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Charger/OTG

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Battery

File: battery.sch

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Modem Power

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3G/4G Modem

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SIM cards and switch

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Modem Antennas

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WLAN, Bluetooth, FM

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RFID/NFC

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Infrared

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B2B LOWER-UPPER

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Hackerbus

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uSD Breakout Board

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Keypad and buttons

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Cameras

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Sheet: Adaptation (v2 only)



Adaptation (v2 only)

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BB-xM Adapter (CPU)

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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.

Unless indicated otherwise, resistors have a tolerance of 1%, or better. If the nominal value specified in the schematics is only available with lower tolerance, use that.

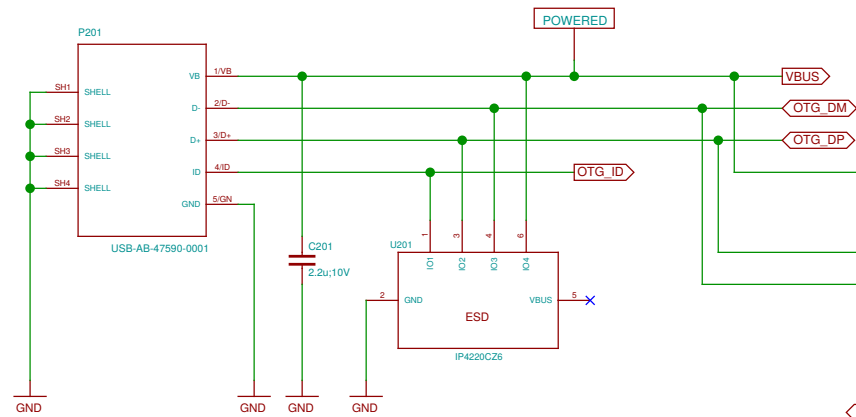
Unless indicated otherwise, all capacitors should be X5R or X6S, or better (X7R, NP0, etc.)  
If no voltage is specified, use  $\geq 6.3$  V.

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

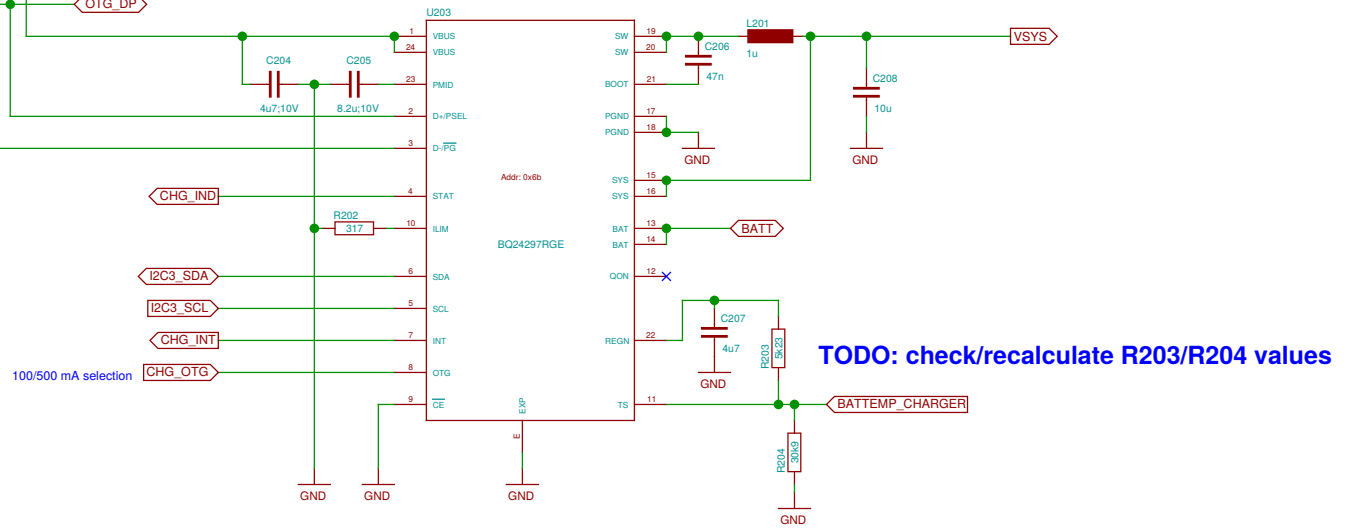
Signals that exist on both LOWER and UPPER (and maybe also BOB) have a \_U suffix on UPPER. No suffix is needed to distinguish between LOWER and BOB because all BOB components are on the same sheet and wires connecting them use sheet-local labels.

Sheet: /	
File: neo900.sch	
Title: Neo900	
Size: A3	Date: 2016-12-03 19:31:15
Plotted by: eeshow 221aa28 20161208-00:03Z	Rev: Id: 1/25

### USB OTG connector

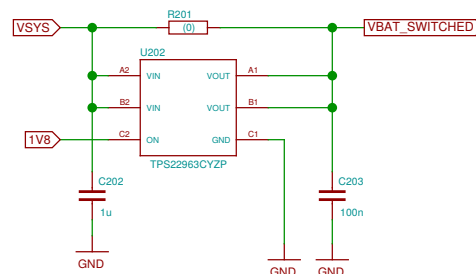


### Battery charger with USB OTG

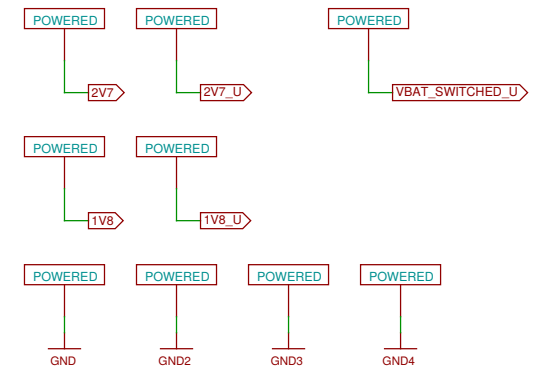


### Power distribution and sequencing

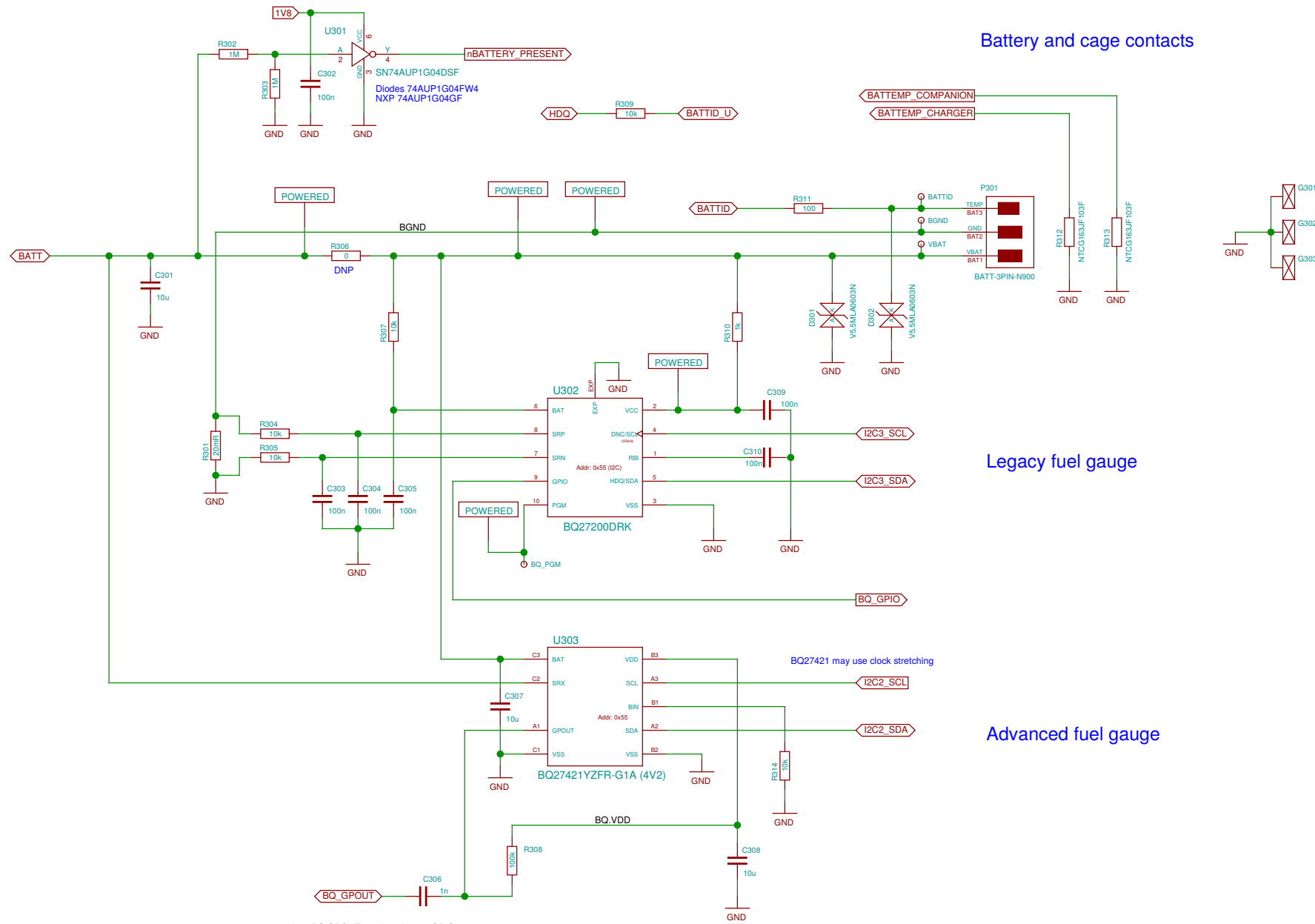
Most high-current consumers are on VBAT\_SWITCHED, 1V8 signals that the regulators on UPPER are operational.



### KiCad bureaucracy



Sheet: /Charger/OTG/		File: charger.sch	
Title: Charger/OTG			
Size: A3	Date: 2016-11-30 16:58:16	Rev:	
Plotted by eeshow 221aa28 20161208-00:03Z			Id: 2/25



Battery and cage contacts

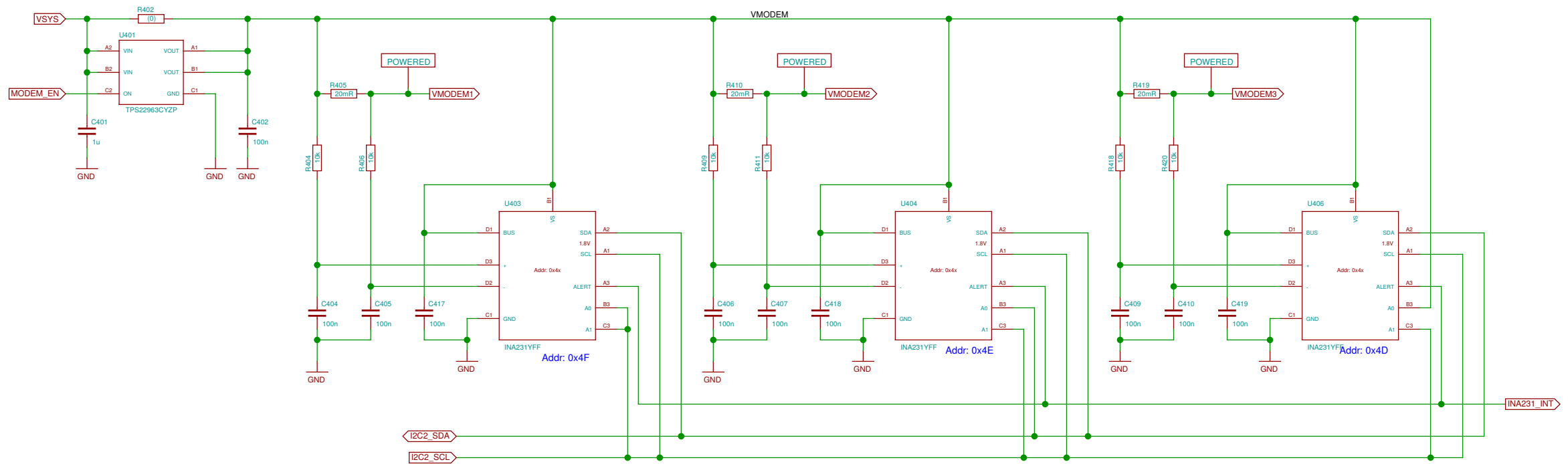
Legacy fuel gauge

Advanced fuel gauge

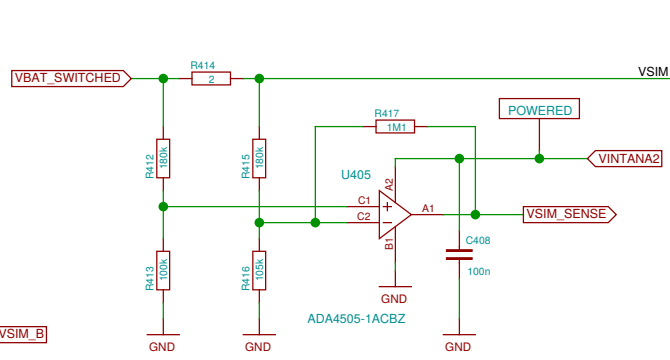
Note: BQ.GPOUT needs pull-up at GPIO.

Sheet: /Battery/ File: battery.sch		
Title: Battery		
Size: A3	Date: 2016-11-29 23:12:49	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 3/25

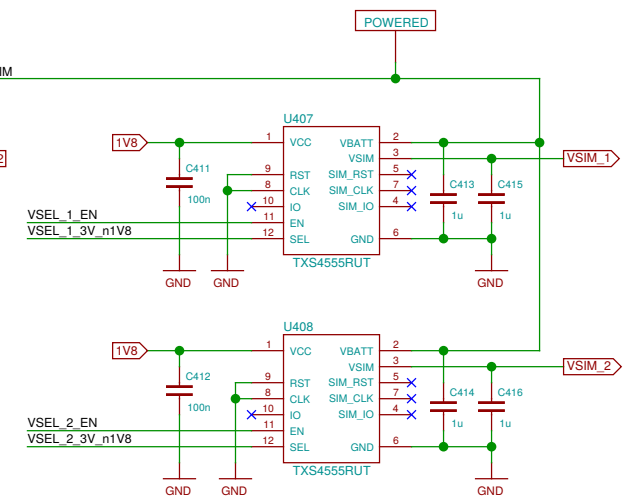
### Modem current monitor



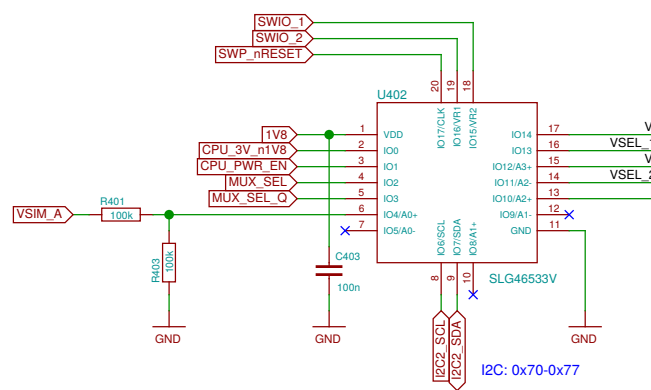
### SIM current sensing



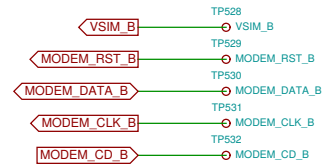
### SIM power supply



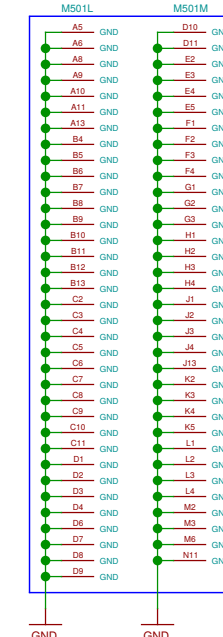
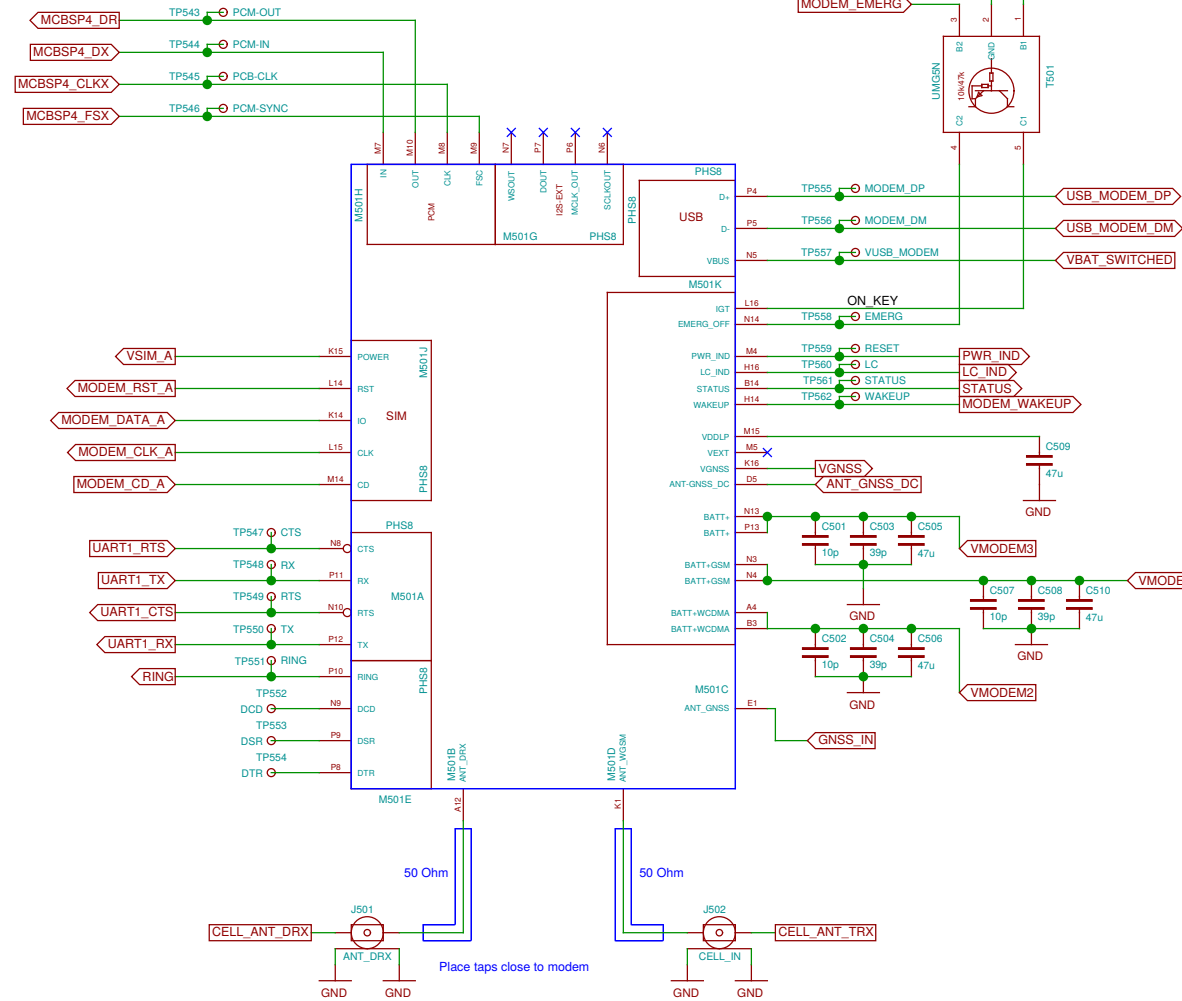
### SIM power selection



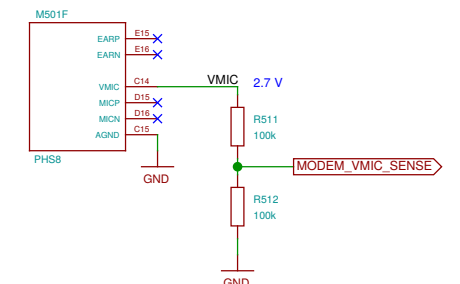
### SIM B bus



### Modem (module)



### Anti-eavesdropping



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.

Pads that are DNU in PHS8 and PLS8.

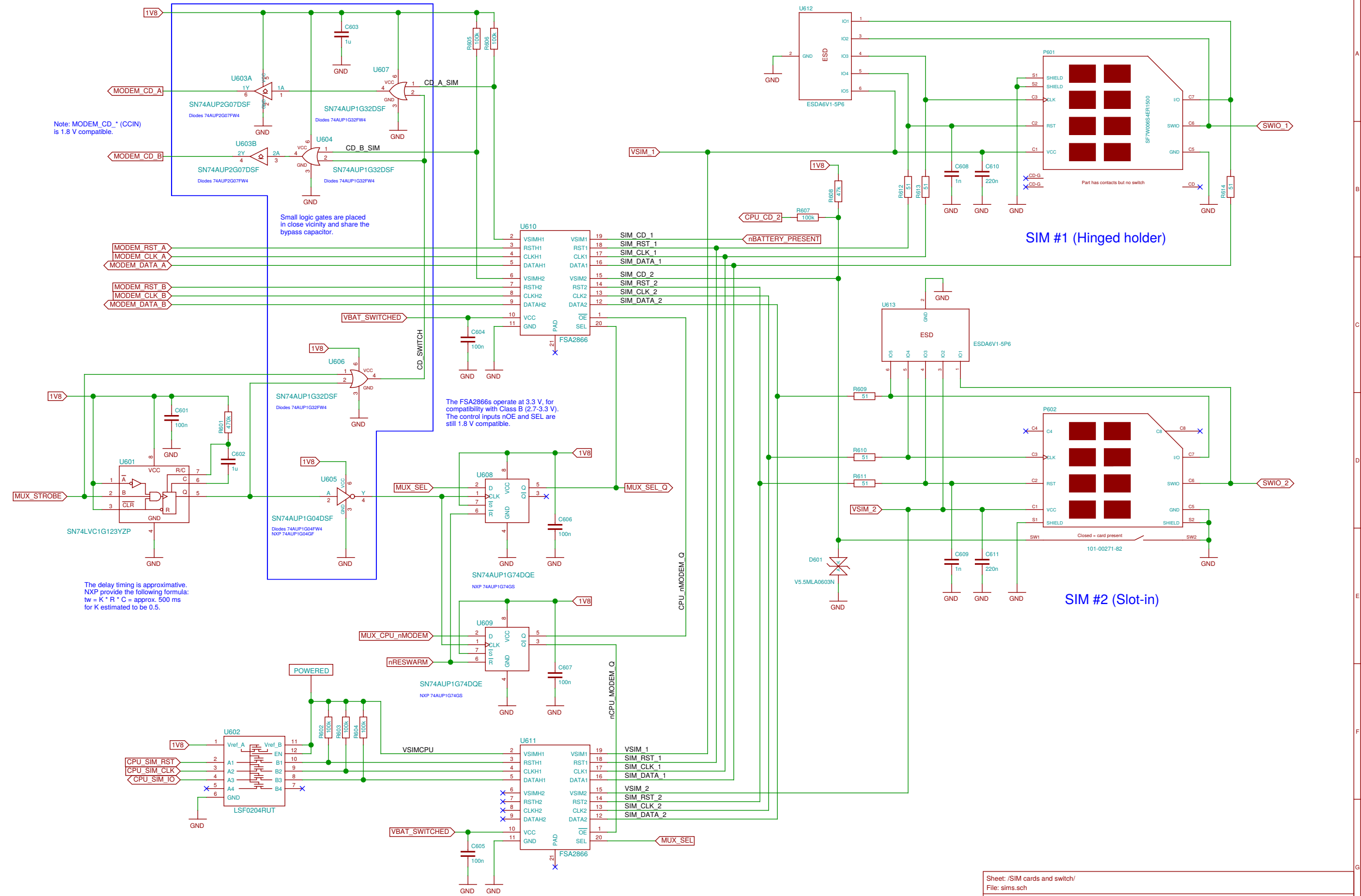
Pads that are DNU in PHS8 but have a GPIO or ADC function assigned to them in PLS8.

Pads RFU (GND) in PHS8 and RFU (DNU) in PLS8. The resistors indicate cuttable traces.

50 Ohm

Place taps close to modem

50 Ohm



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

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

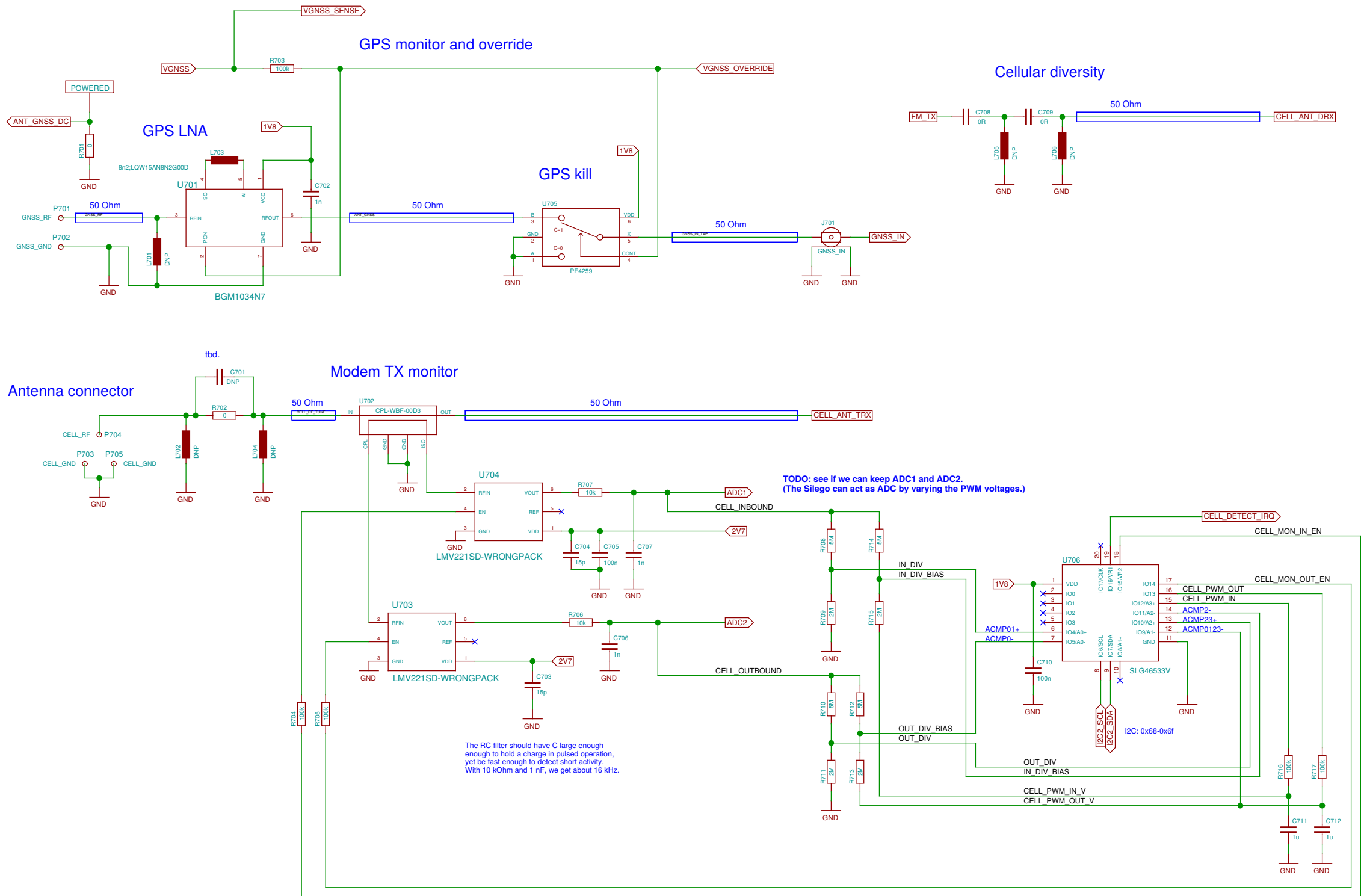
The FSA2866s operate at 3.3 V, for compatibility with Class B (2.7-3.3 V). The control inputs nOE and SEL are still 1.8 V compatible.

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)

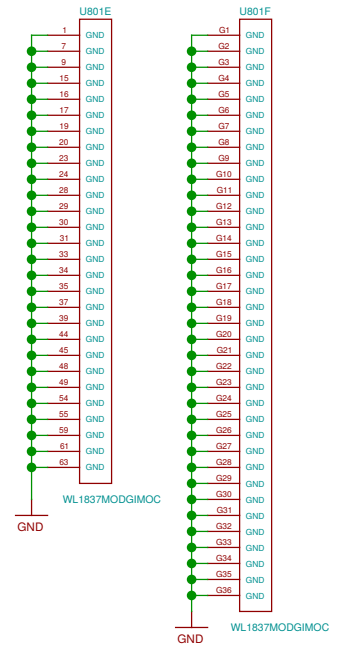
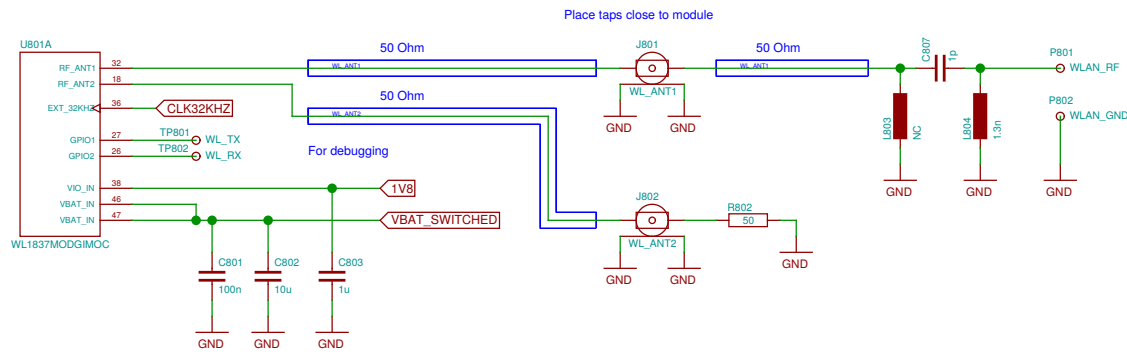
SIM #2 (Slot-in)

Sheet: /SIM cards and switch/		
File: sims.sch		
Title: SIM cards and switch		
Size: A3	Date: 2016-11-21 23:56:50	Rev:
Plotted by eeshow 22/1aa28 20161208-00:03Z		Id: 6/25

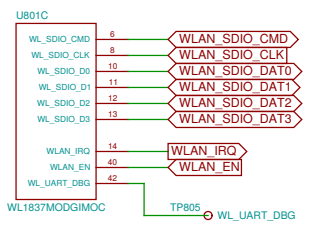


TODO: assign footprints for c-spring contacts

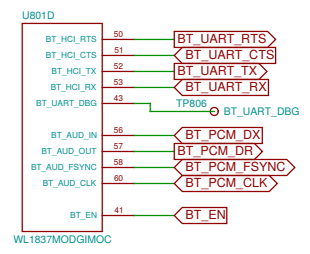
### WLAN/BT antenna



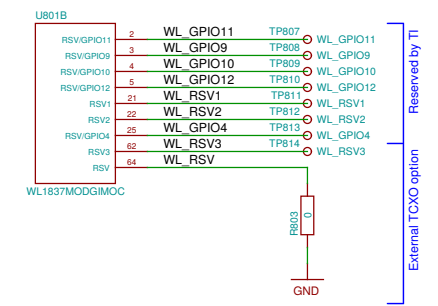
### WLAN



### Bluetooth

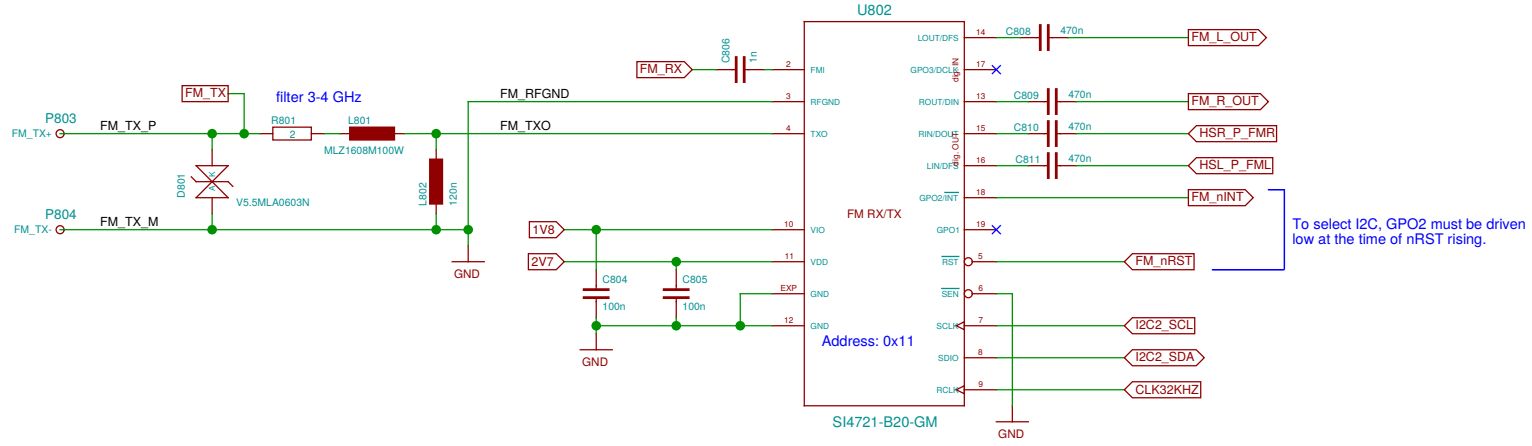


### Reserved / Debugging



### FM Radio (TX/RX)

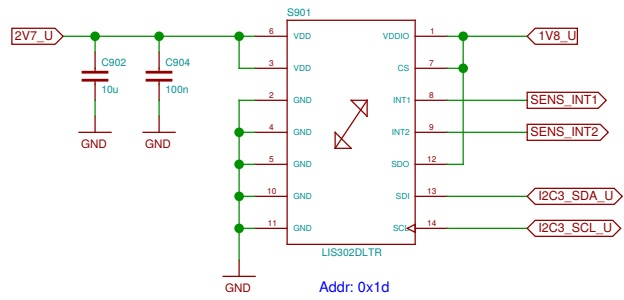
### FM TX antenna



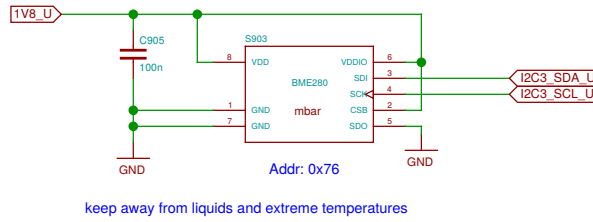
SI4705 is pin compatible (mostly) but RX-only



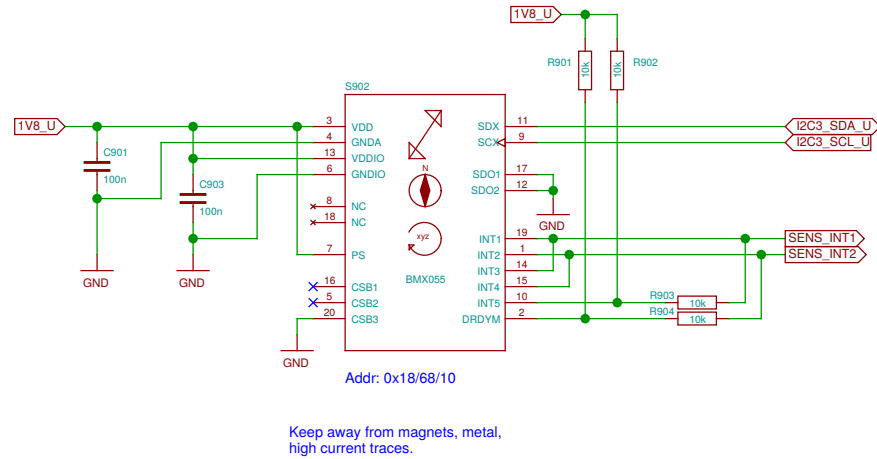
### Acceleration (legacy)



### Pressure, humidity

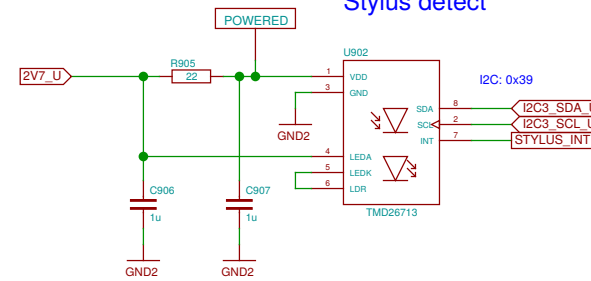


### 9-axis (acceleration, gyroscope, magnetometer)

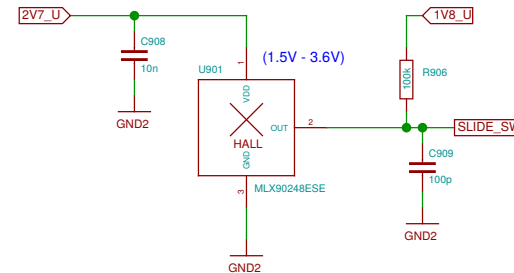


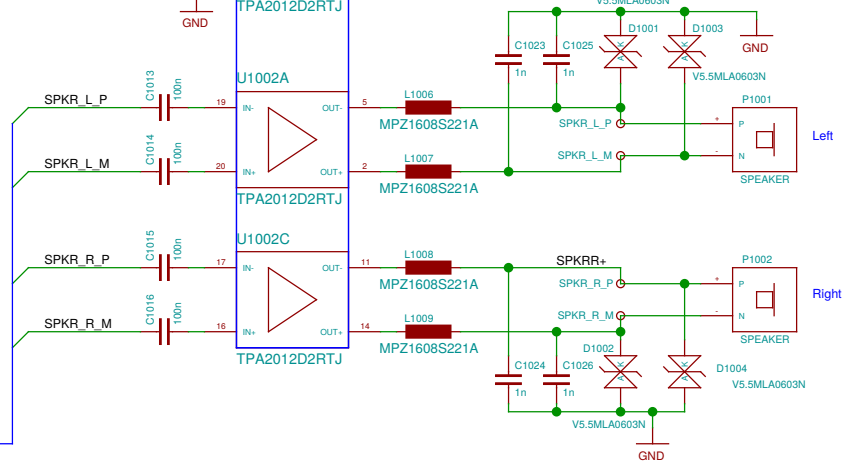
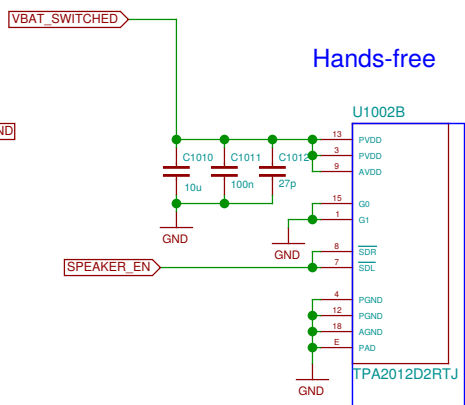
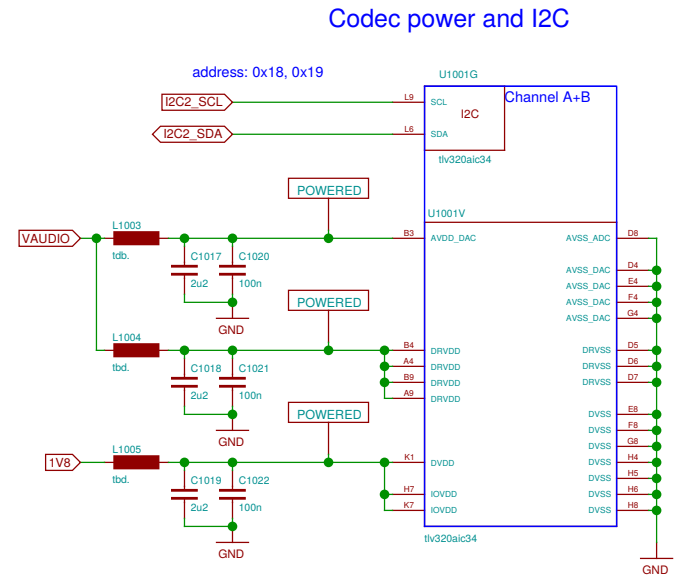
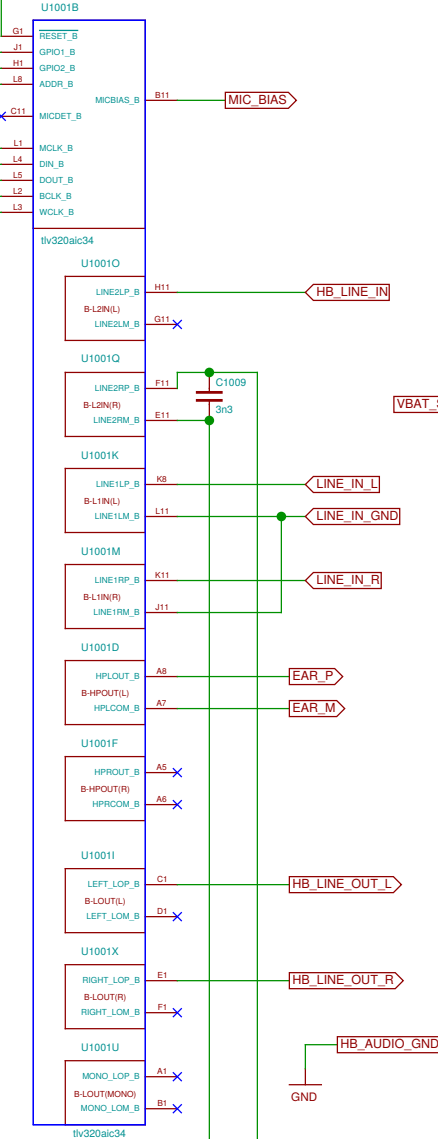
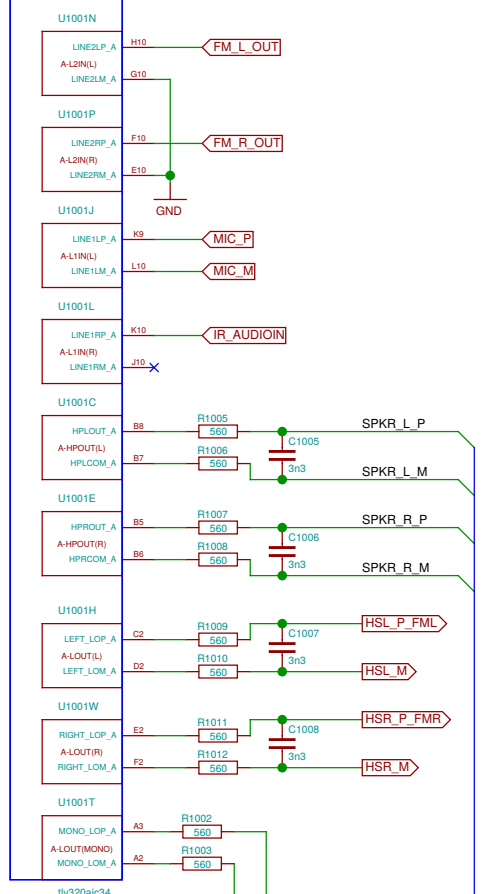
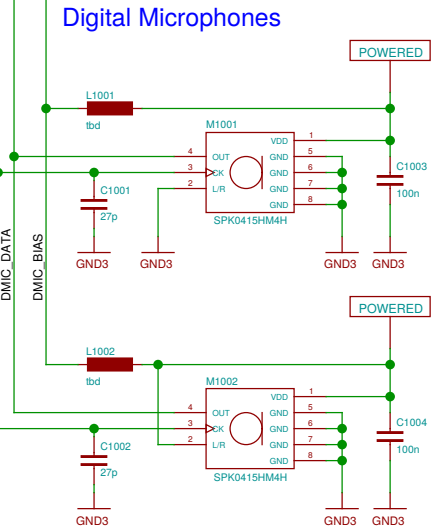
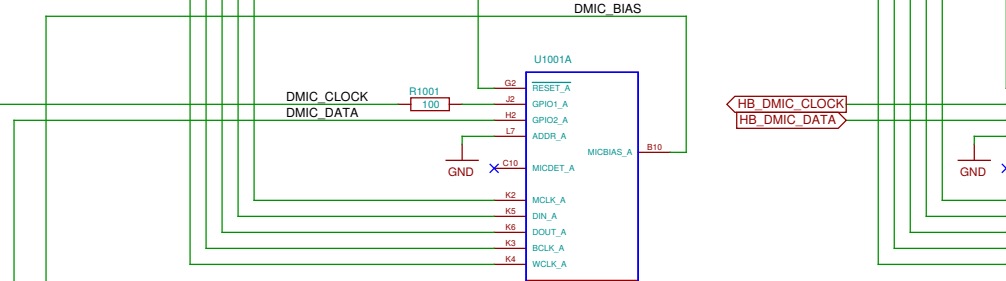
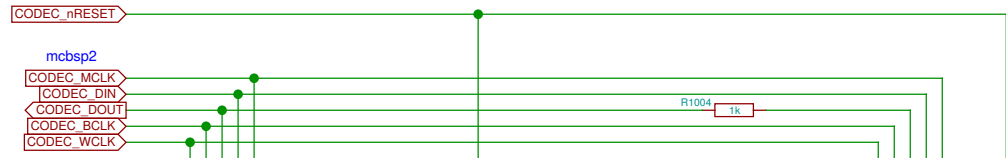
UPPER  
LOWER

### Stylus detect

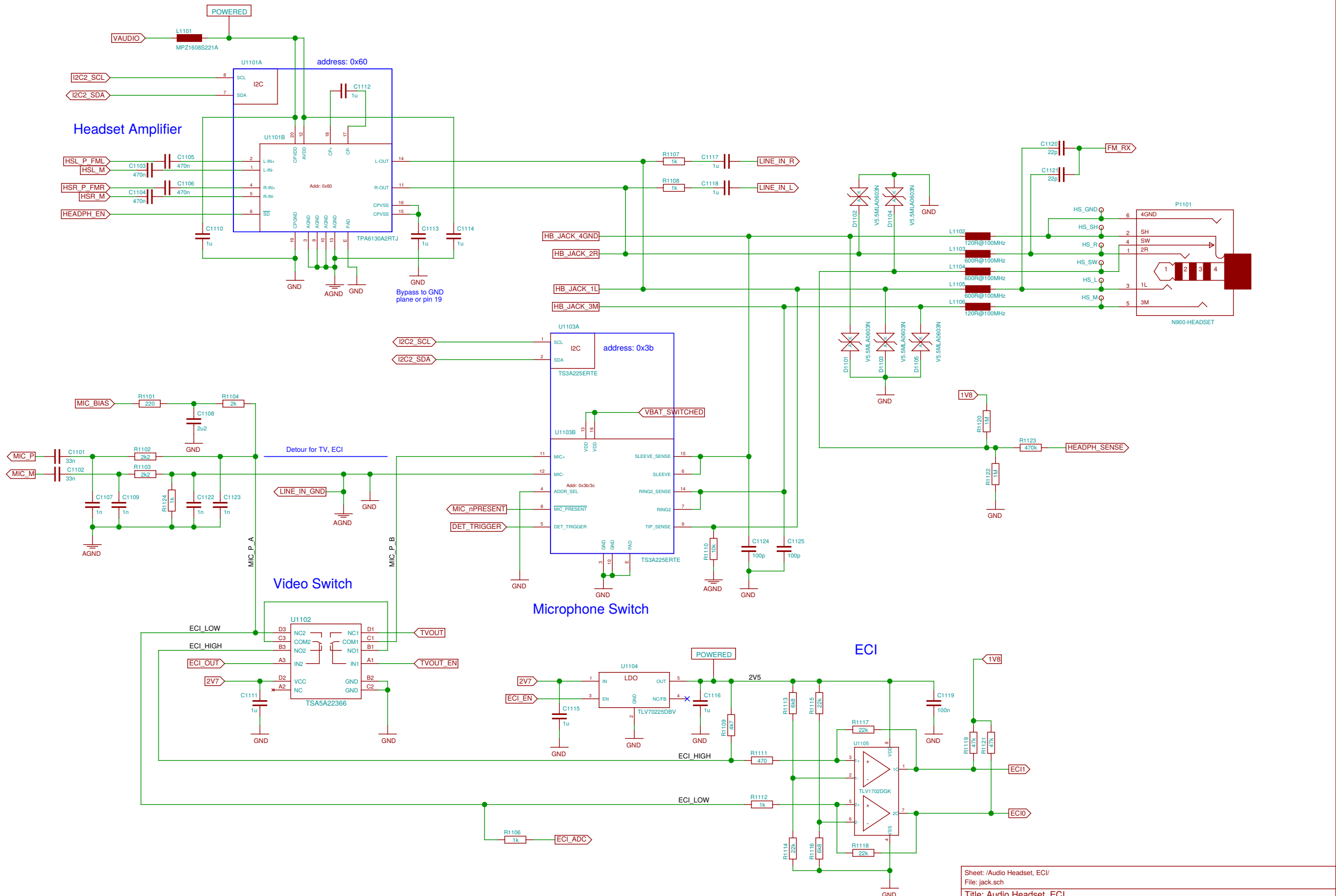


### Slide sensor





Sheet: /Audio Codec/		Date: 2016-11-18 15:49:26	
File: codec.sch		Rev: 1	
Title: Audio Codec		Id: 10/25	
Size: A3	Plotted by eeshow 22/1aa28 2016/12/08-00:03Z		



Sheet: /Audio Headset, ECI/		Date: 2016-12-07 23:55:46	
File: jack.sch		Rev: 1	
Title: Audio Headset, ECI		Plotted by eeshow 221aa28 20161208-00:03Z	
Size: A3	Date: 2016-12-07 23:55:46	Rev: 1	Id: 11/25

## No-Solder Components

N1201  
N900 case assembly

N1202  
N97-CAMERA-HOLE

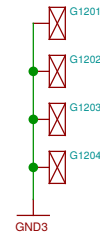
N1205  
headset jack

N1203  
STENCIL-TOP

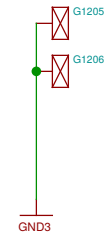
N1204  
STENCIL-BOTTOM

## Shield Contacts on UPPER

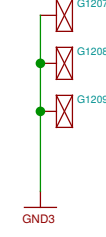
For the display



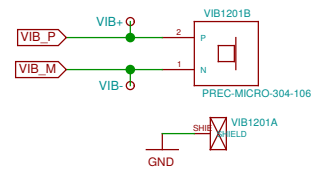
For the key mat



For the "key frame hook"



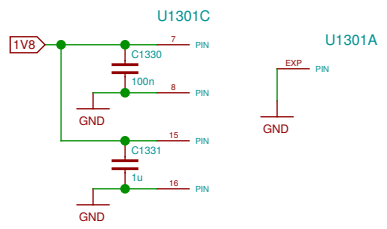
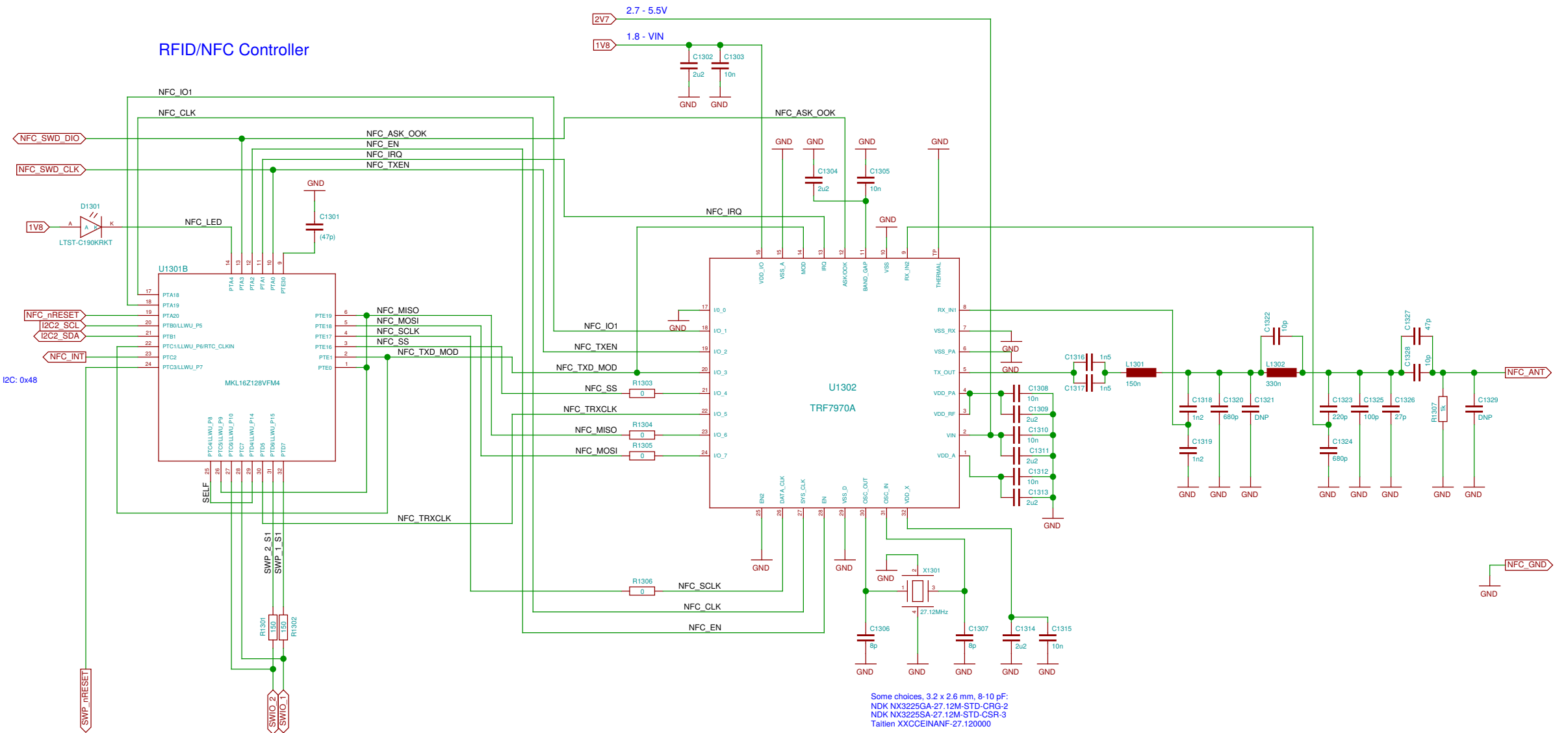
## Vibramotor



Sheet: /Misc/			
File: misc.sch			
Title: Misc			
Size: A3	Date: 2016-11-18 15:49:26	Rev:	
Plotted by eeshow 221aa28 20161208-00:03Z			Id: 12/25

# RFID/NFC Transceiver

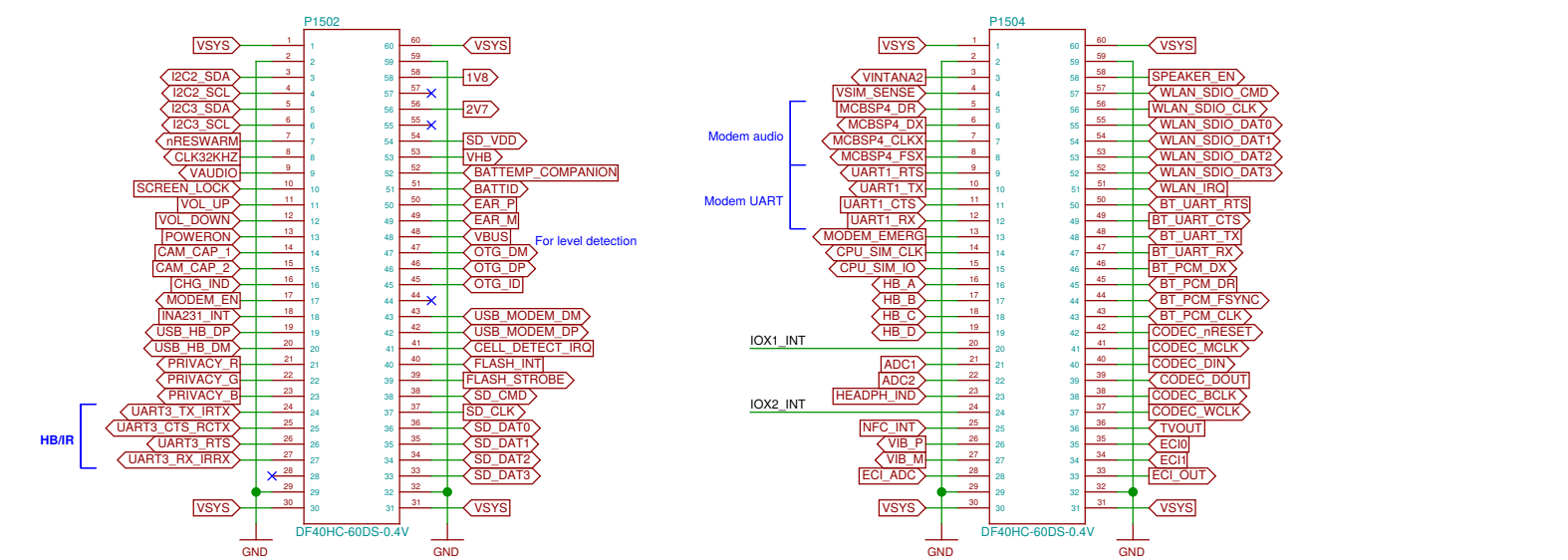
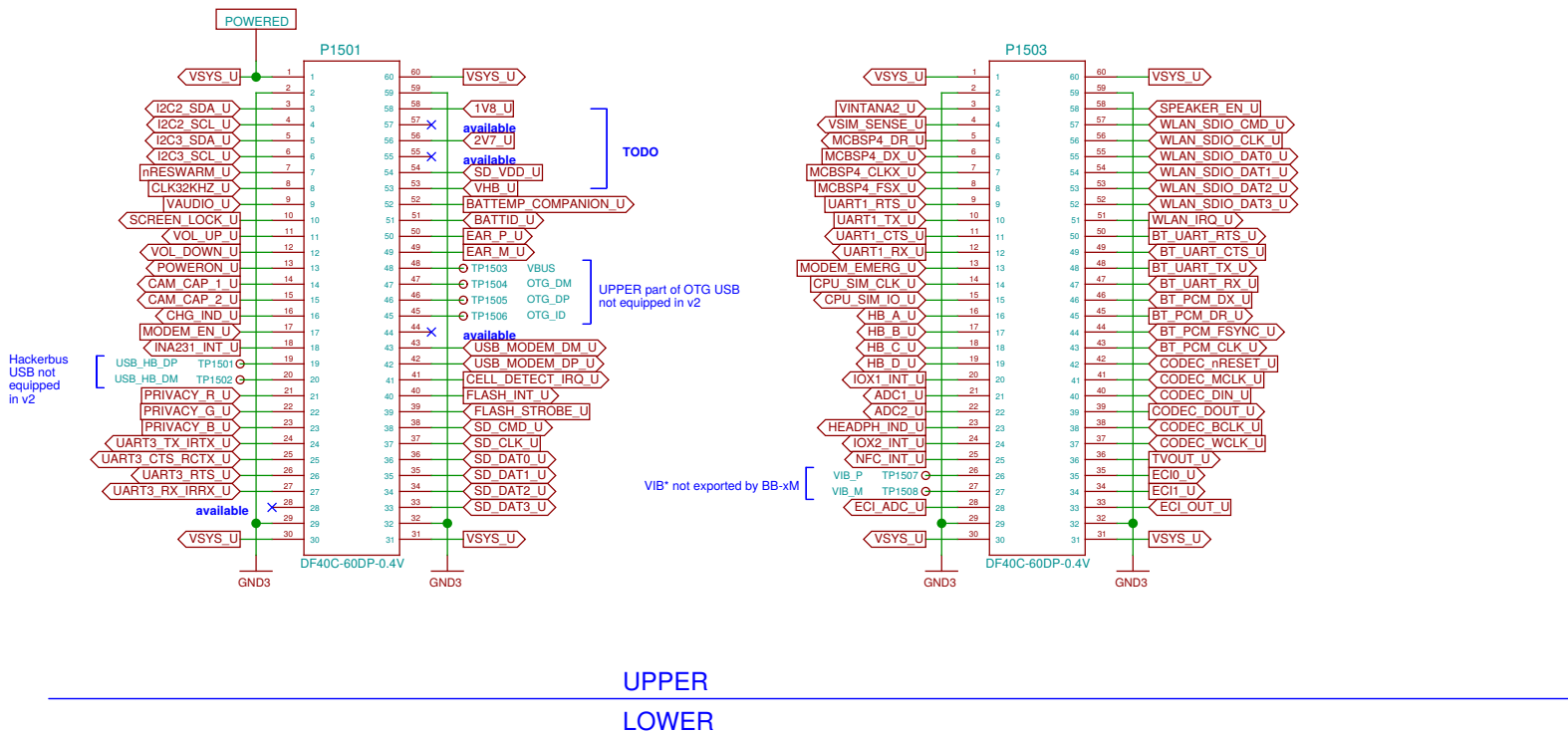
## RFID/NFC Controller



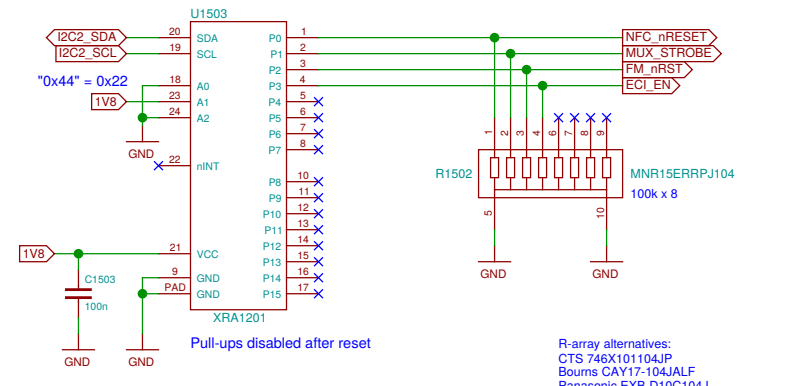
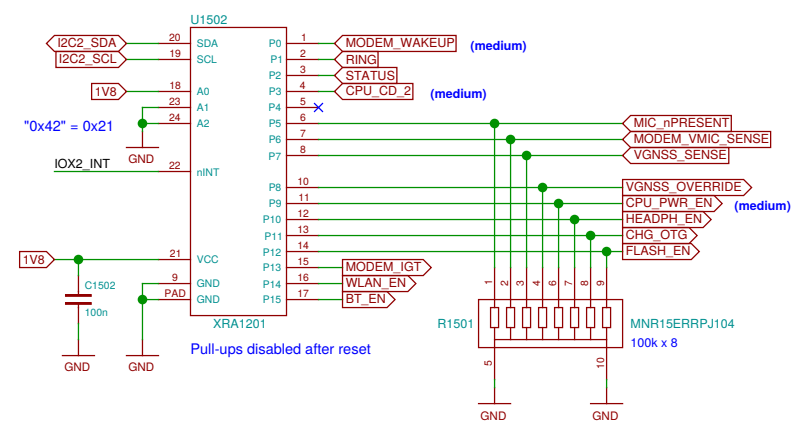
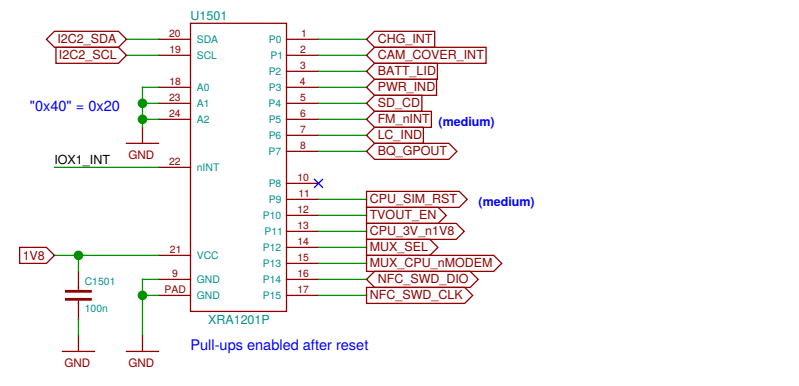
Sheet: /RFID/NFC/		File: nfc.sch	
Title: RFID/NFC			
Size: A3	Date: 2016-12-05 19:39:17	Rev:	
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 13/25	



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



## IO expanders (on LOWER)



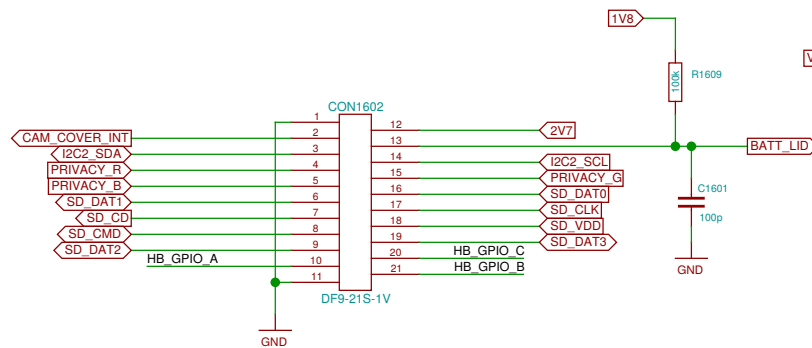
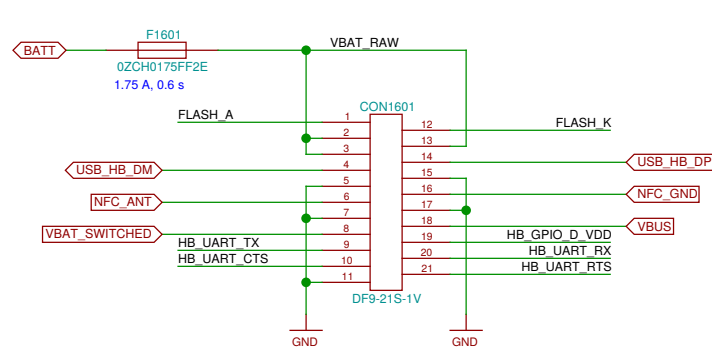
R-array alternatives:  
CTS 746X101104JP  
Bourns CAY17-104JALF  
Panasonic EXB-D10C104J

Current rating per contact: 0.3 A

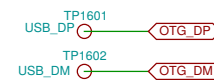
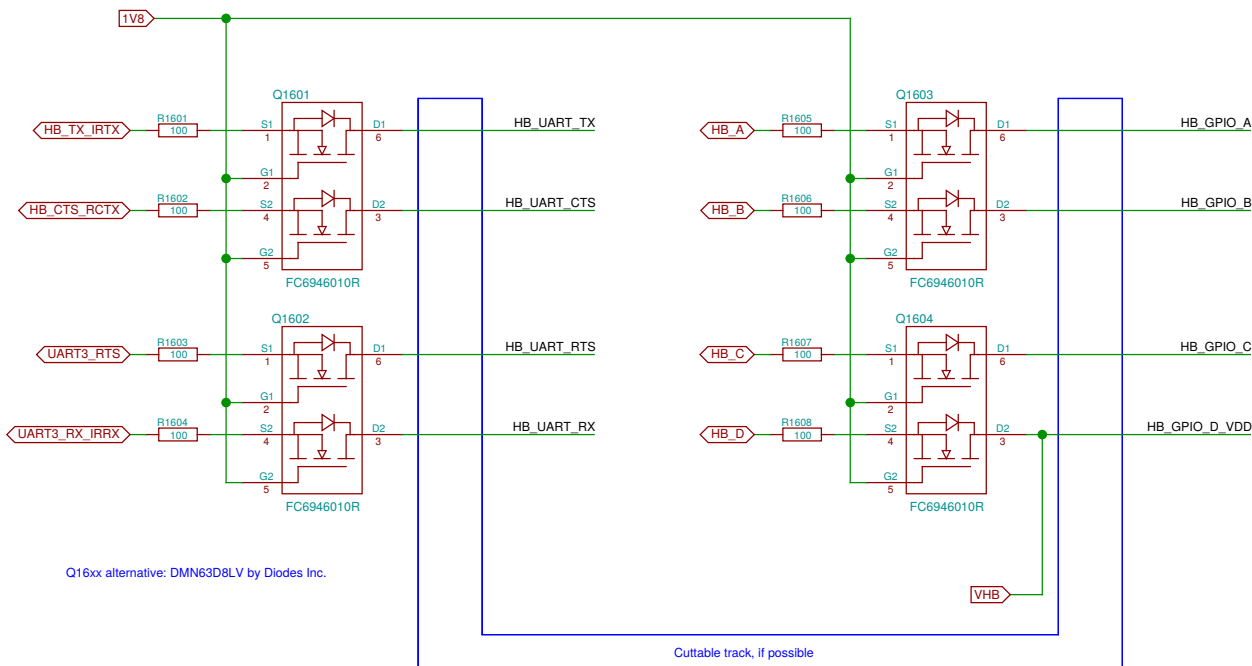
Sheet: /B2B LOWER-UPPER/ File: b2b.sch	
Title: B2B LOWER-UPPER	
Size: A3	Date: 2016-12-10 11:00:21
Plotted by: eeshow 221aa28 20161208-00:03Z	Rev: Id: 15/25

## LOWER-BOB Interconnect (LOWER side)

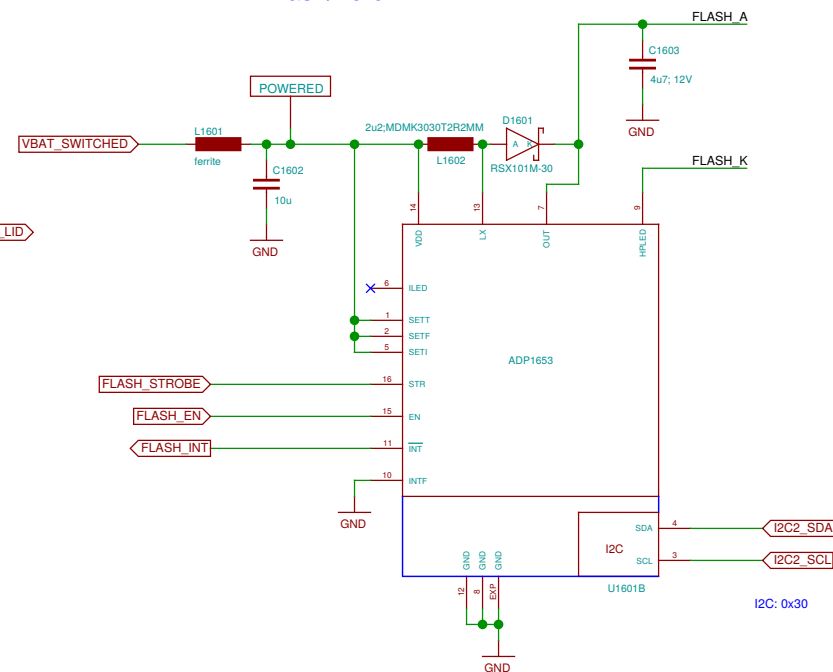
Defined in the Hackerbus specification, <http://neo900.org/stuff/papers/hb.pdf>



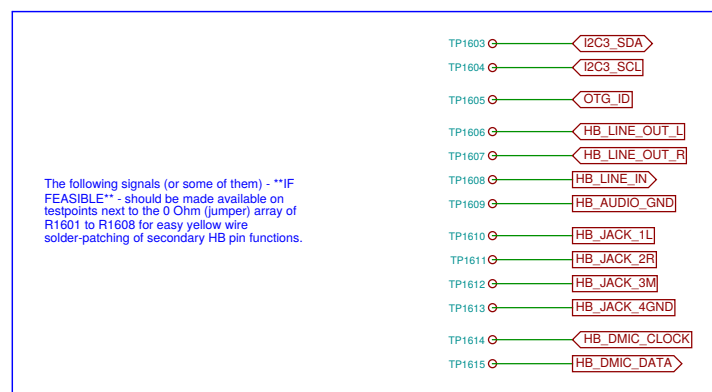
## Level shifters for Hackerbus GPIO and UART



## Flash/Torch

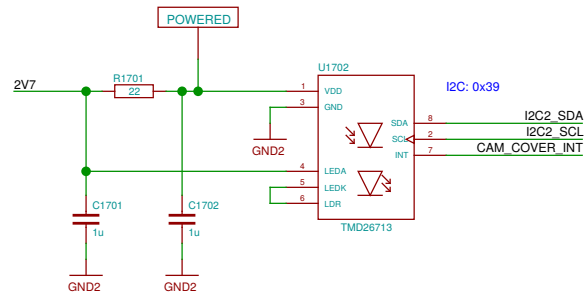


## Patch field

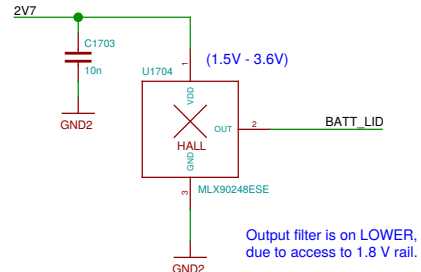




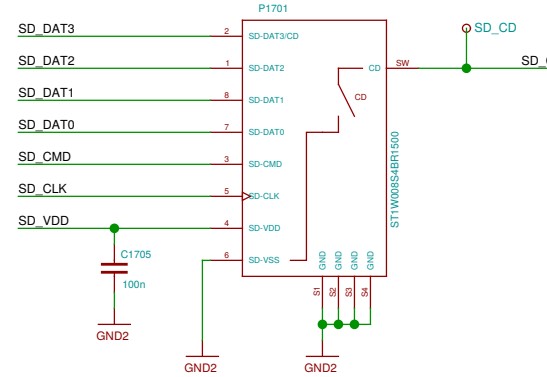
### Camera Cover detect



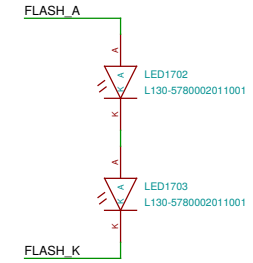
### Battery Cover detect



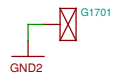
### Memory card holder



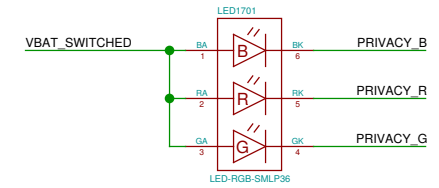
### Camera flash



### Camera lens plate

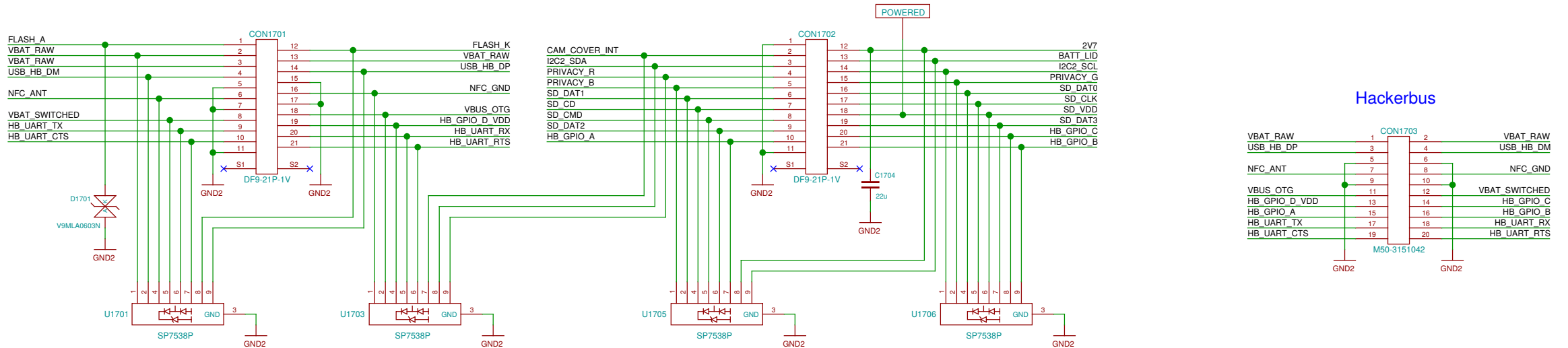


### Privacy LED



### LOWER-BOB Interconnect (BOB side)

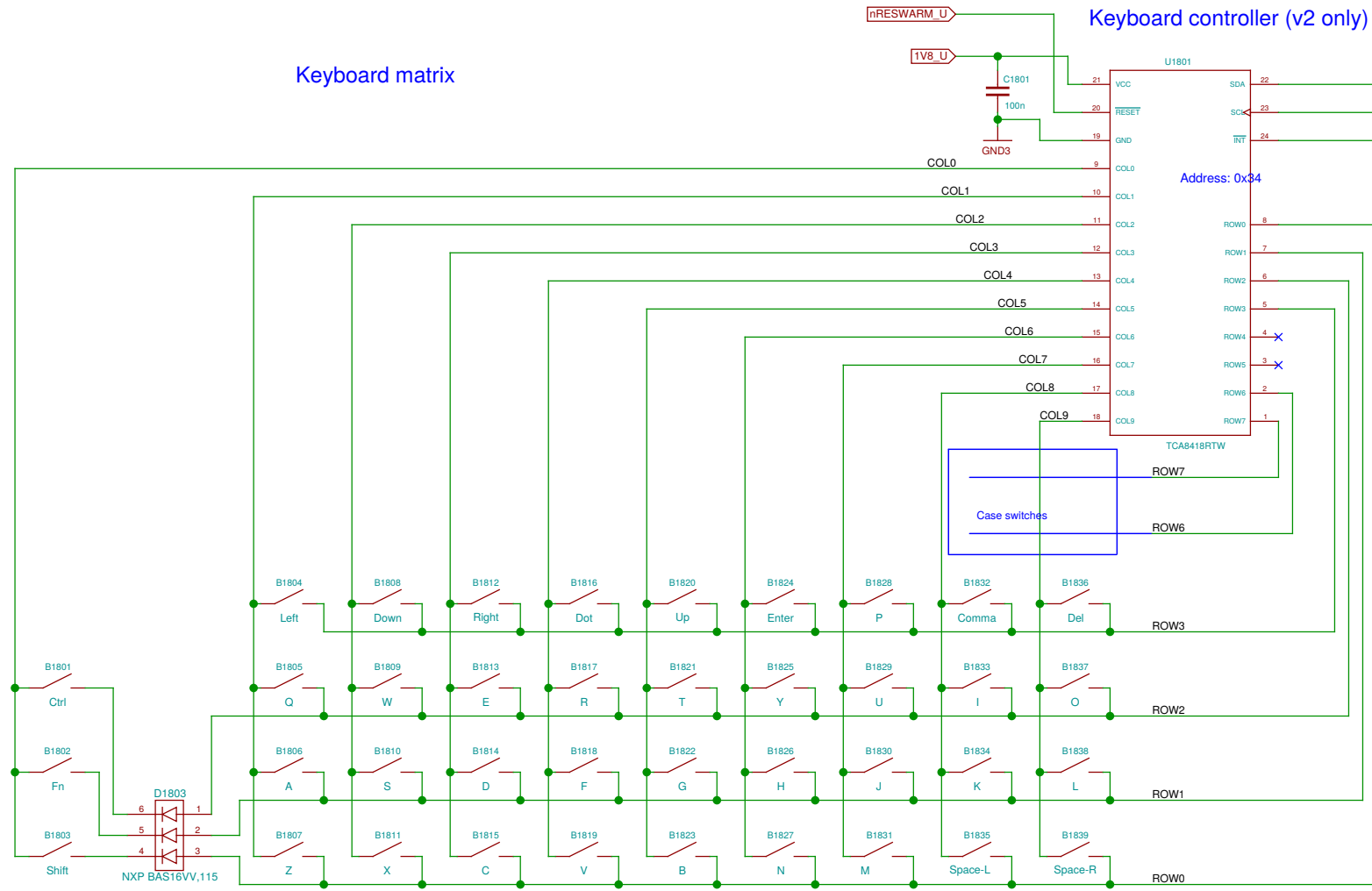
Defined in the Hackbus specification, <http://neo900.org/stuff/papers/hb.pdf>



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

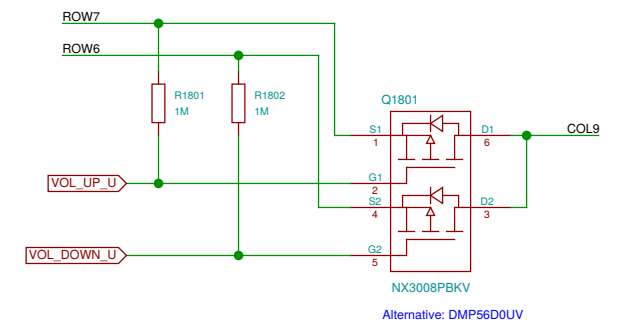
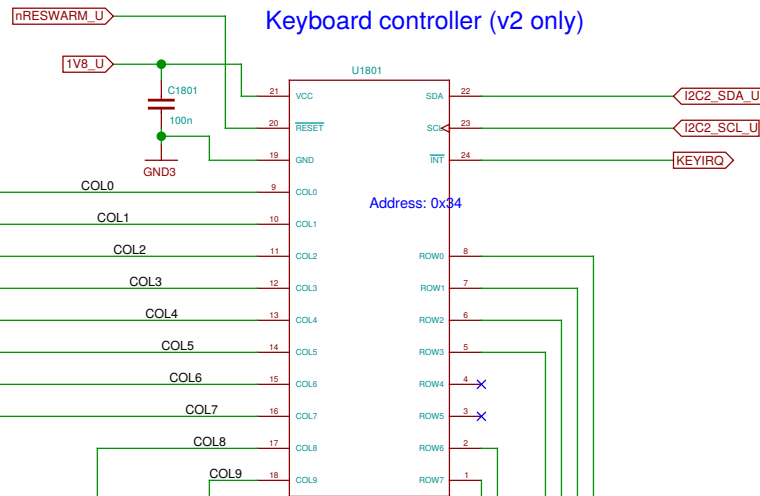
Sheet: /uSD Breakout Board/ File: bob.sch		
Title: uSD Breakout Board		
Size: A3	Date: 2016-11-23 22:26:52	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 17/25

# Keyboard matrix



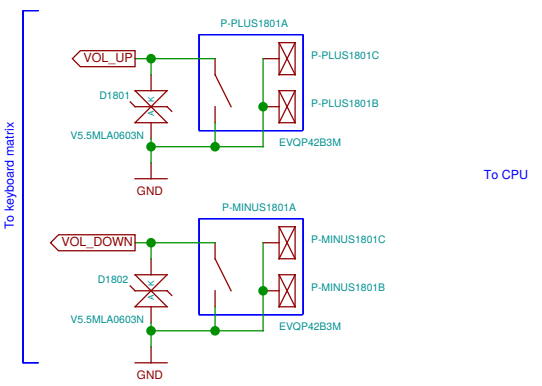
Alternative: Diodes Inc. BAS16VV-7  
Warning: Diodes Inc. have cathodes on pin 1 side, NXP anodes !

# Keyboard controller (v2 only)

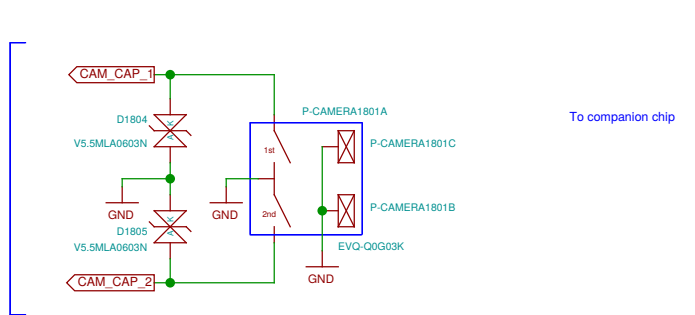


UPPER  
LOWER

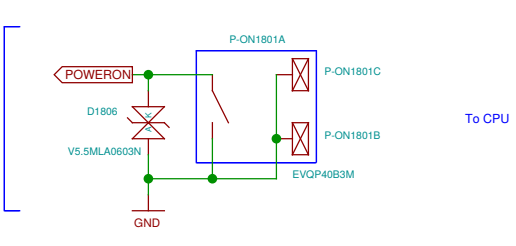
## Volume



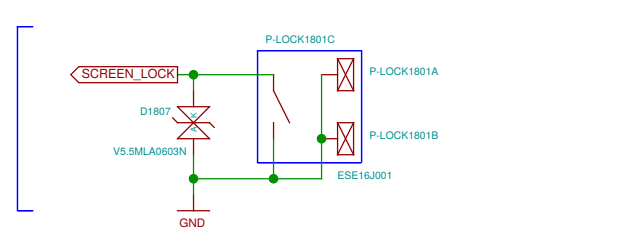
## Camera trigger



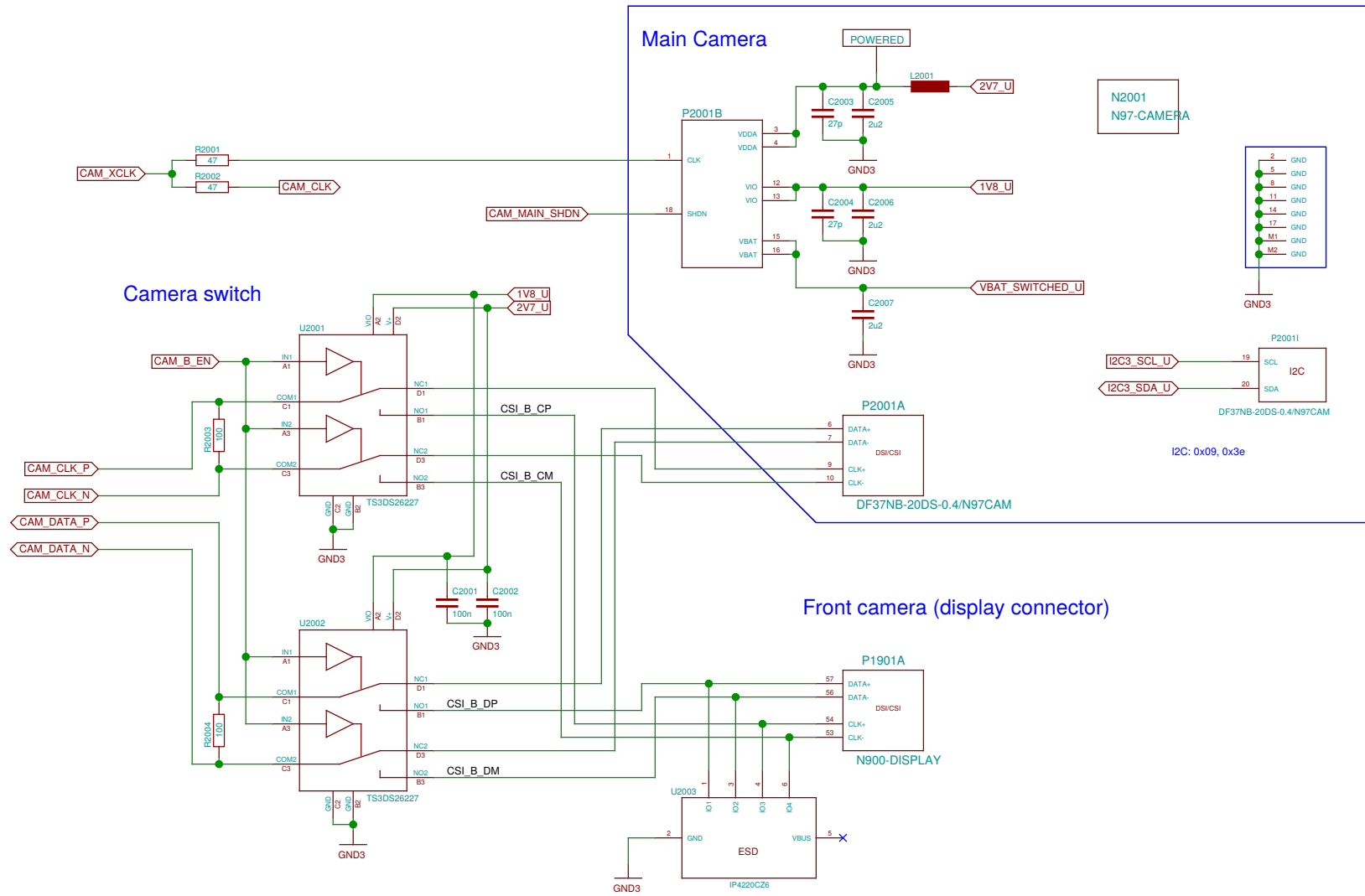
## On-off



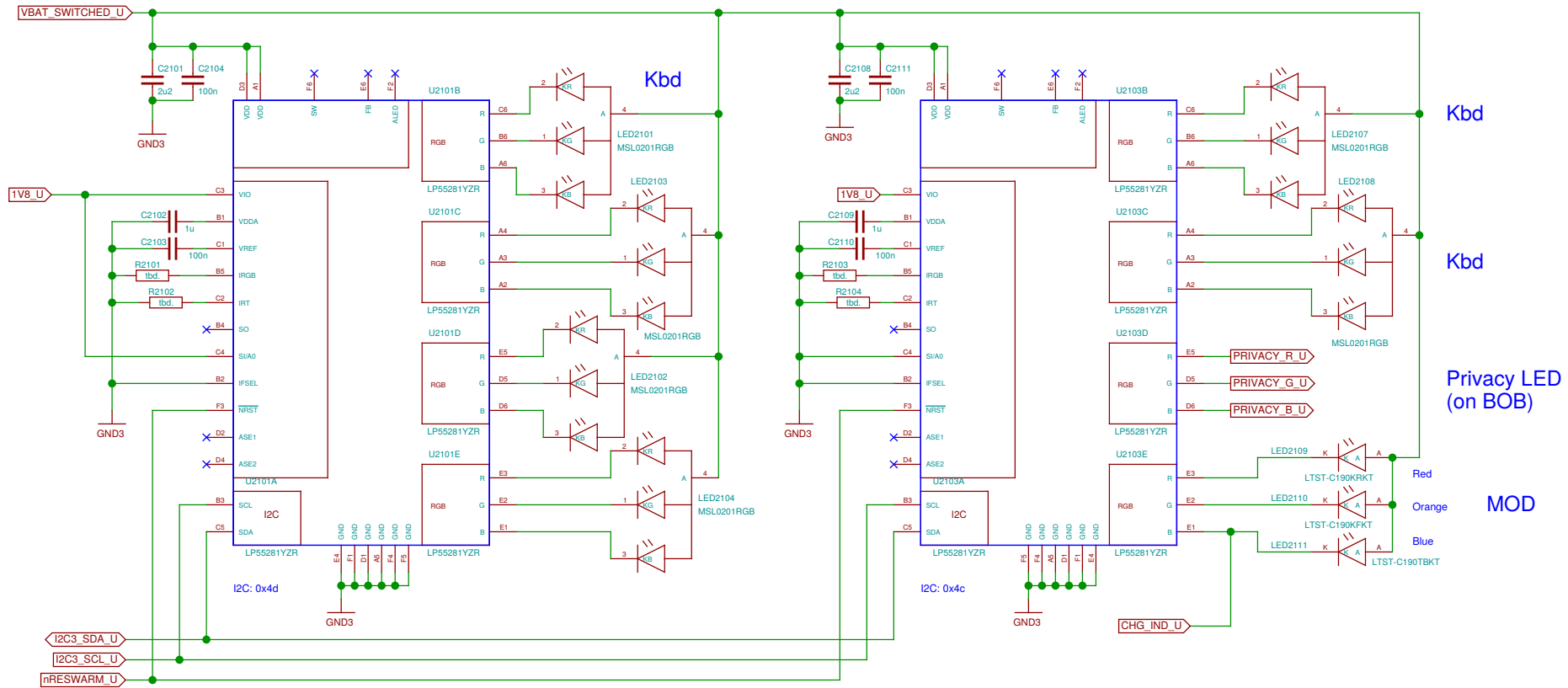
## Lock switch



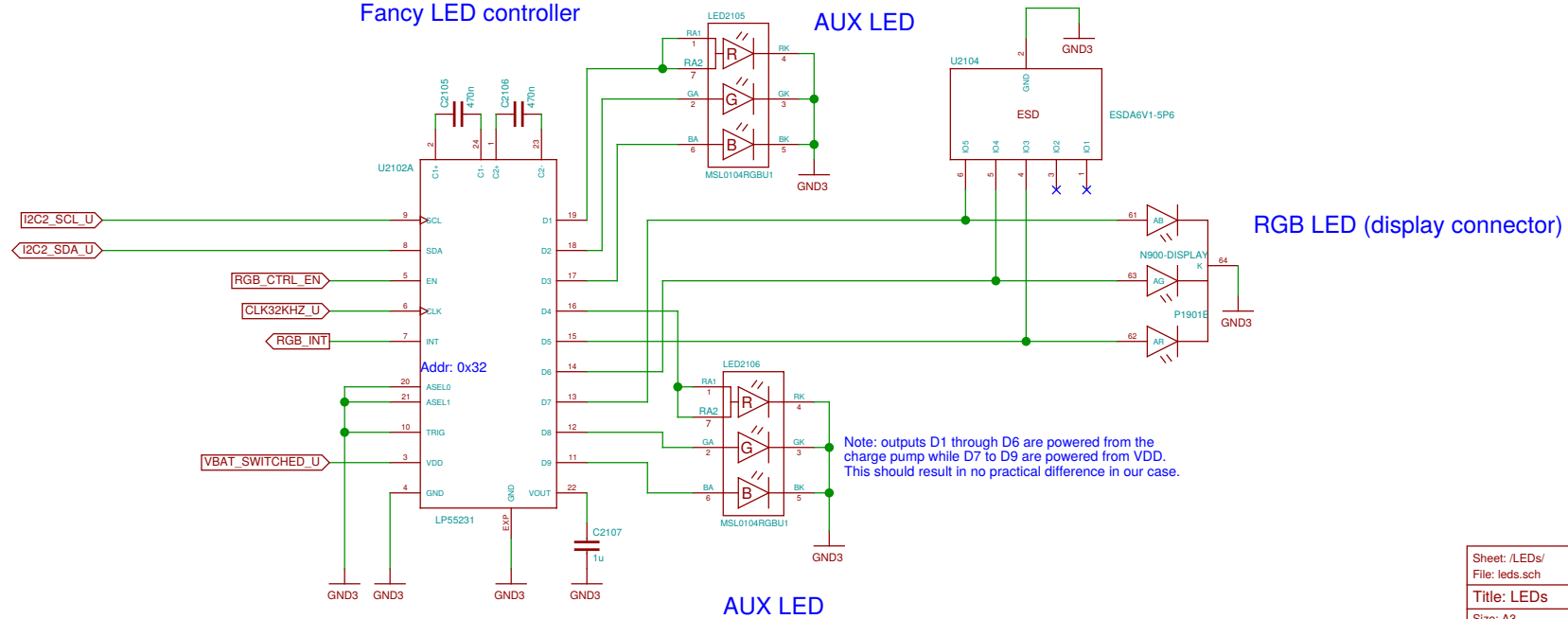




### Basic LED controllers

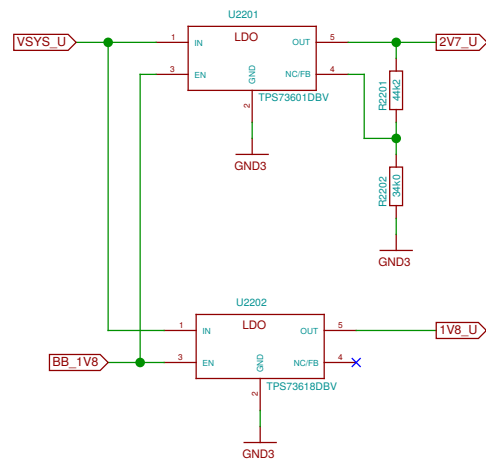


### Fancy LED controller



Sheet: /LEDs/		Date: 2016-11-23 22:26:52	
File: leds.sch		Rev:	
Title: LEDs		Id: 21/25	
Size: A3	Plotted by: eeshow	221aa28	20161208-00:03Z

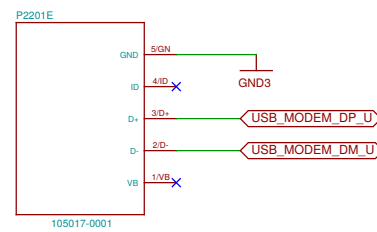
simple capless 400mA LDO for TPS65950 substitute  
(only for prototype)



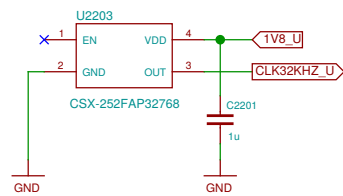
TODO: use REGEN ?

### Modem USB

connect to BB  
by some Micro-USB cable

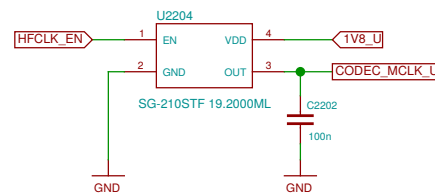


### 32 kHz clock



Alternative: OYKTGLJANF-0.032768

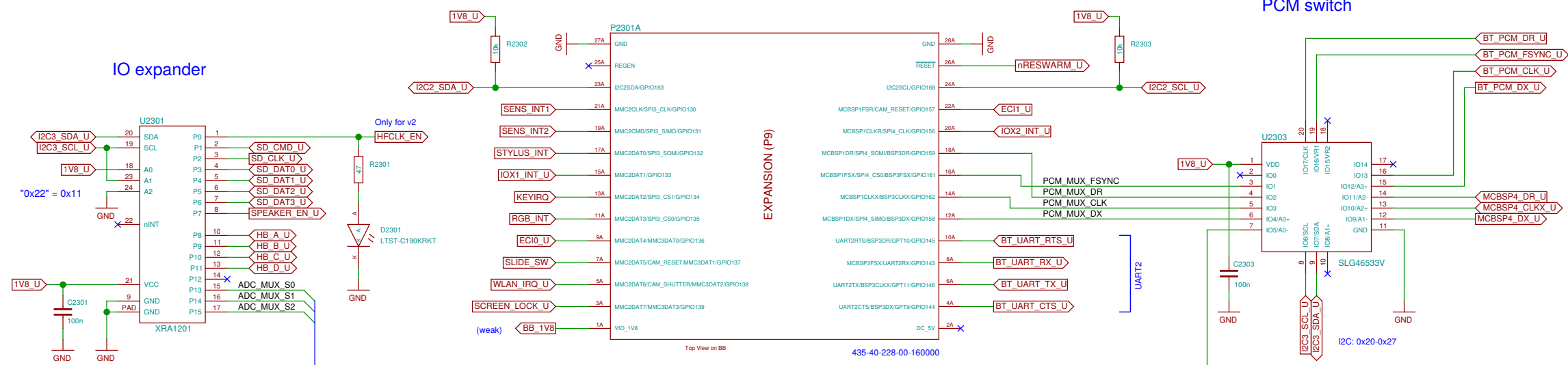
### 19.2 MHz clock



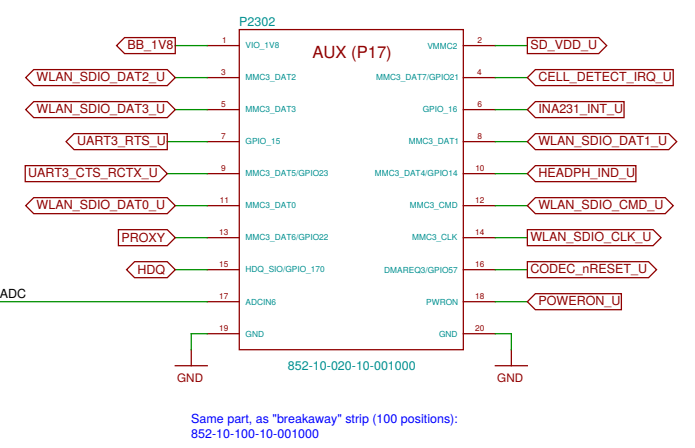
Alternative: KC2520B19.2000C1GE00

Sheet: /Adaptation (v2 only)/		
File: v2.sch		
Title: Adaptation (v2 only)		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 22/25

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



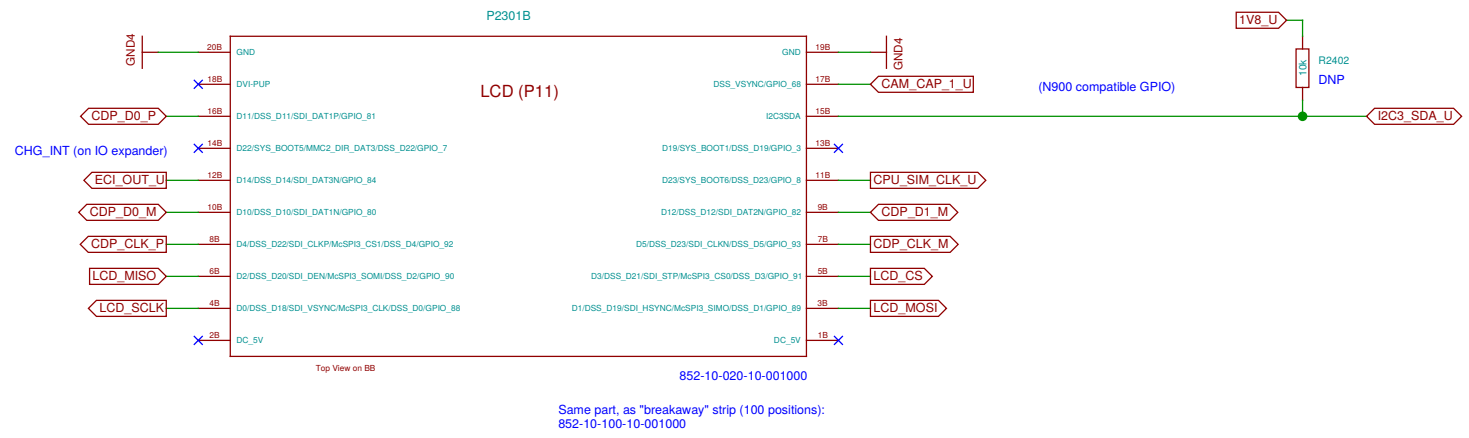
### Auxiliary Expansion Header (P17, 7.26)



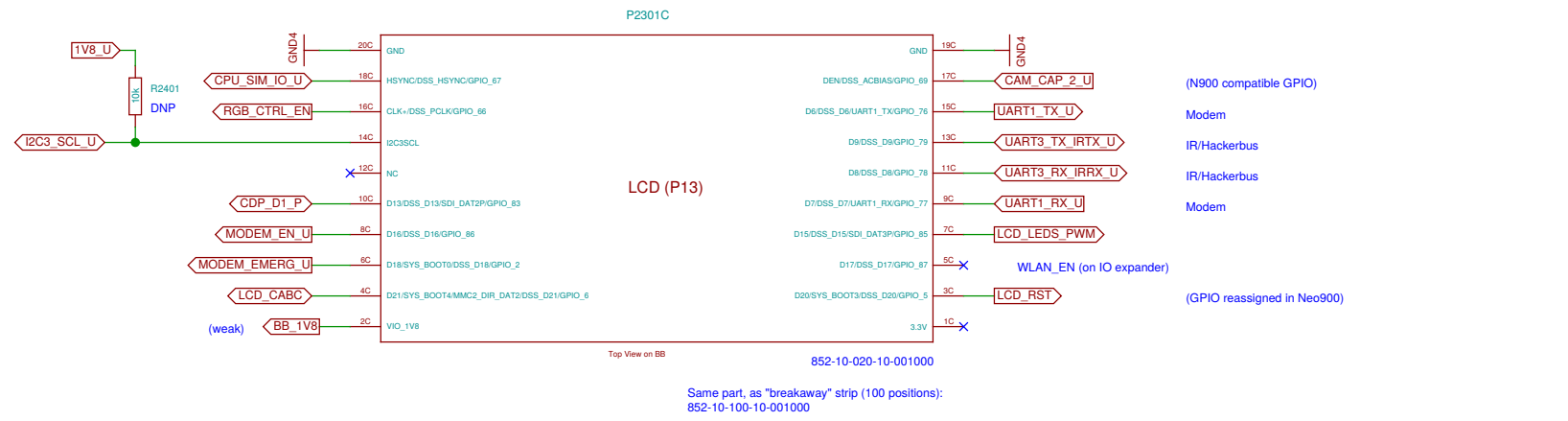
No UART3\_RTS on BB-xM, using GPIO  
 No UART3\_CTS on BB-xM, using GPIO

FM\_nINT (on IO expander)

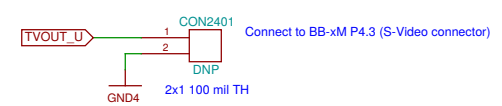
### P11 (7.25)



### P13 (7.25)

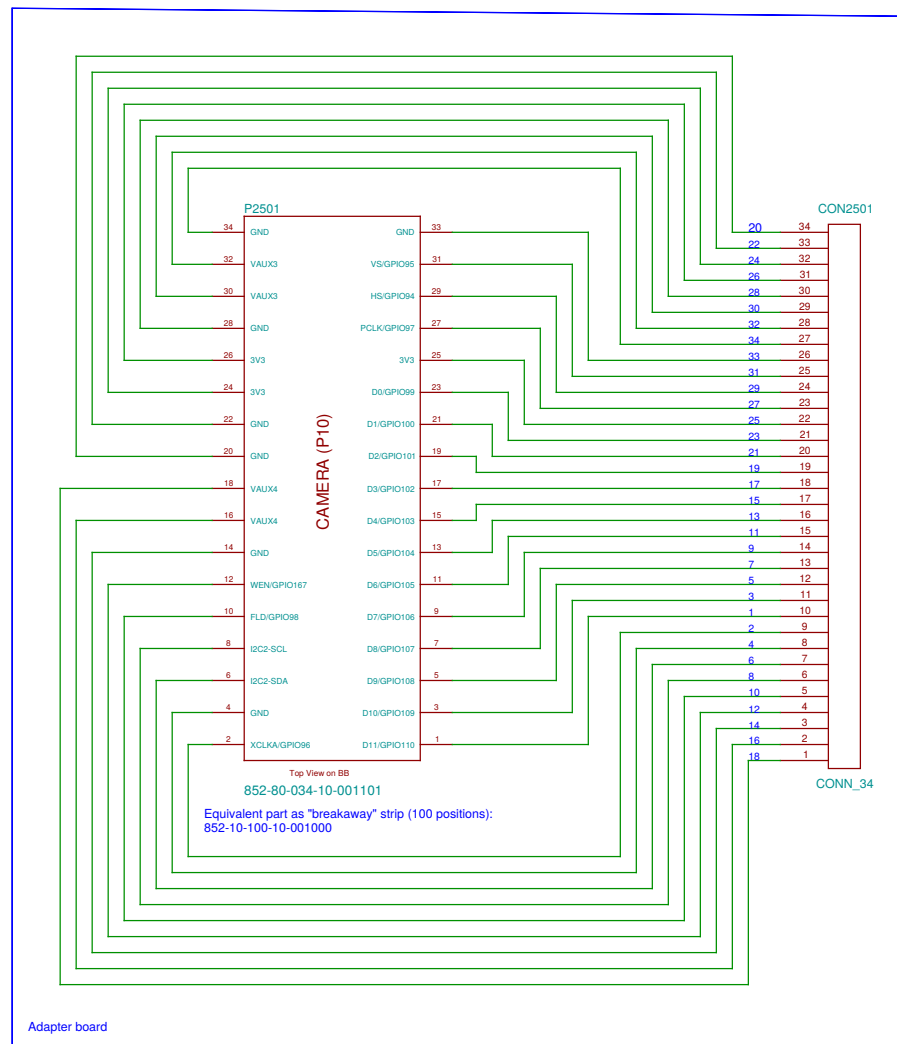


### P4 (7.19)

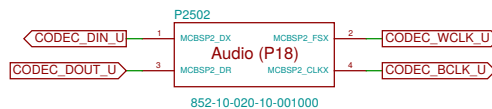
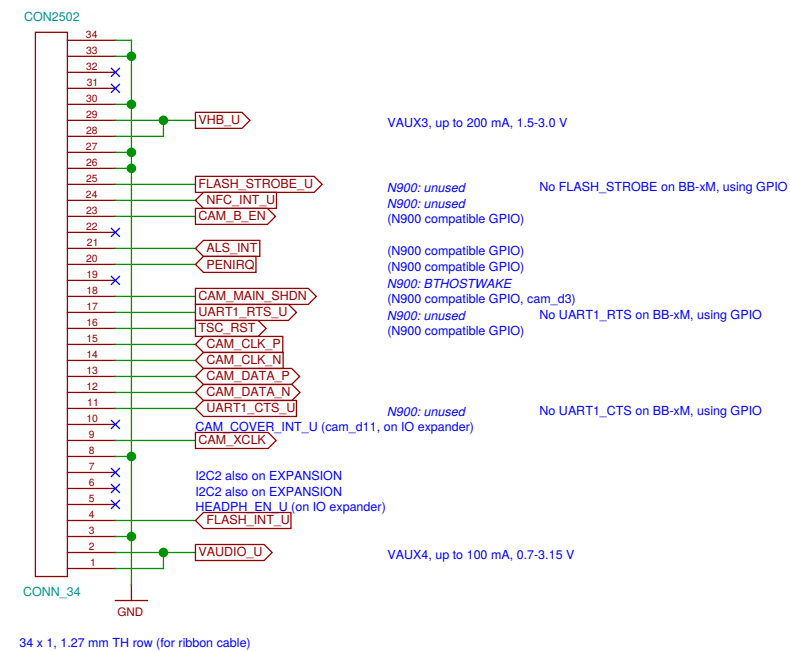




# Processor Camera Port Interface (P10, 7.20.3)



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: 2016-12-03 14:54:41  
Plotted by eeshow 221aa28 20161208-00:03Z

Rev:  
Id: 25/25