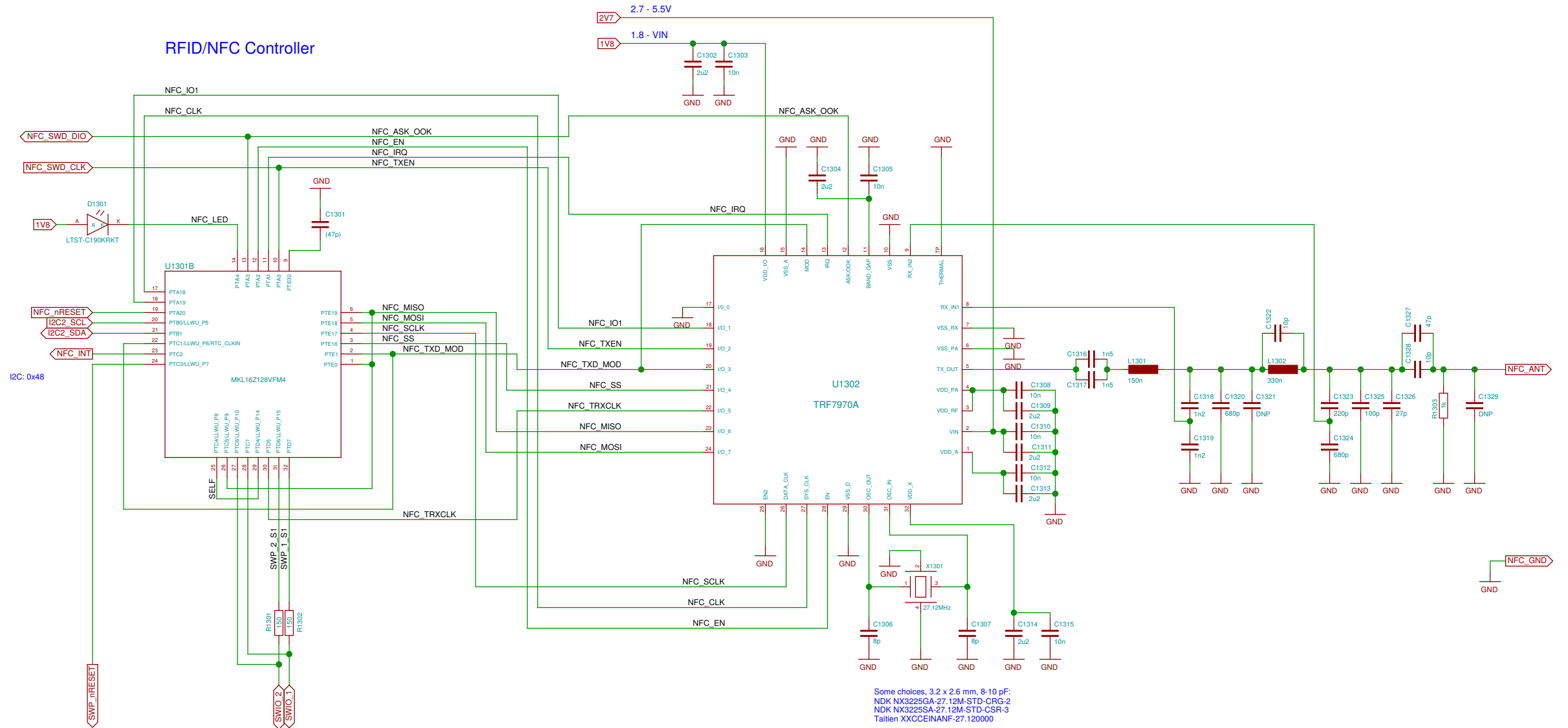
### Vibramotor



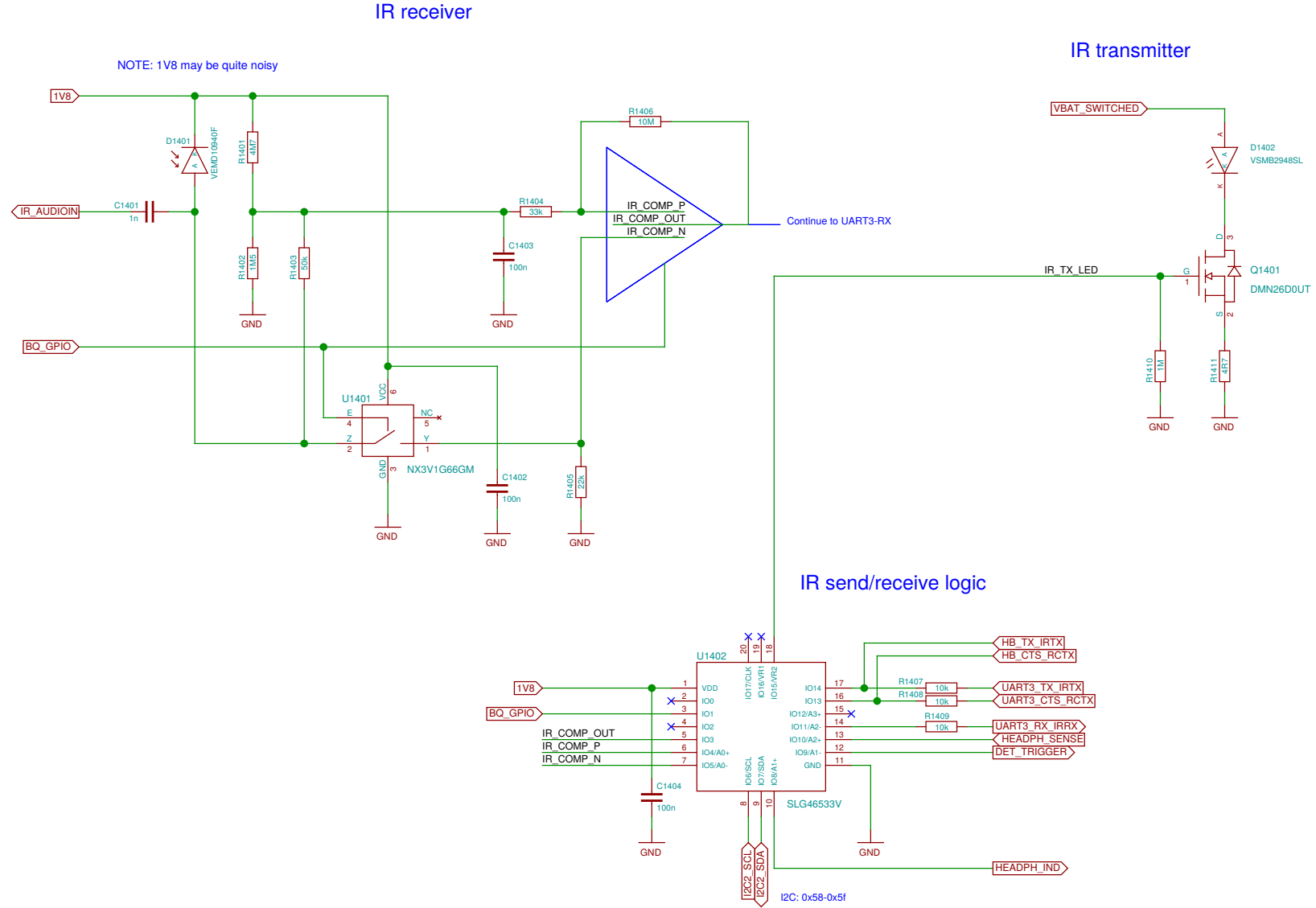
Sheet: /Misc/		
File: misc.sch		
Title: Misc		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow e90e612+ 20161120-16:10Z		Id: 12/25

# RFID/NFC Transceiver

## RFID/NFC Controller



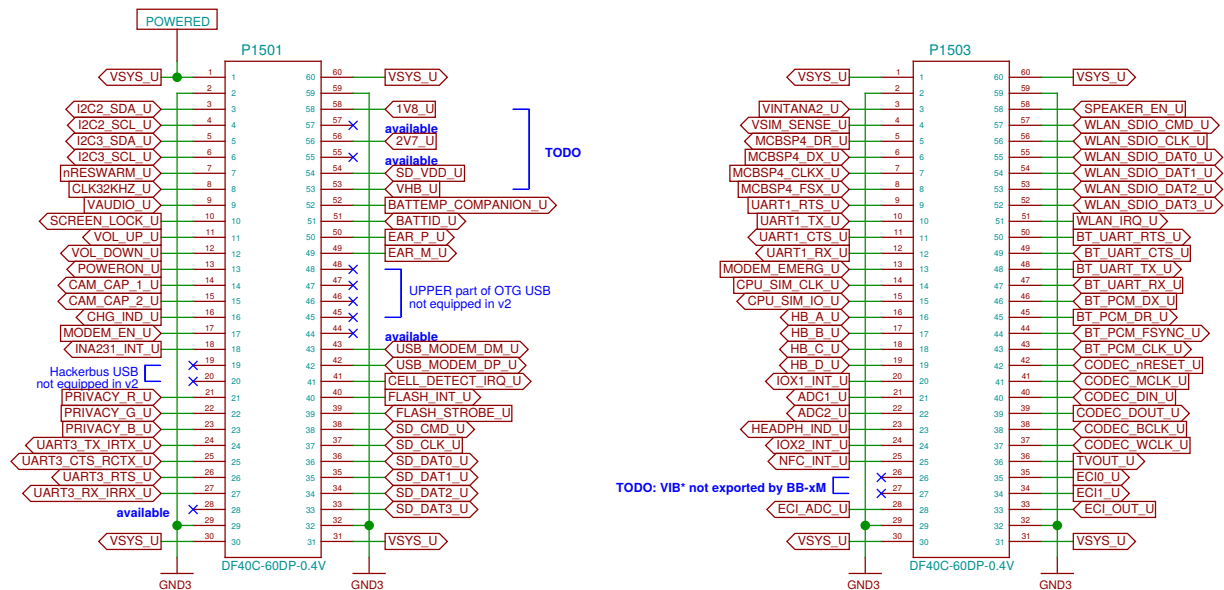
Some choices, 3.2 x 2.6 mm, 8-10 pF:  
 NDK NX3225GA-27.12M-STD-CRG-2  
 NDK NX3225SA-27.12M-STD-CSR-3  
 Tallien XXCCEINANF-27.120000



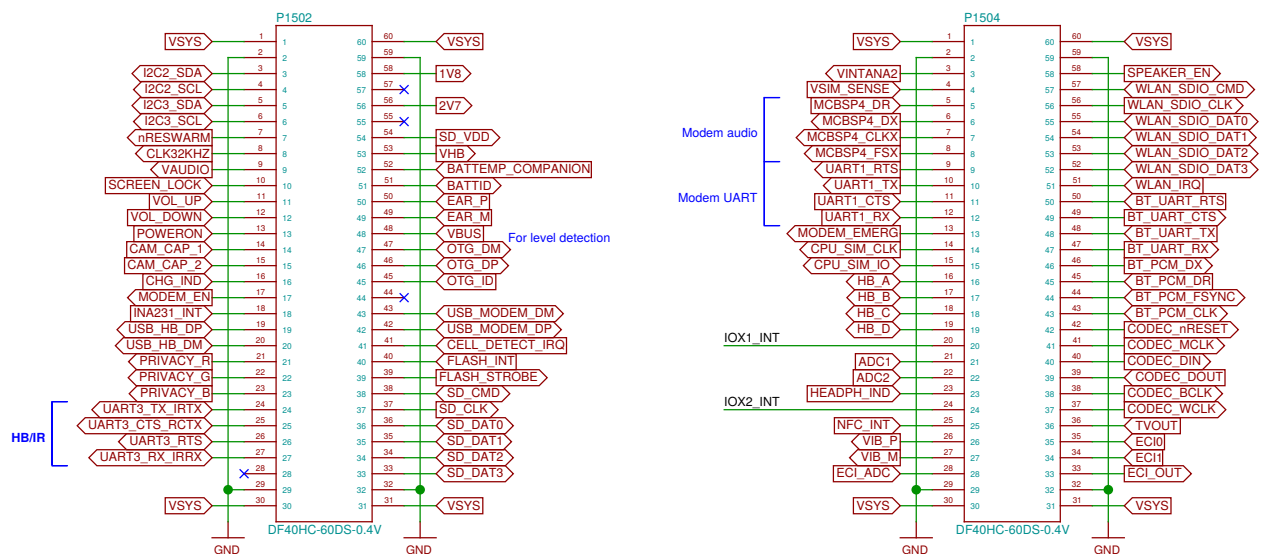
**TODO: update D1401 footprint**

Sheet: /Infrared/	
File: ir.sch	
Title: Infrared	
Size: A3	Date: 2016-11-23 22:26:52
Plotted by eeshow e90e812+ 20161120-16:10Z	
Rev:	Id: 14/25

# This is just the collection of signals we have. Assignment can still change, e.g., to improve layout.

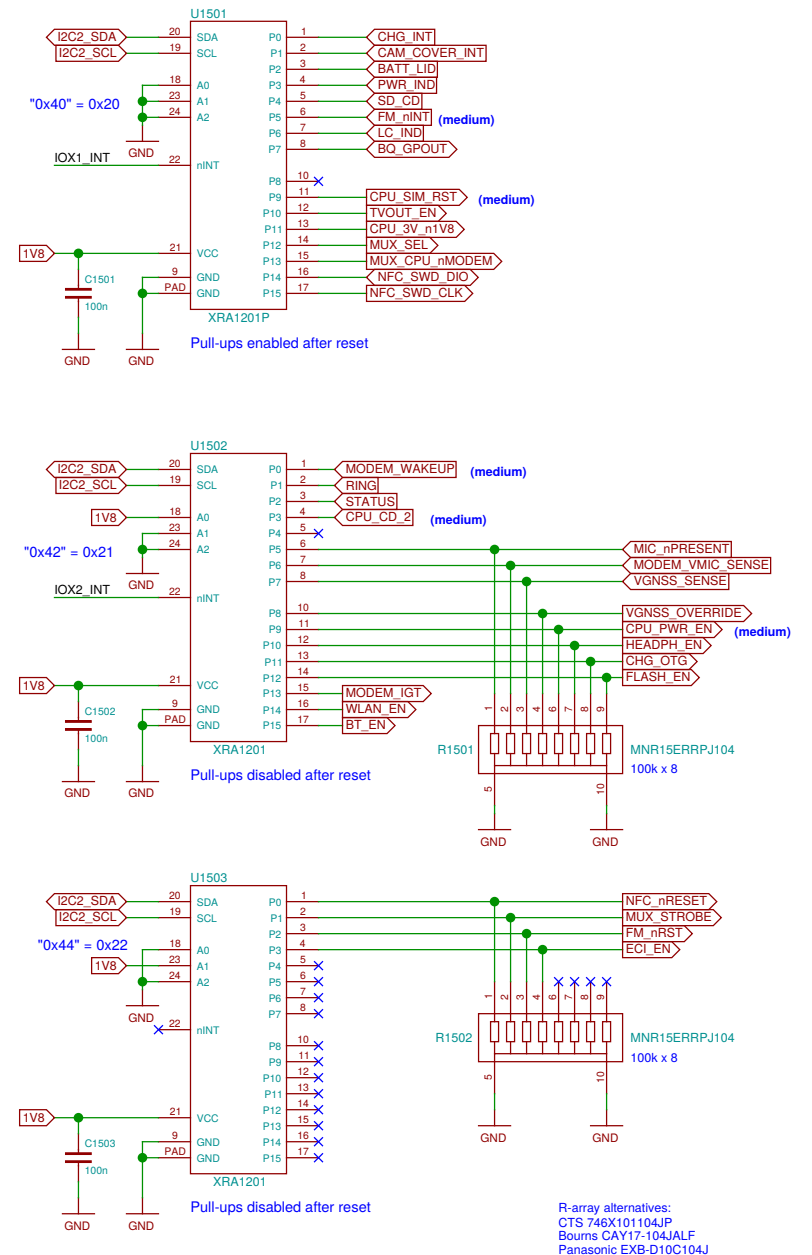


UPPER  
LOWER



Current rating per contact: 0.3 A

## IO expanders (on LOWER)

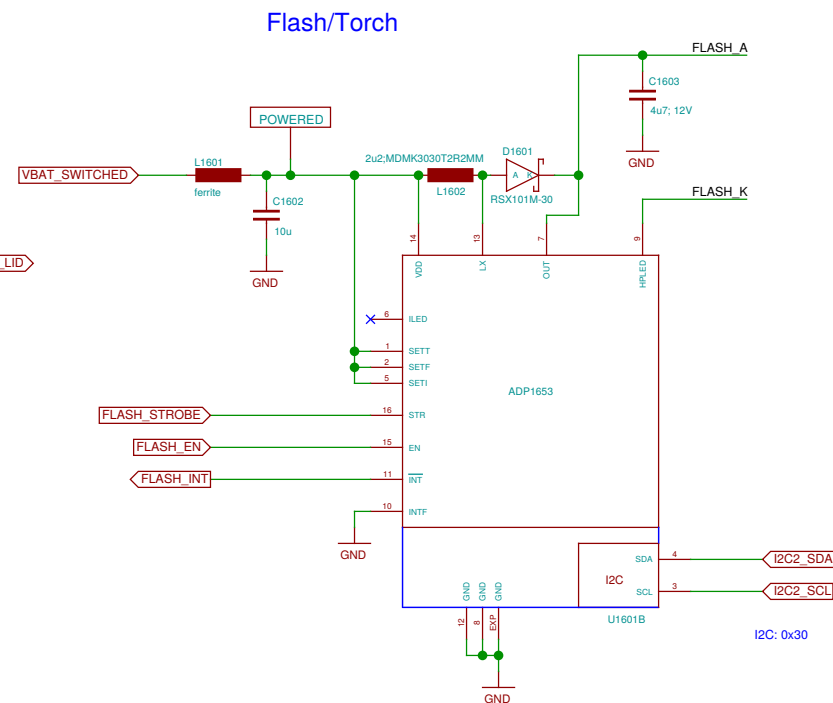
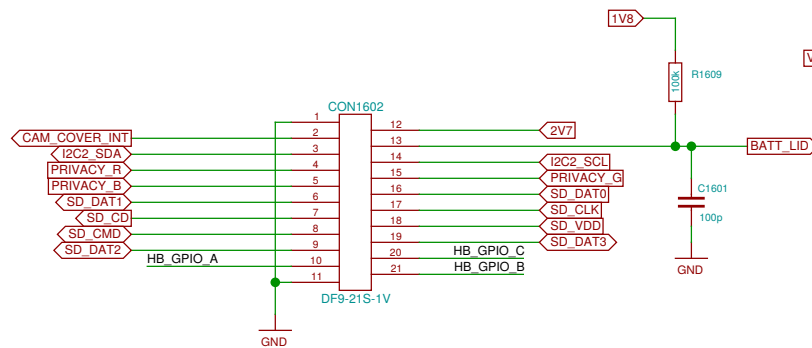
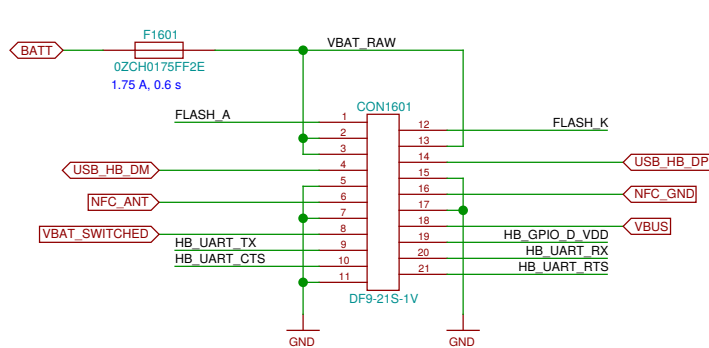


R-array alternatives:  
CTS 746X101104JP  
Bourns CAY17-104JALF  
Panasonic EXB-D10C104J

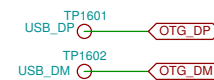
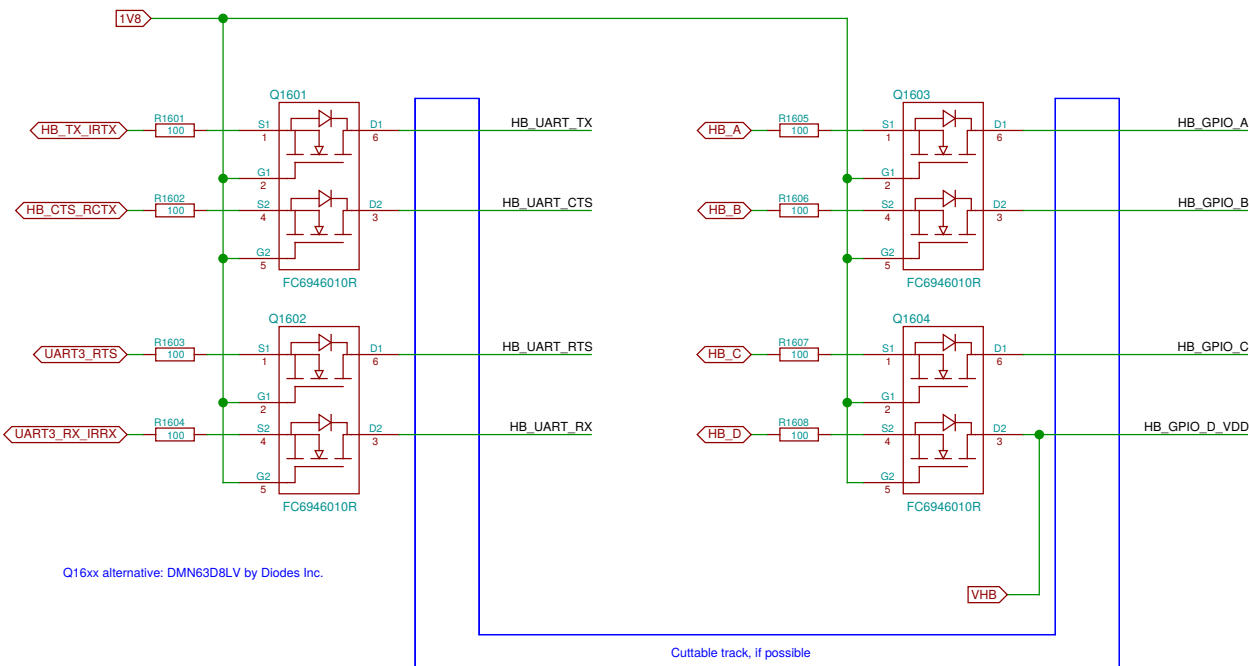
Sheet: /B2B LOWER-UPPER/ File: b2b.sch	
Title: B2B LOWER-UPPER	
Size: A3	Date: 2016-11-22 10:44:58
Plotted by: eeshow e90e812	20161120-16:10:2
Rev:	Id: 15/25

## LOWER-BOB Interconnect (LOWER side)

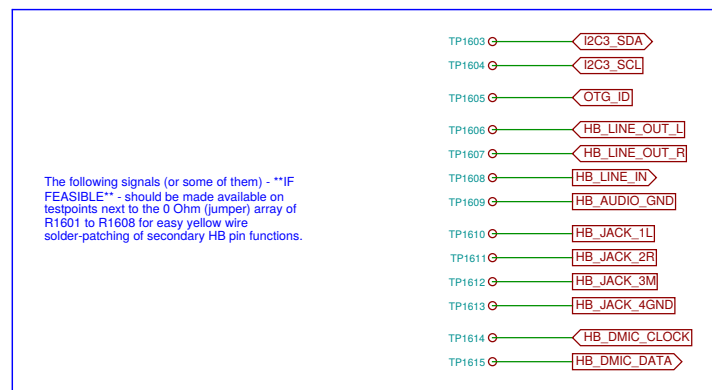
Defined in the Hackerbus specification, <http://neo900.org/stuff/papers/hb.pdf>



## Level shifters for Hackerbus GPIO and UART

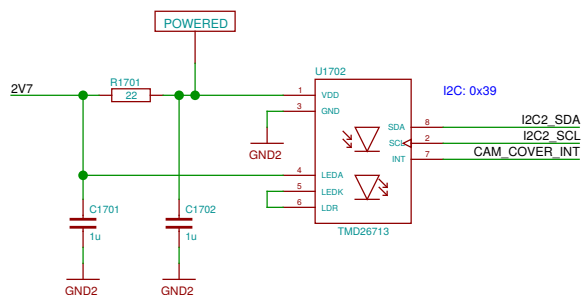


## Patch field

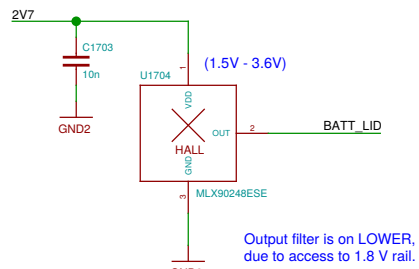




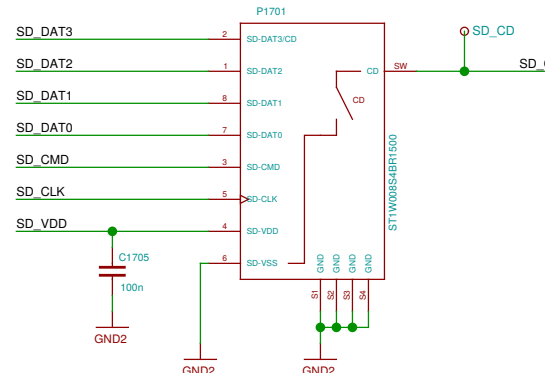
### Camera Cover detect



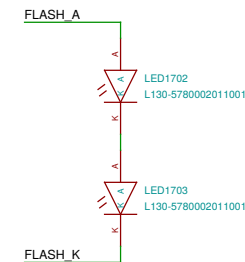
### Battery Cover detect



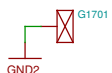
### Memory card holder



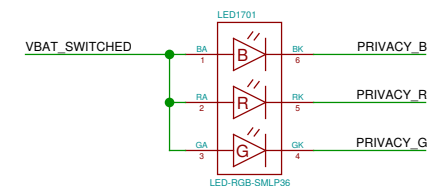
### Camera flash



### Camera lens plate

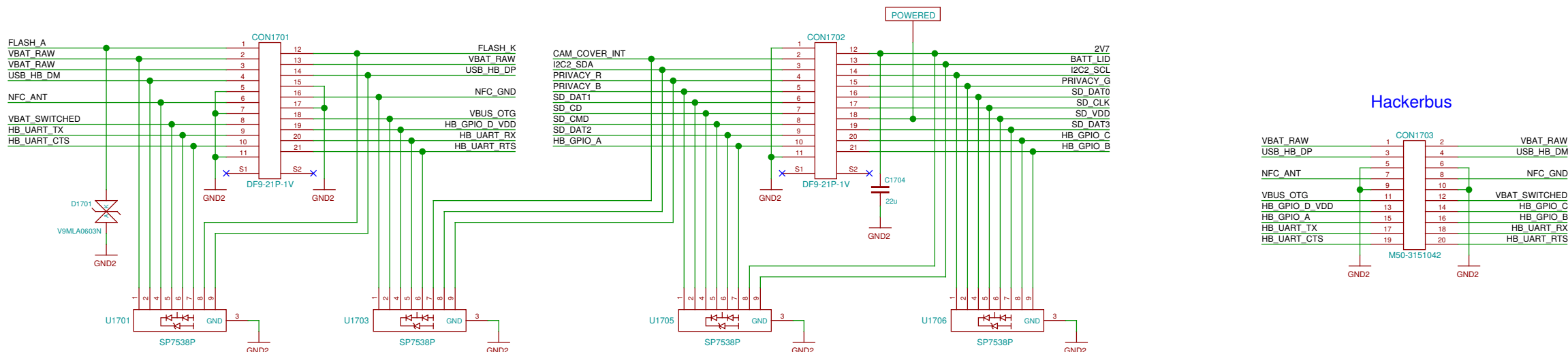


### Privacy LED



### LOWER-BOB Interconnect (BOB side)

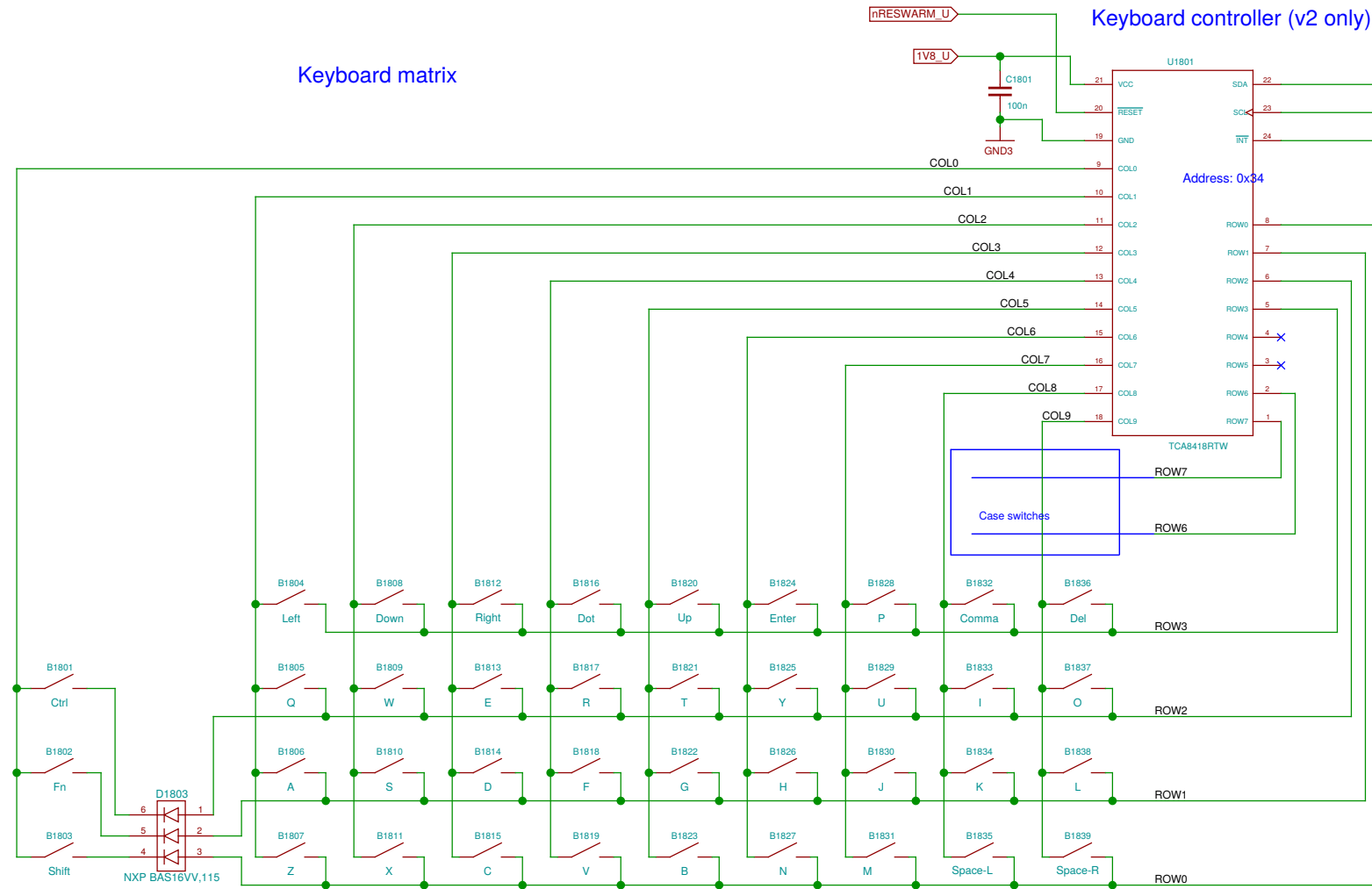
Defined in the Hackbus specification, <http://neo900.org/stuff/papers/hb.pdf>



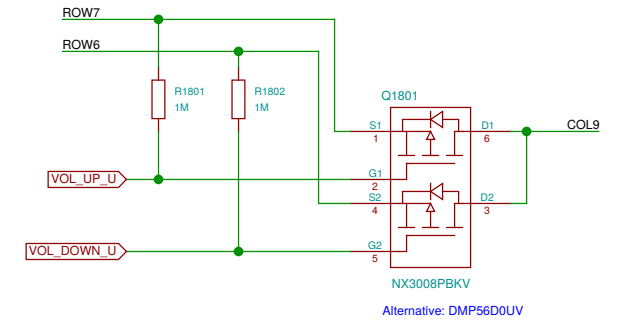
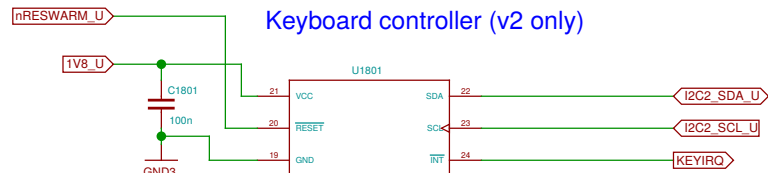
**ESD pin assignment is only indicative.  
Actual assignment to be defined by layout.**

Sheet: /uSD Breakout Board/ File: bob.sch		
Title: uSD Breakout Board		
Size: A3	Date: 2016-11-23 22:26:52	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 17/25

# Keyboard matrix



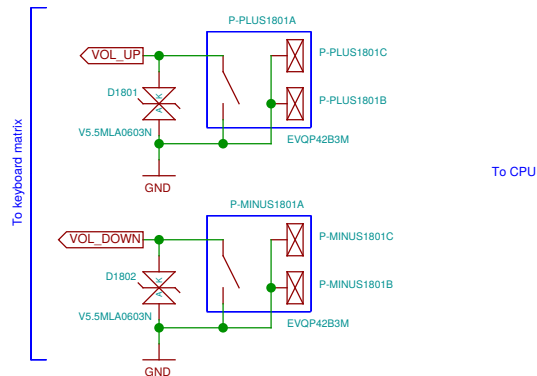
## Keyboard controller (v2 only)



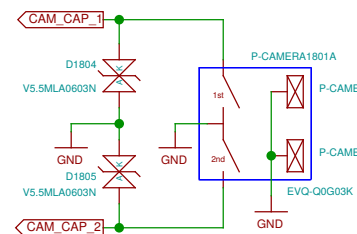
Alternative: Diodes Inc. BAS16VV-7  
Warning: Diodes Inc. have cathodes on pin 1 side, NXP anodes!

UPPER  
LOWER

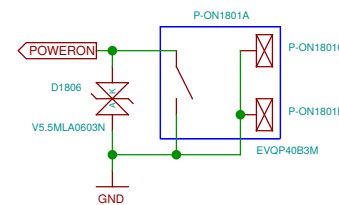
### Volume



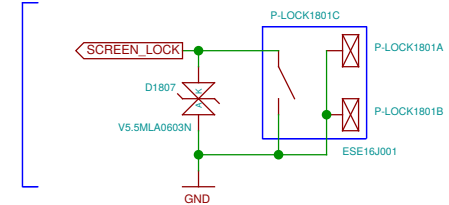
### Camera trigger



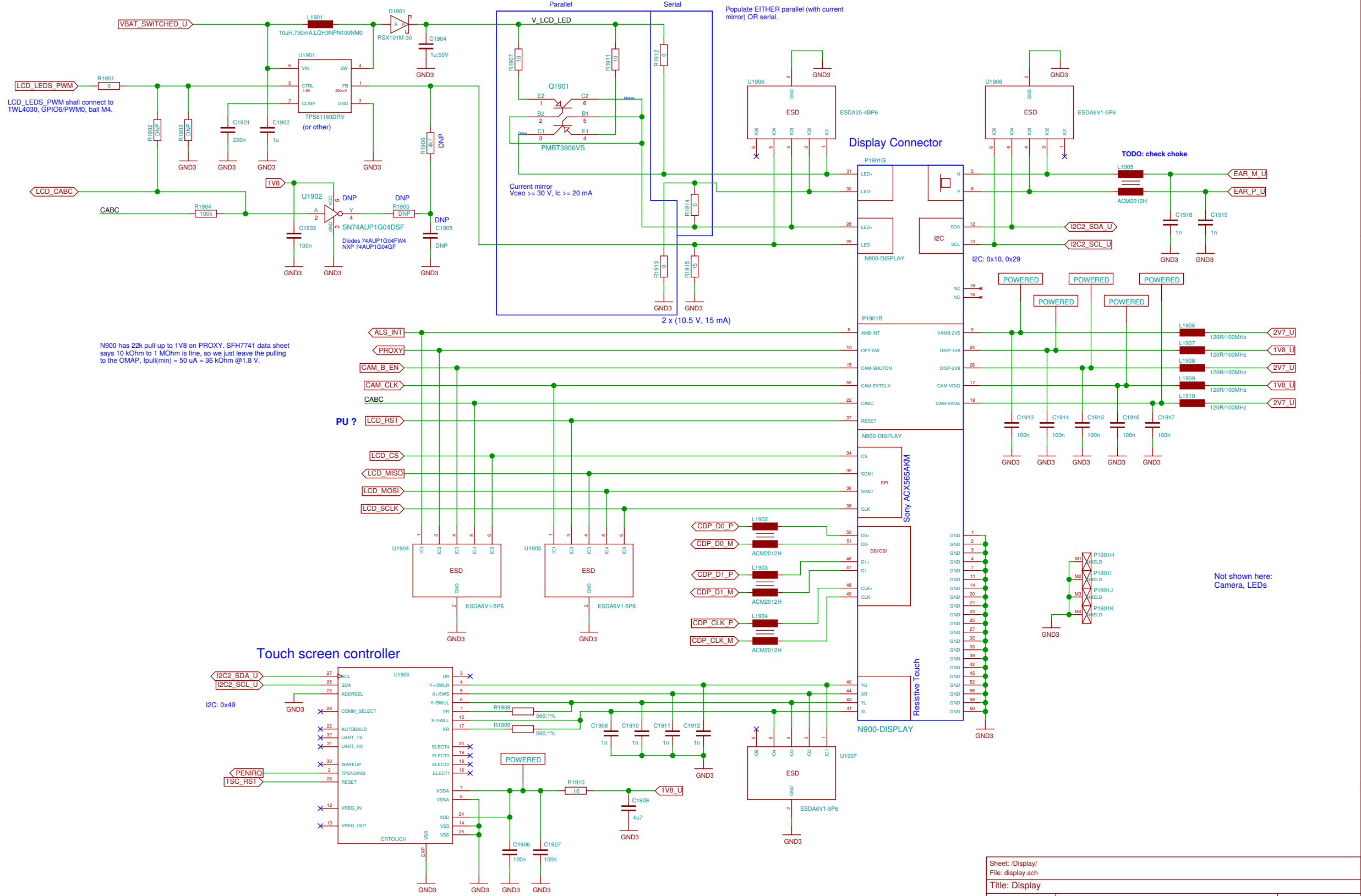
### On-off



### Lock switch



Sheet: /Keypad and buttons/		
File: keys.sch		
Title: Keypad and buttons		
Size: A3	Date: 2016-11-18 15:48:54	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 18/25



LCD\_LEDS\_PWM shall connect to TWL4030, GPIO6/PWM0, ball M4.

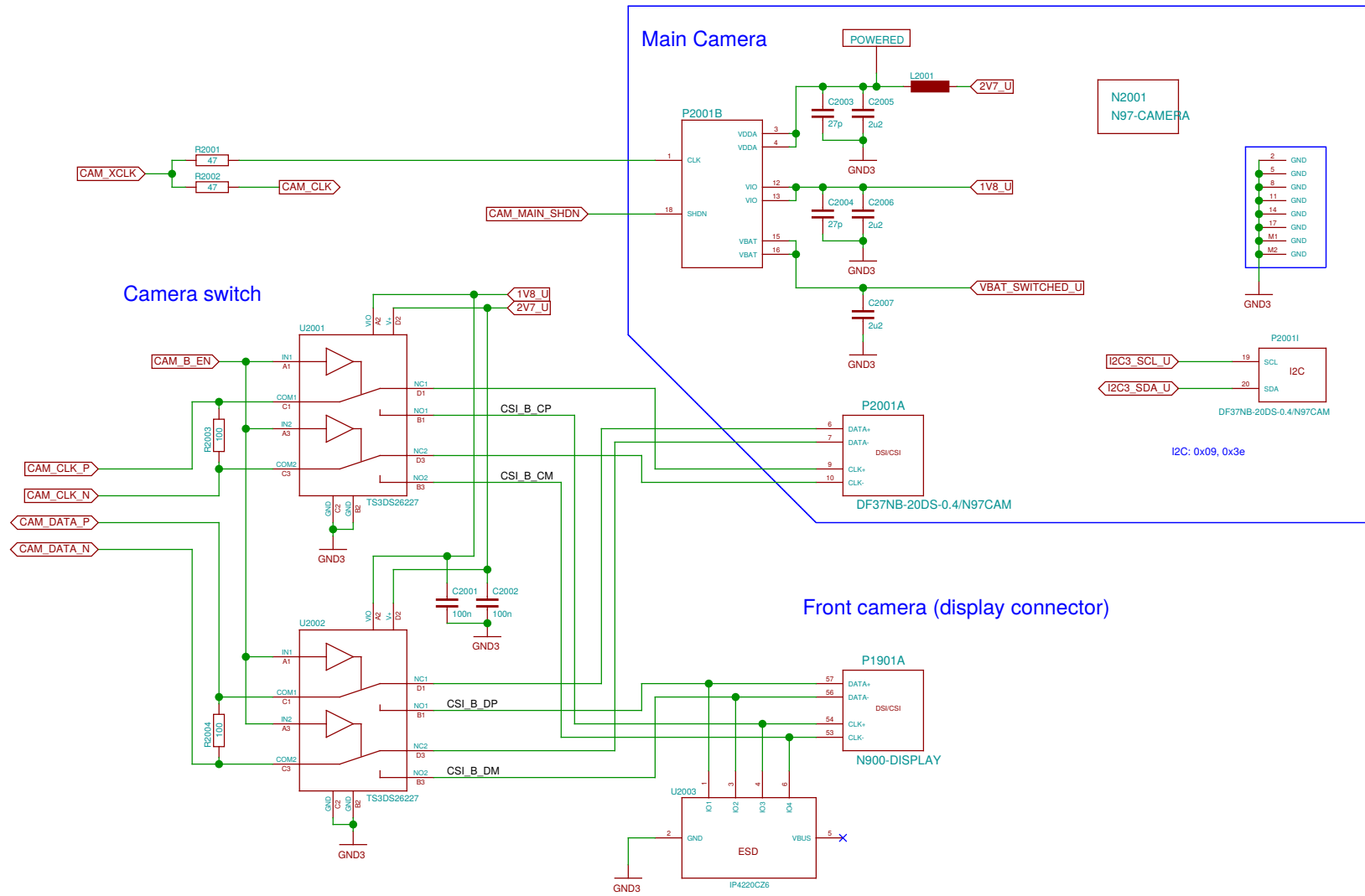
Current mirror  
Vceo >= 30 V, Ic >= 20 mA

Populate EITHER parallel (with current mirror) OR serial.

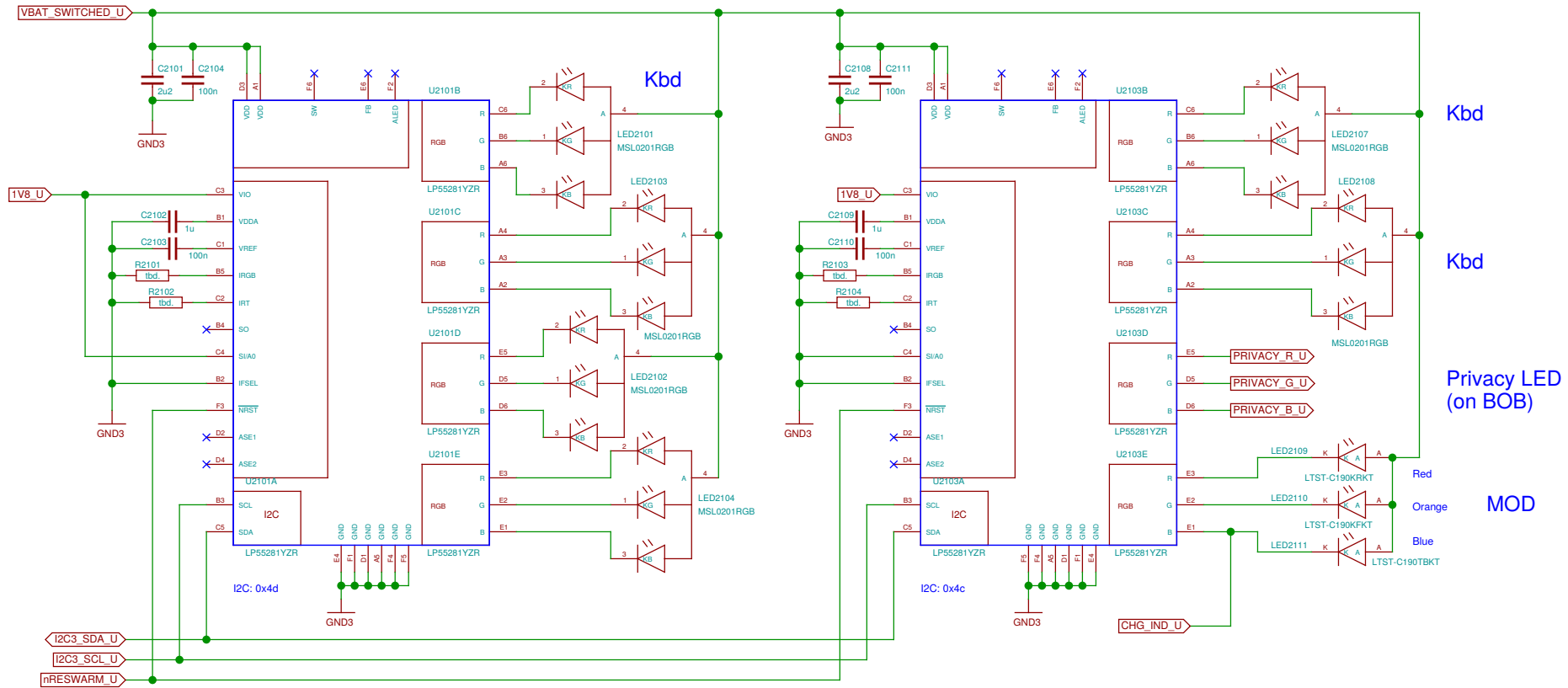
N900 has 22k pull-up to 1V8 on PROXY. SFH7741 data sheet says 10 kOhm to 1 MOhm is fine, so we just leave the pulling to the OMAP. Ipull(min) = 50 uA = 36 kOhm @ 1.8 V.

Not shown here:  
Camera, LEDs

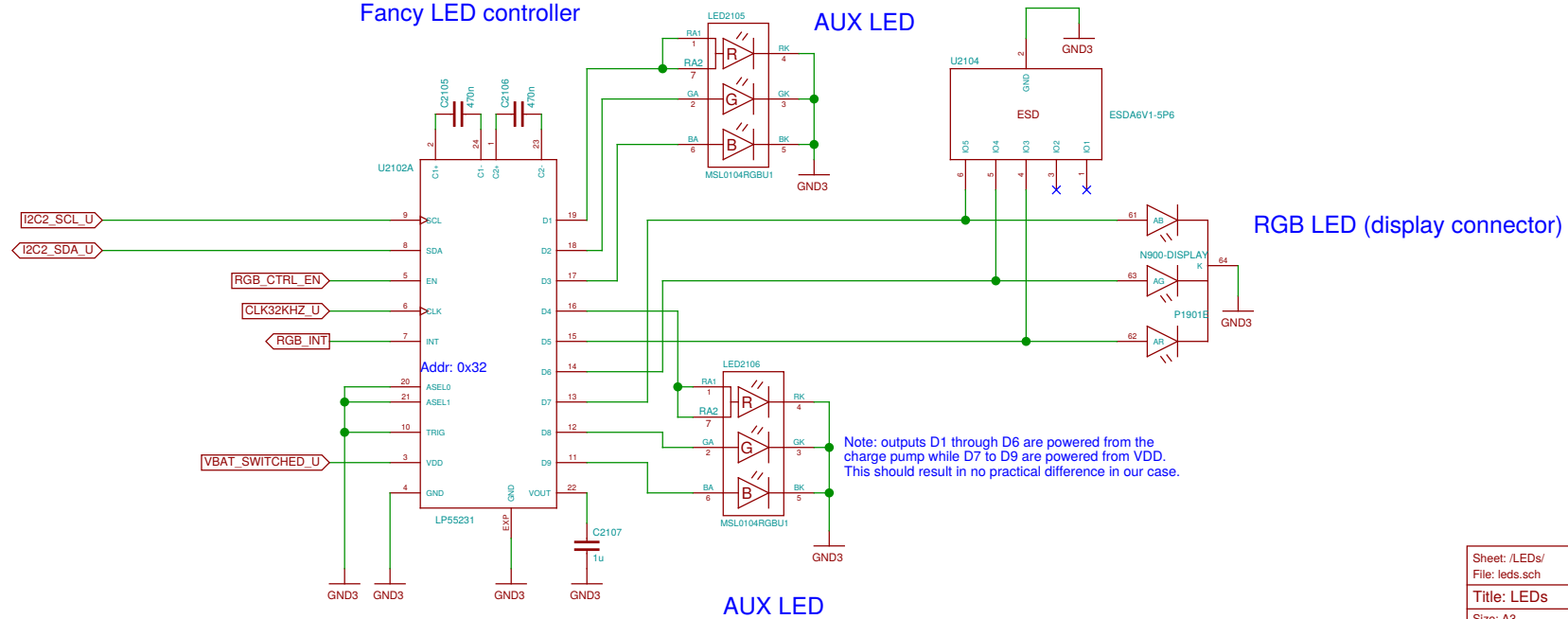
Sheet: /Display/ File: display.sch		Date: 2016-11-23 22:26:52	
Title: Display		Rev:	
Size: A3	Plotted by: eeshow e90e812+	20161120-16:10Z	Id: 19/25



### Basic LED controllers

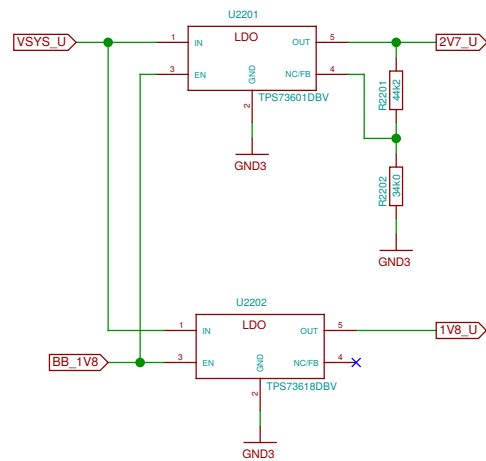


### Fancy LED controller



Sheet: /LEDs/		Date: 2016-11-23 22:26:52	
File: leds.sch		Rev:	
Title: LEDs		Id: 21/25	
Size: A3	Plotted by: eeshow	e90e612+	20161120-16:10Z

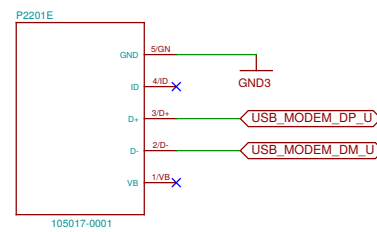
simple capless 400mA LDO for TPS65950 substitute  
(only for prototype)



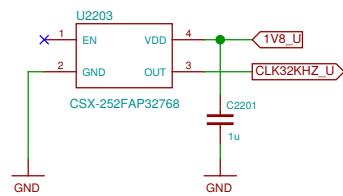
TODO: use REGEN ?

### Modem USB

connect to BB  
by some Micro-USB cable

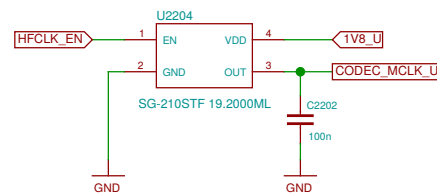


### 32 kHz clock



Alternative: OYKTGLJANF-0.032768

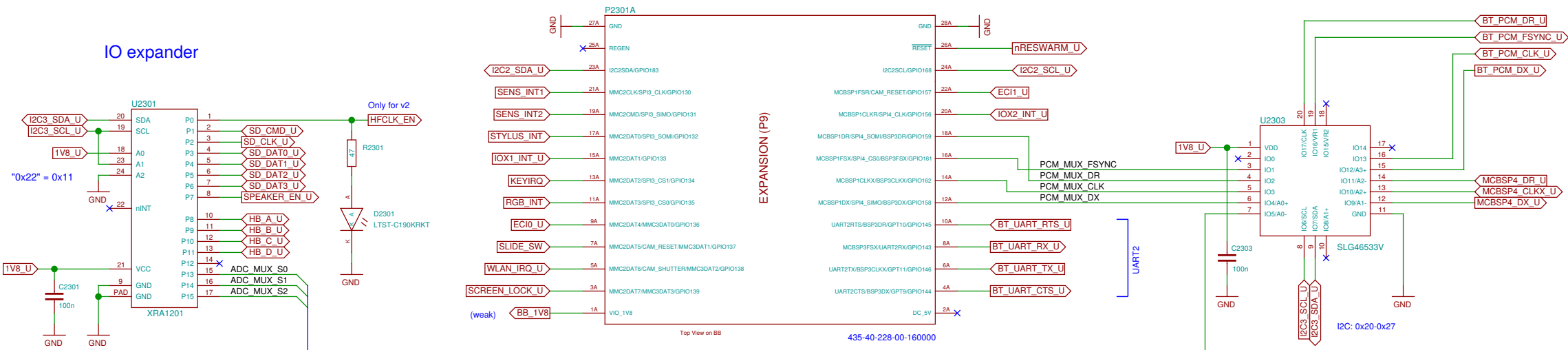
### 19.2 MHz clock



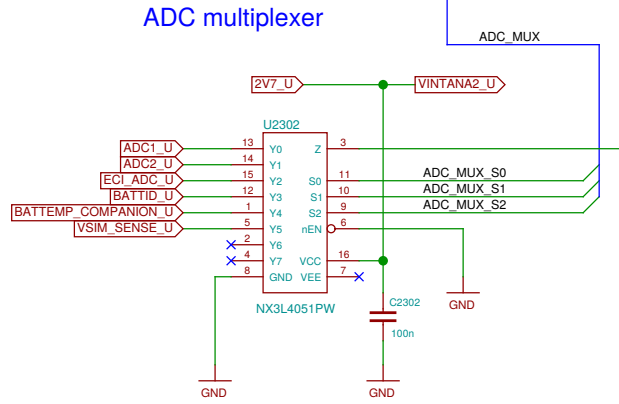
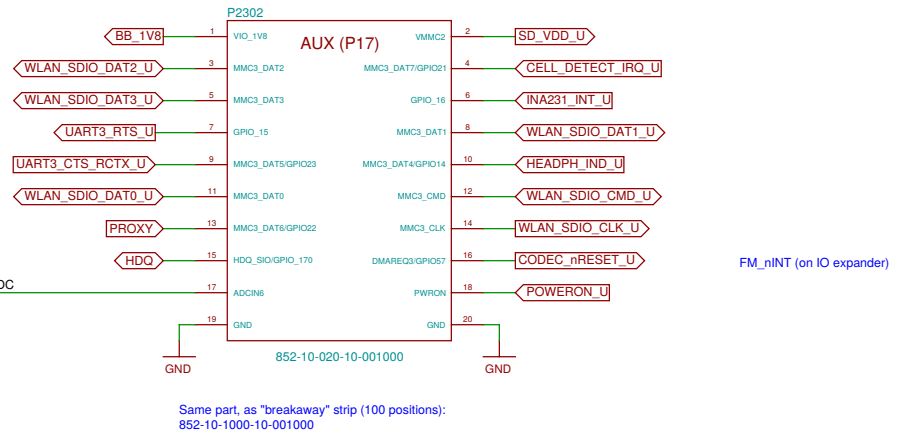
Alternative: KC2520B19.2000C1GE00

Sheet: /Adaptation (v2 only)/		
File: v2.sch		
Title: Adaptation (v2 only)		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow e90e612+ 20161120-16:10Z		Id: 22/25

### BB-xM Main Expansion Header (P9, 7.24)



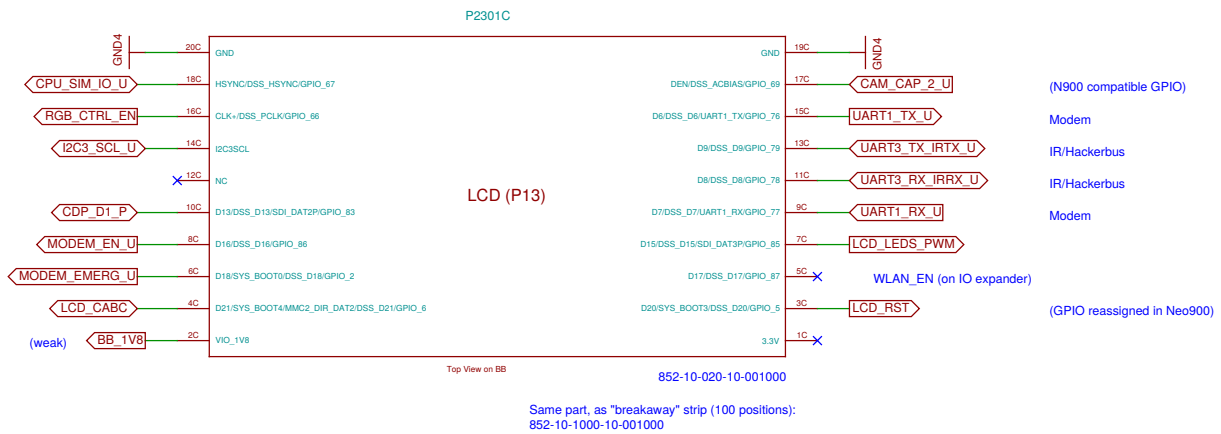
### Auxiliary Expansion Header (P17, 7.26)



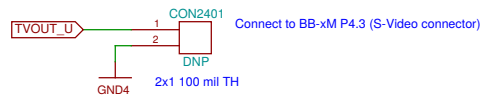
### P11 (7.25)



### P13 (7.25)

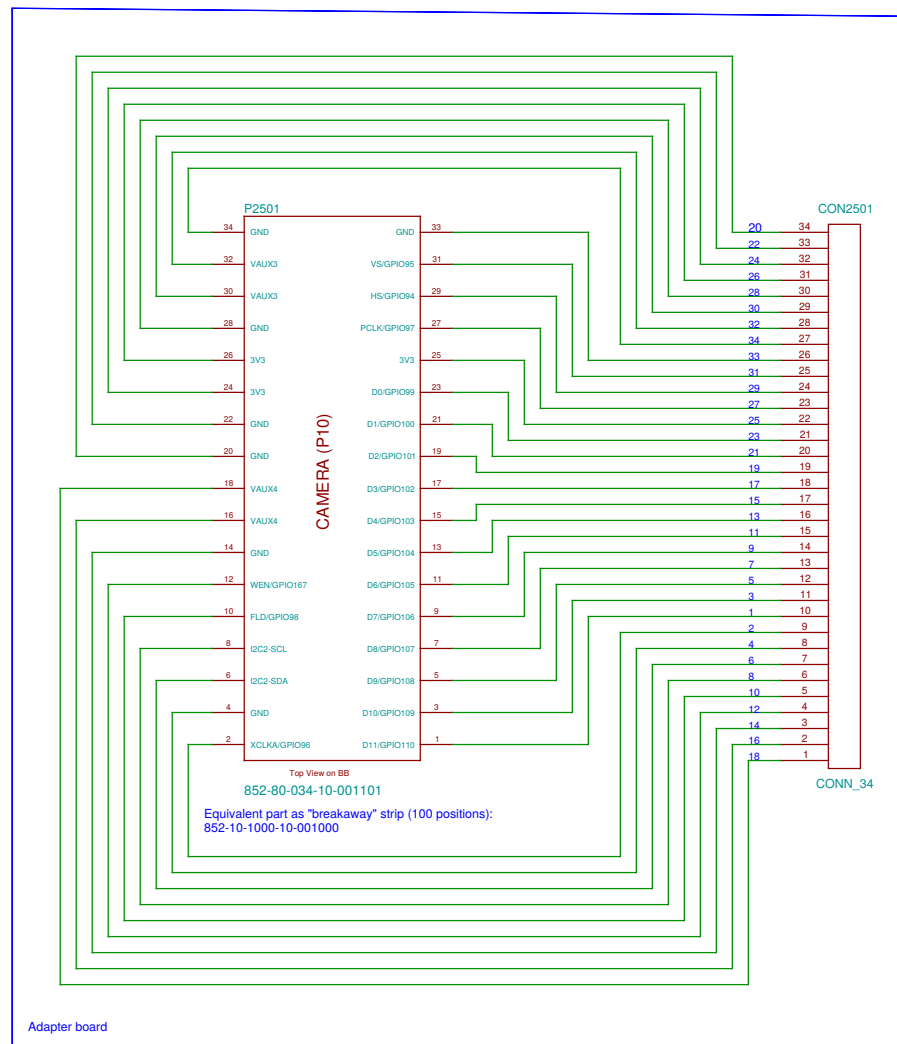


### P4 (7.19)

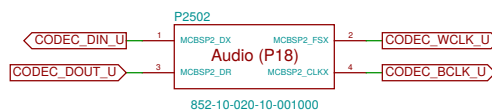
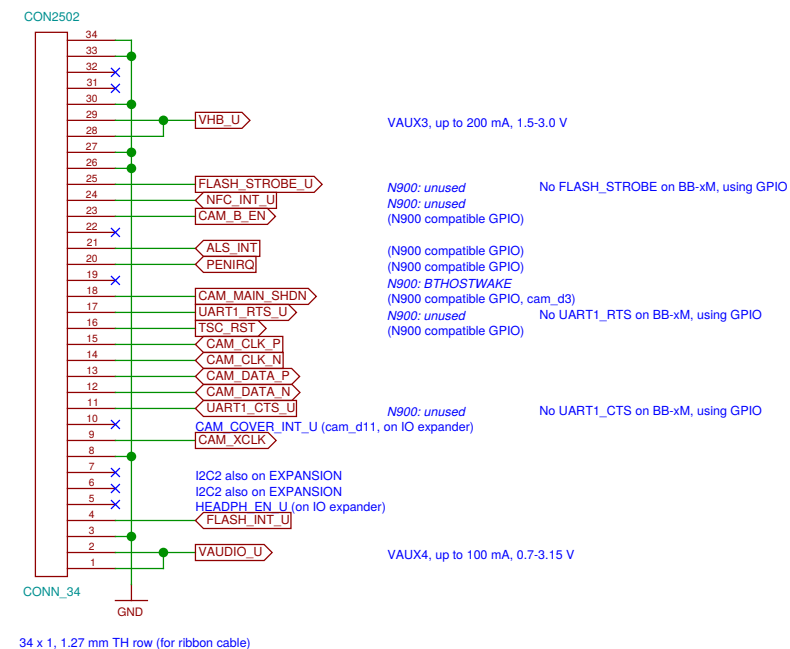




# Processor Camera Port Interface (P10, 7.20.3)



Adapter board



This part is a "breakaway" strip (20 positions) and needs to be customized (cut) before assembly.  
Alternatively, 852-10-100-10-001000 (100 positions) could be used.

Sheet: /BB-xM Adapter (CAM)/  
File: bbcam.sch

Title: BB-xM Adapter (CAM)

Size: A3 Date: 2016-11-23 13:28:26  
Plotted by eeshow e90e612- 20161120-16:10Z

Rev:  
Id: 25/25