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Charger/OTG

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Sheet: Battery



Battery

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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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Audio Codec

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Misc

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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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Display

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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)

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Sheet: BB-xM Adapter (CAM)



BB-xM Adapter (CAM)

File: bbcam.sch

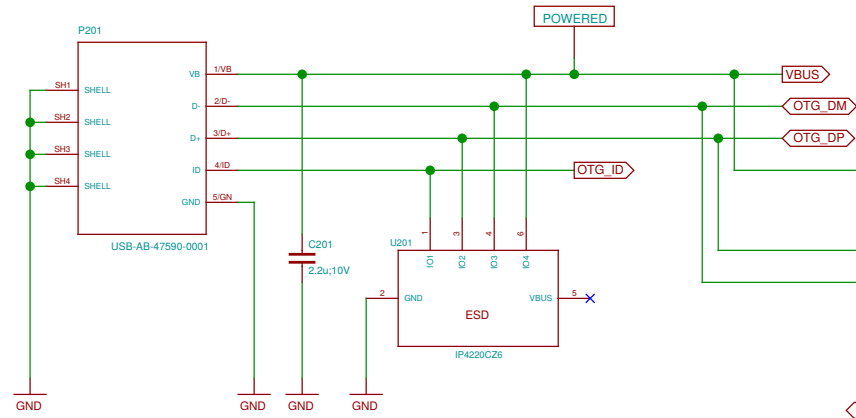
Circuits that exist in the v2 prototype only
and that will not be part of the final design.

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

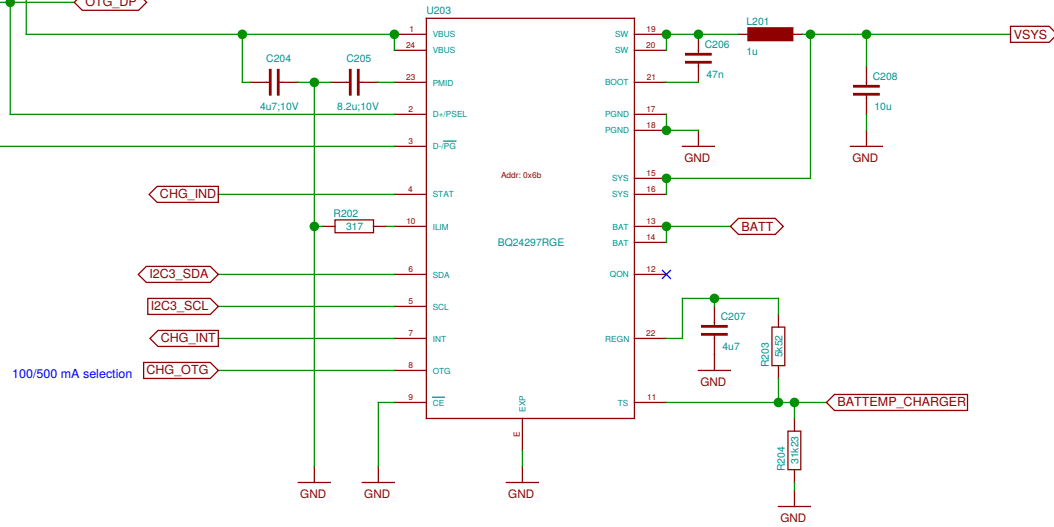
Signals that exist on both LOWER and UPPER (and maybe also BOB)
have a _U suffix on UPPER. No suffix is needed to distinguish
between LOWER and BOB because all BOB components are on
the same sheet and wires connecting them use sheet-local labels.

| | | | |
|--|---------------------------|------|----------|
| 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

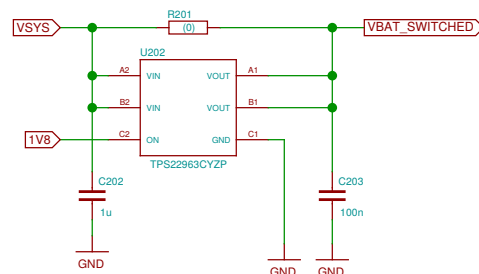


Battery charger with USB OTG

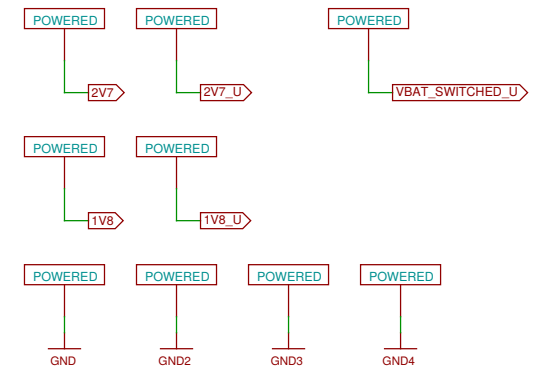


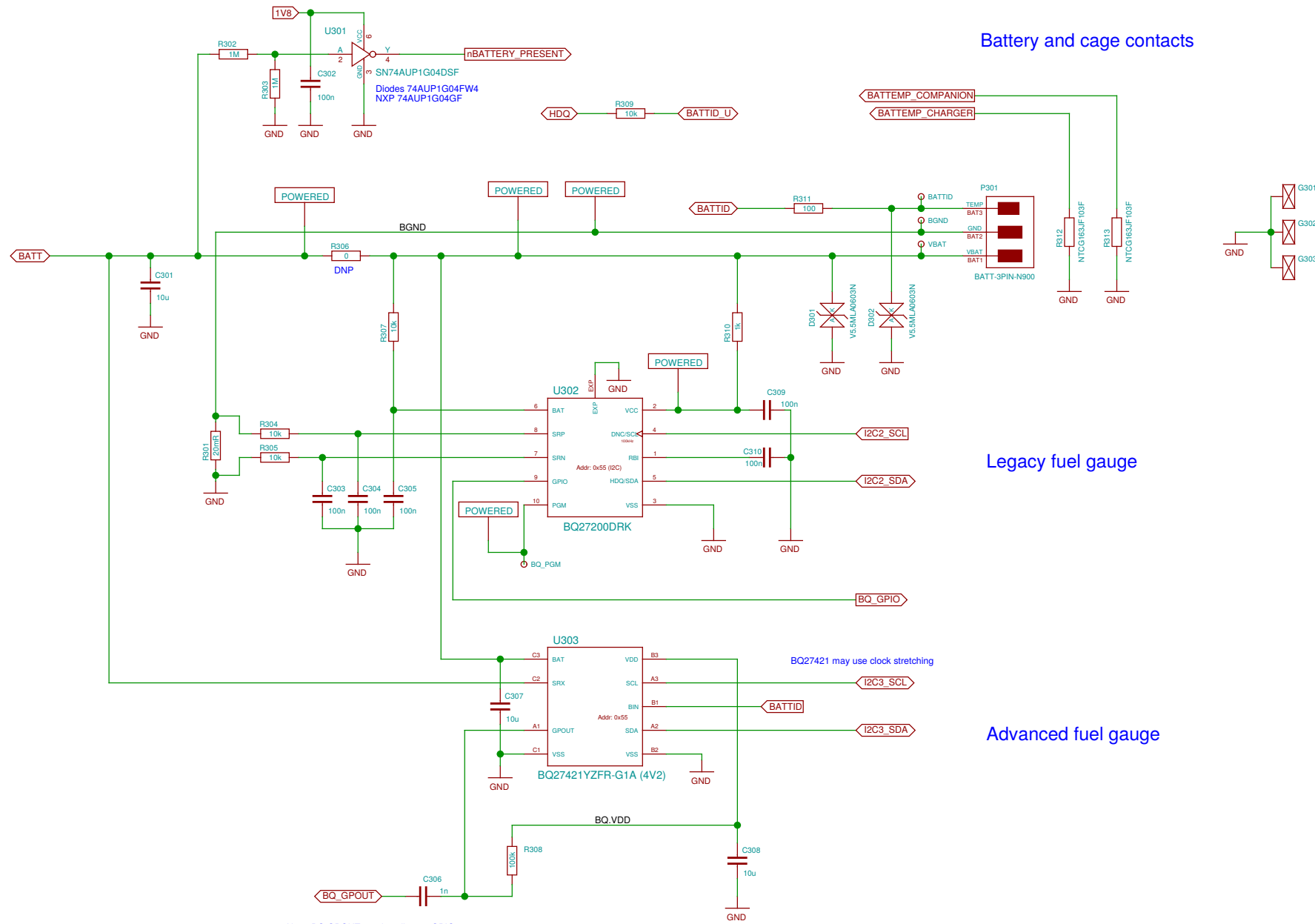
Power distribution and sequencing

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



KiCad bureaucracy





Battery and cage contacts

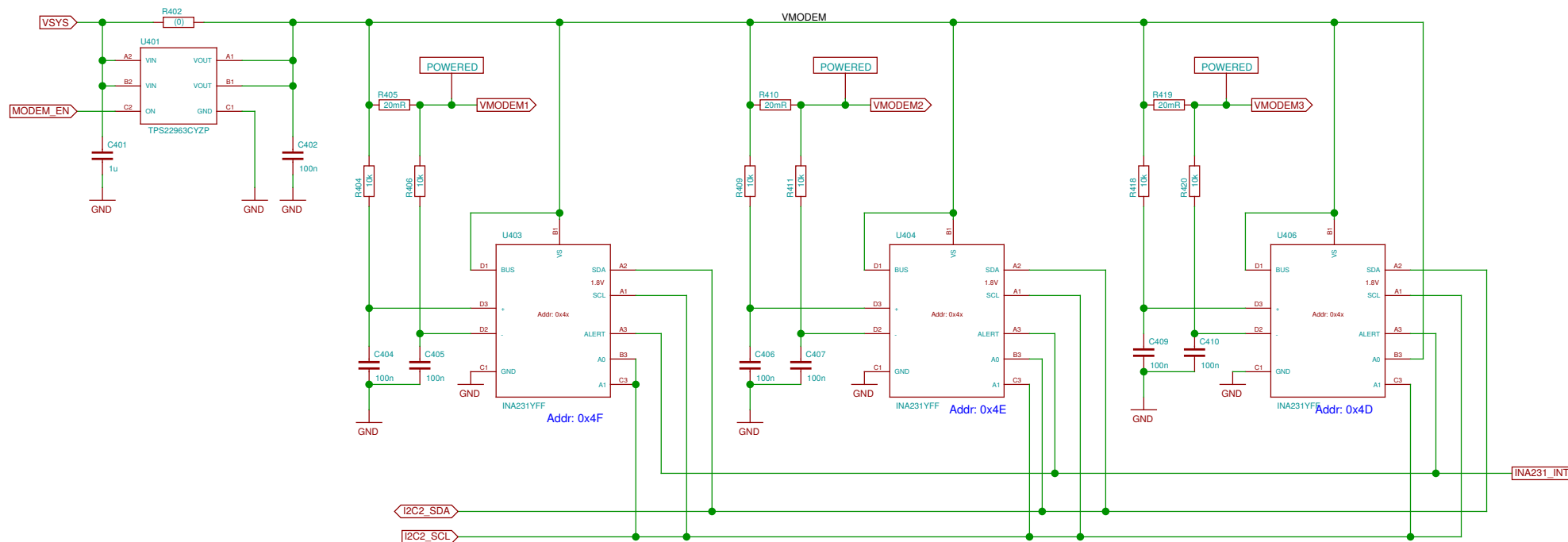
Legacy fuel gauge

Advanced fuel gauge

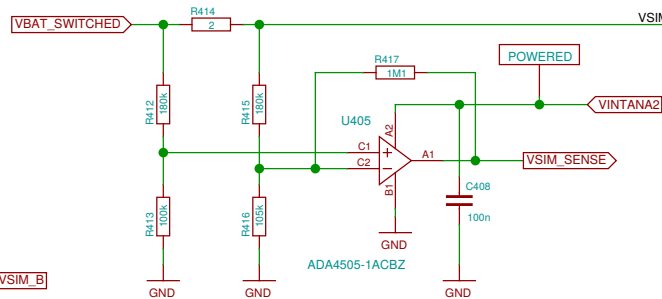
Note: BQ.GPOUT needs pull-up at GPIO.

| | |
|---------------------------------------|---------------------------|
| Sheet: /Battery/ File: battery.sch | |
| Title: Battery | |
| Size: A3 | Date: 2016-11-18 04:02:08 |
| Plotted by: eeshow e90e612* | 20161120-16:10Z |
| Rev: | Id: 3/25 |

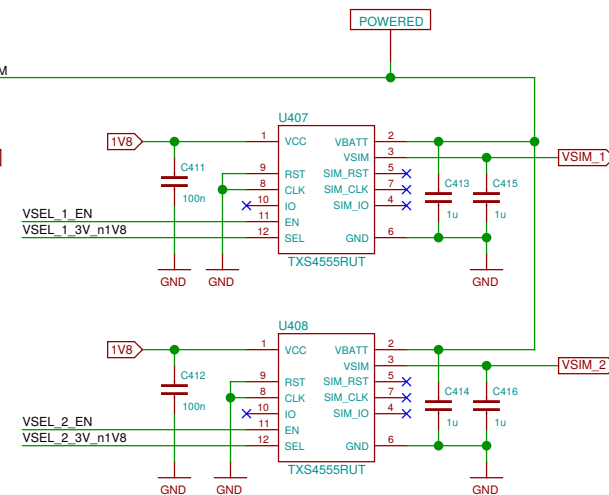
Modem current monitor



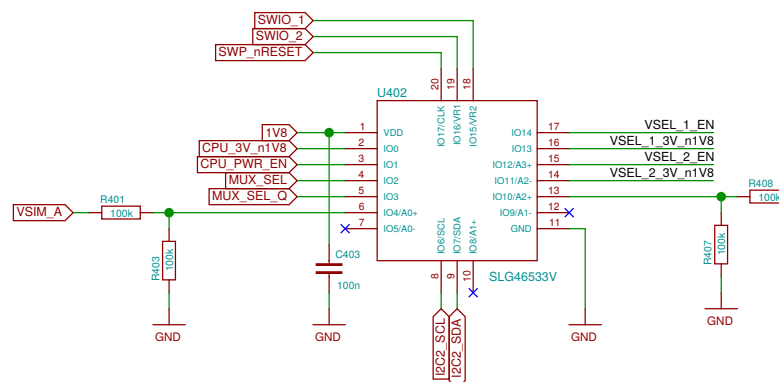
SIM current sensing



SIM power supply

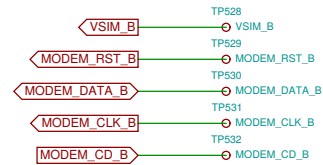


SIM power selection

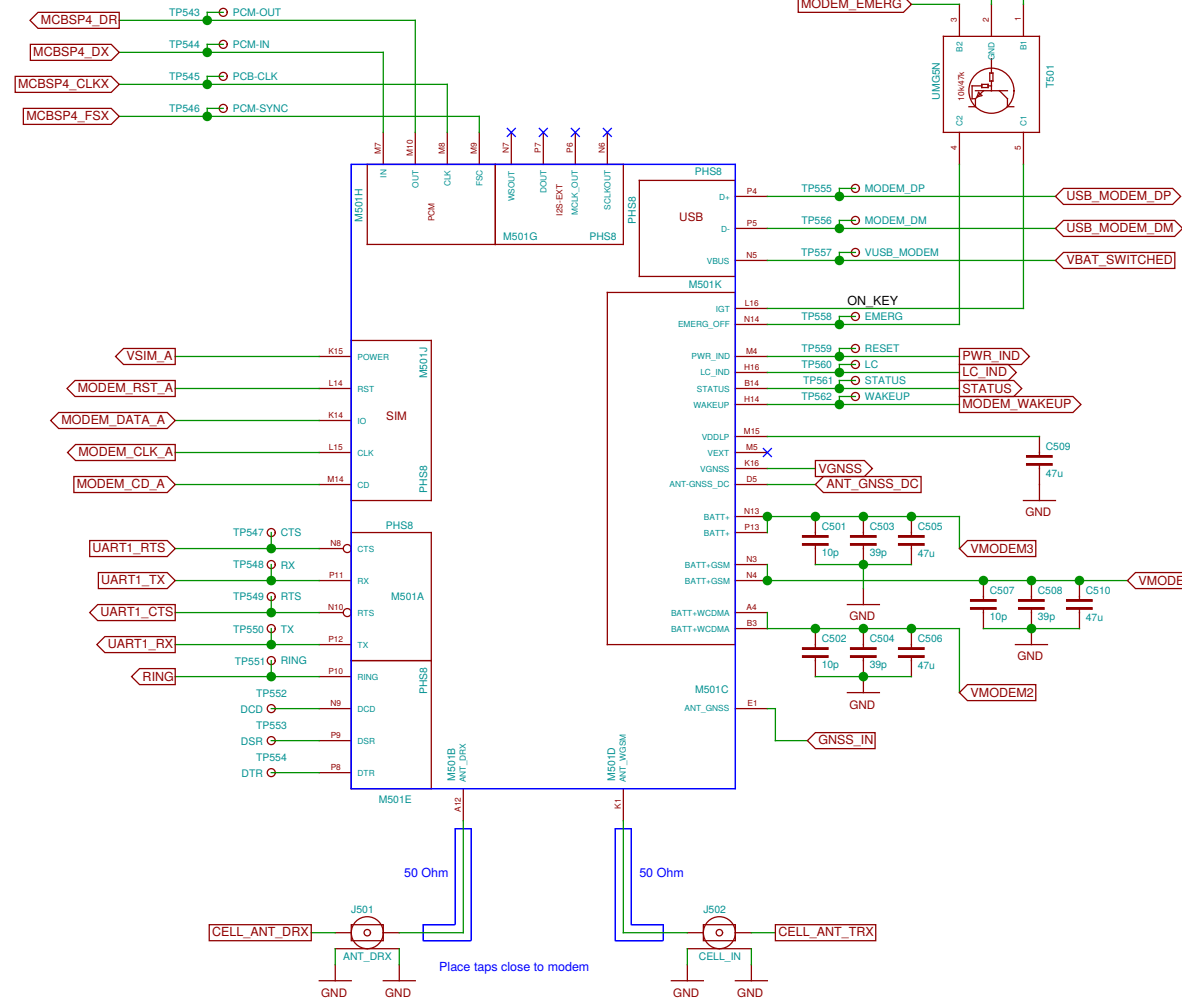


TODO: update SLG design for changed pins

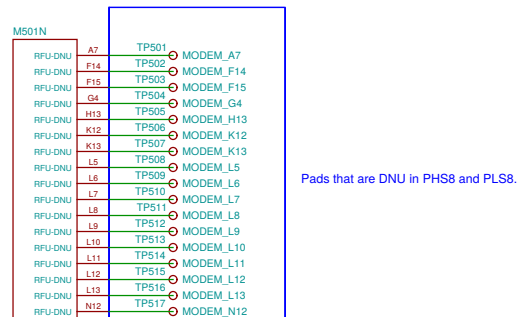
SIM B bus



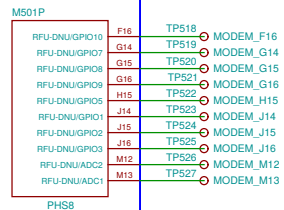
Modem (module)



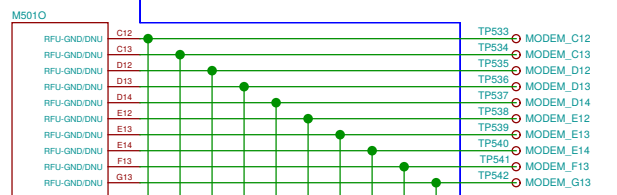
17+10+10 = 37 test points. PCB space permitting, to be arranged in a 6 x 6 + 1 grid with 1.0 mm pitch. This patch field is to be placed adjacent to the SIM B bus test points.



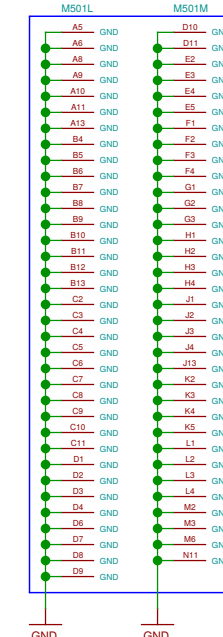
Pads that are DNU in PHS8 and PLS8.



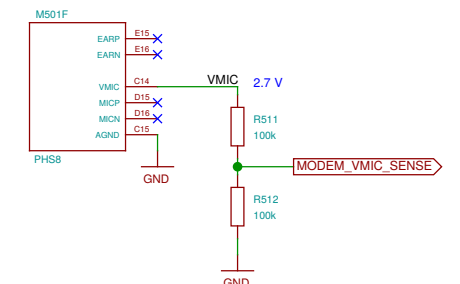
Pads that are DNU in PHS8 but have a GPIO or ADC function assigned to them in PLS8.

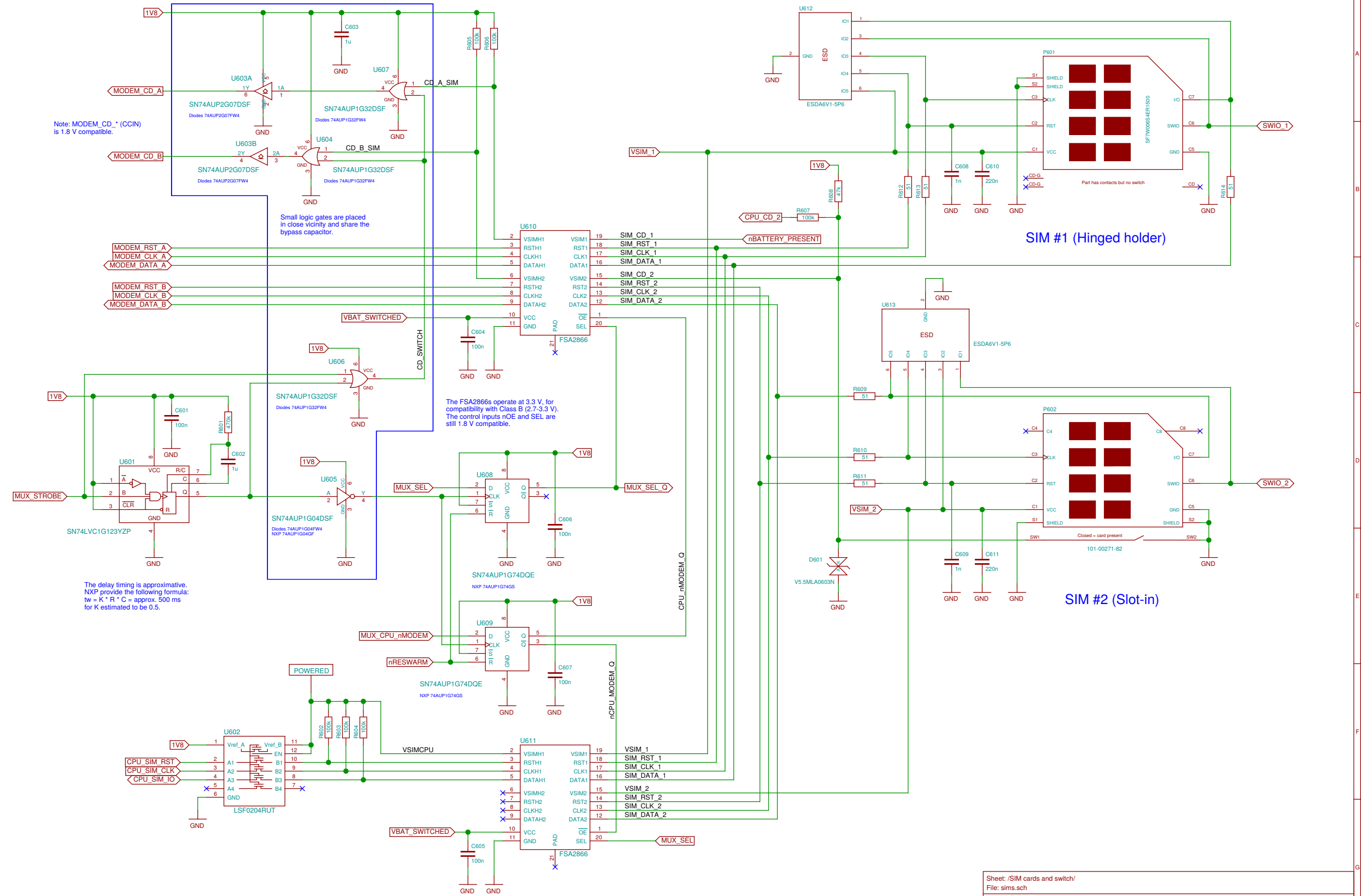


Pads RFU (GND) in PHS8 and RFU (DNU) in PLS8. The resistors indicate cuttable traces.



Anti-eavesdropping





Note: MODEM_CD_* (CCIN) is 1.8 V compatible.

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

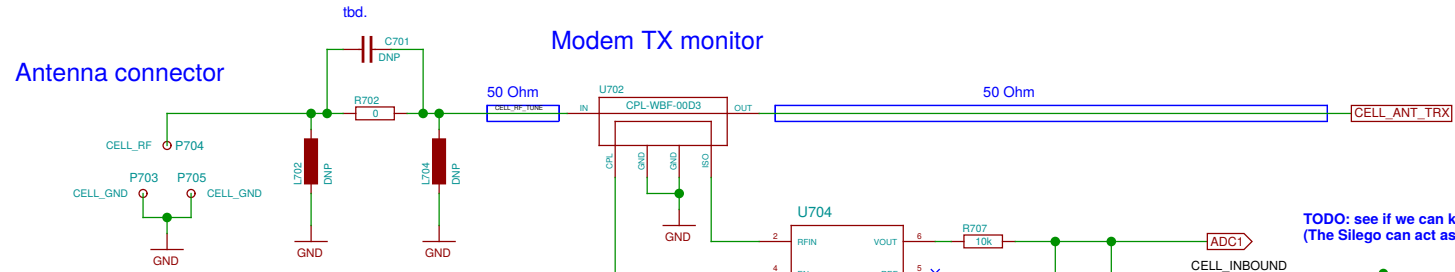
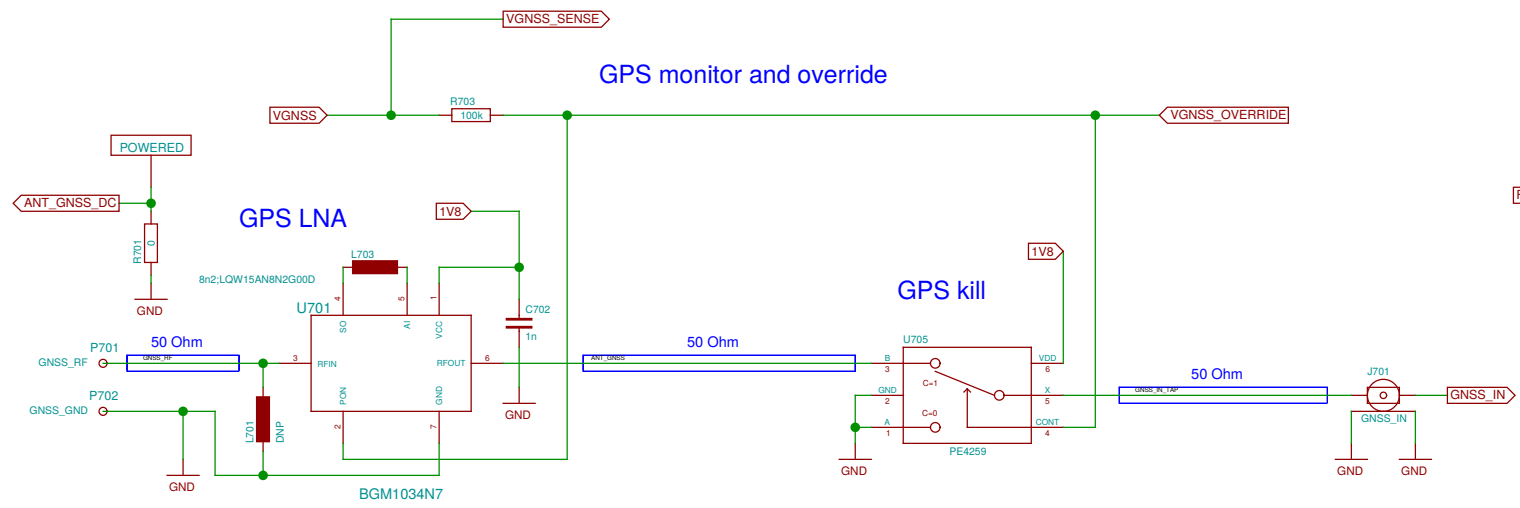
The FSA2866s operate at 3.3 V, for compatibility with Class B (2.7-3.3 V). The control inputs nOE and SEL are still 1.8 V compatible.

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)

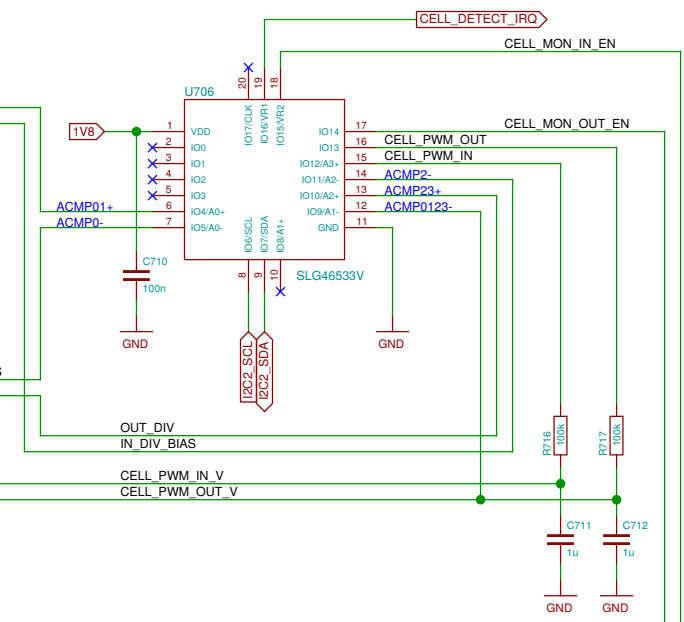
SIM #2 (Slot-in)

| | | |
|--|---------------------------|-----------|
| Sheet: /SIM cards and switch/ File: sim.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 | | |



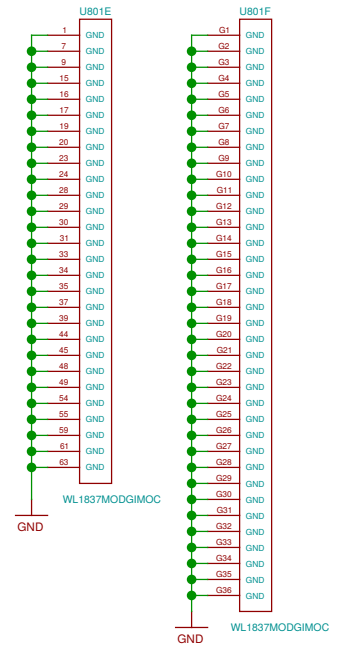
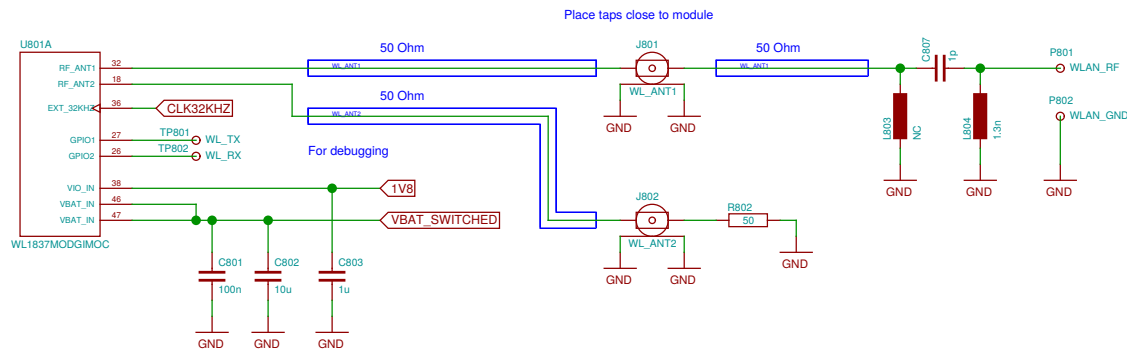
The RC filter should have C large enough to hold a charge in pulsed operation, yet be fast enough to detect short activity. With 10 kOhm and 1 nF, we get about 16 kHz.

TODO: see if we can keep ADC1 and ADC2. (The Silago can act as ADC by varying the PWM voltages.)

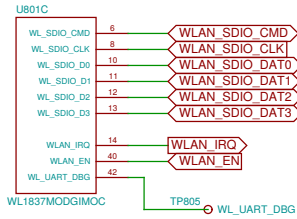


TODO: assign footprints for c-spring contacts

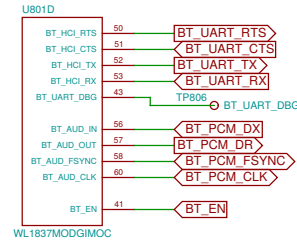
WLAN/BT antenna



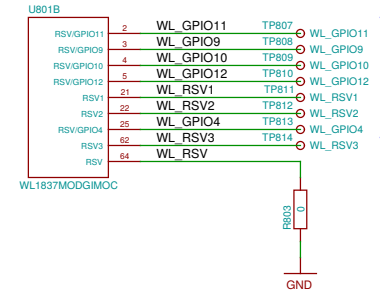
WLAN



Bluetooth

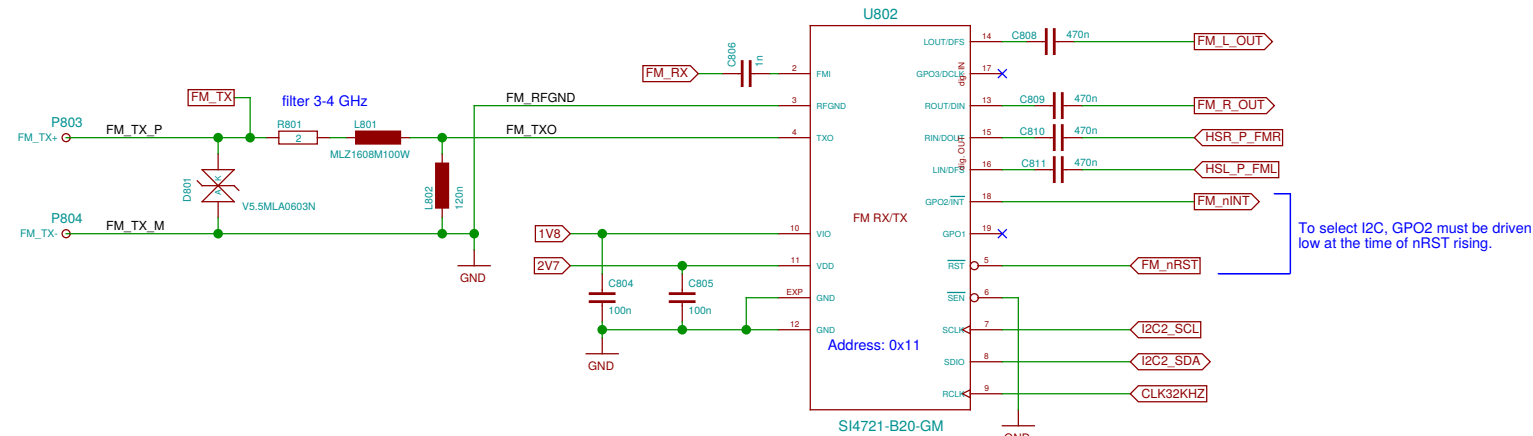


Reserved / Debugging



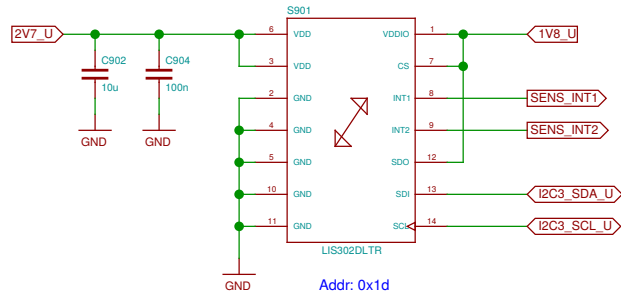
FM Radio (TX/RX)

FM TX antenna

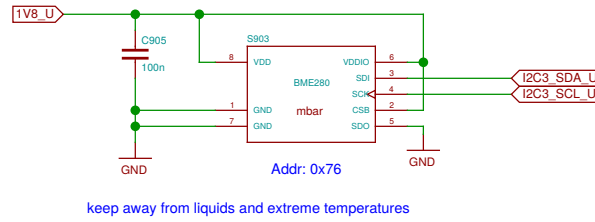


SI4705 is pin compatible (mostly) but RX-only

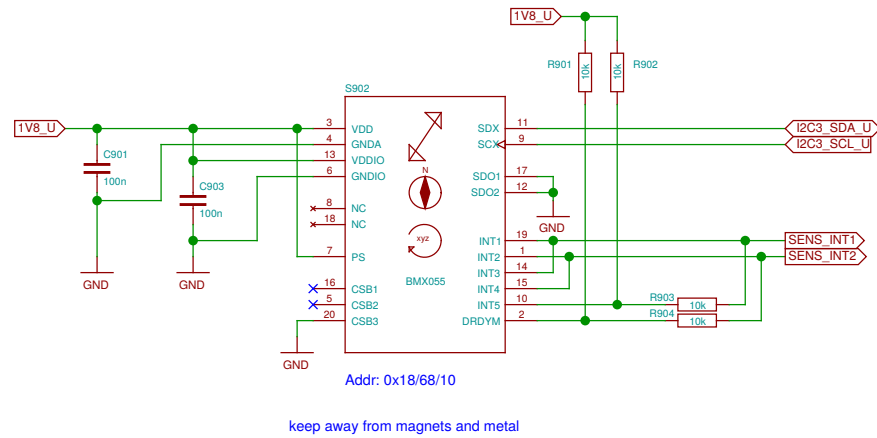
Acceleration (legacy)



Pressure, humidity

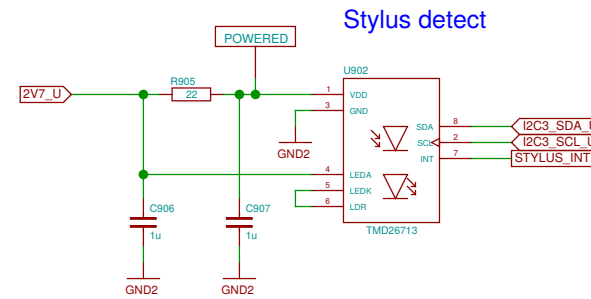


9-axis (acceleration, gyroscope, magnetometer)

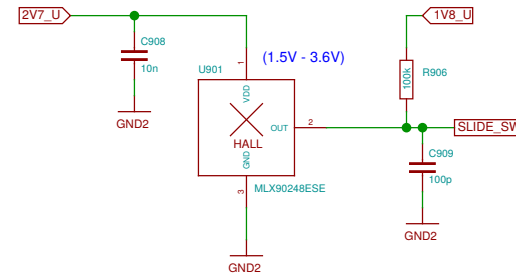


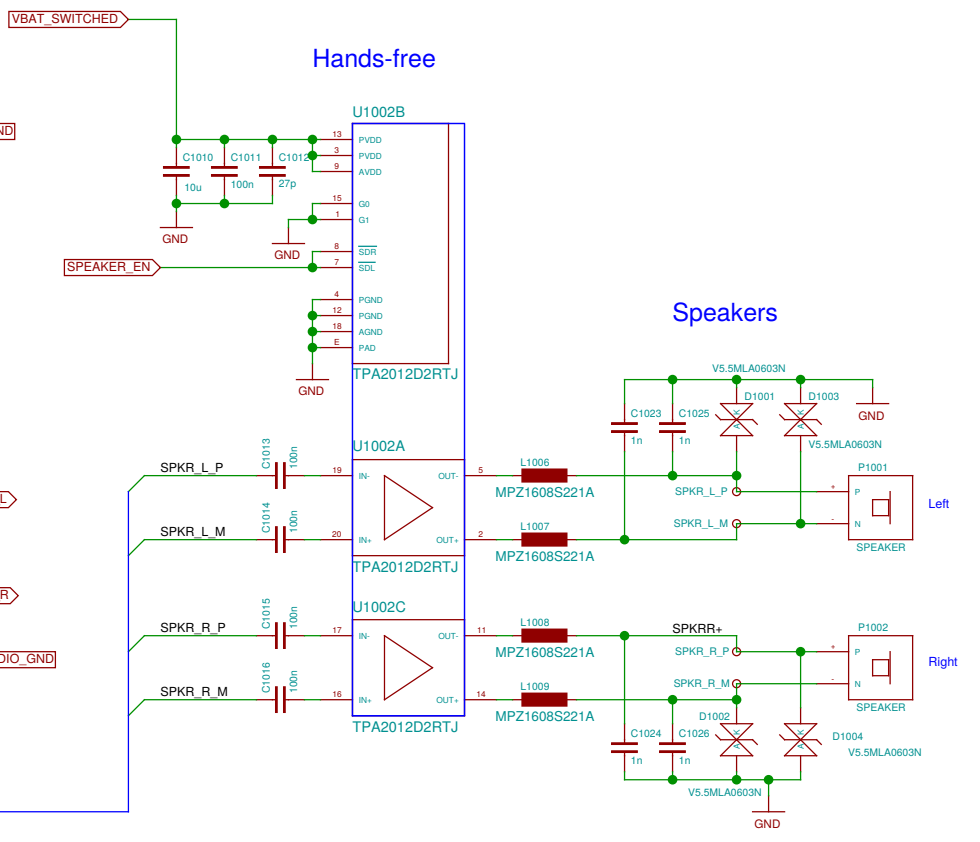
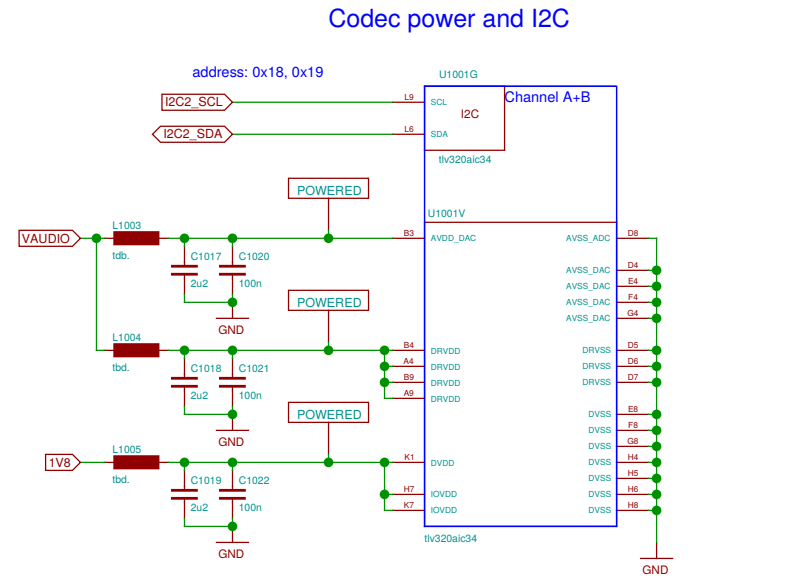
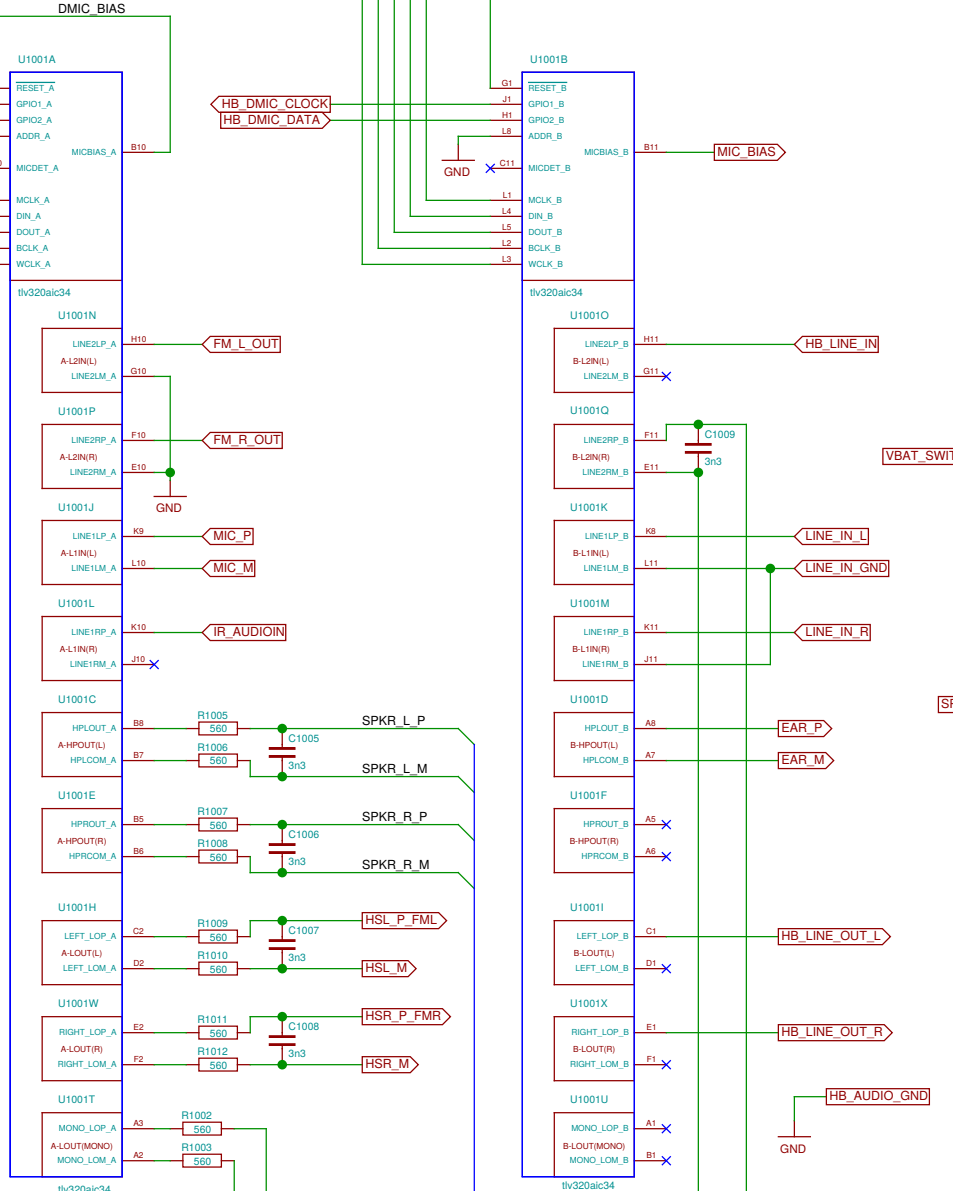
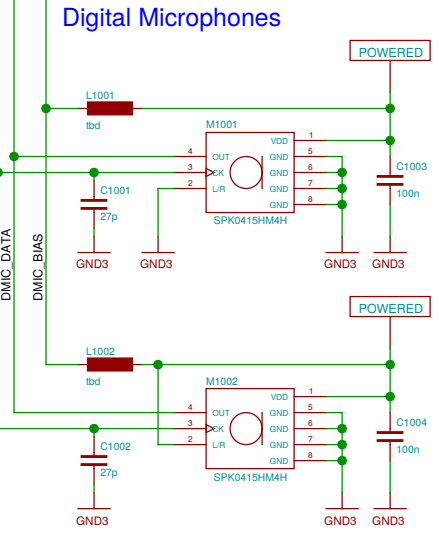
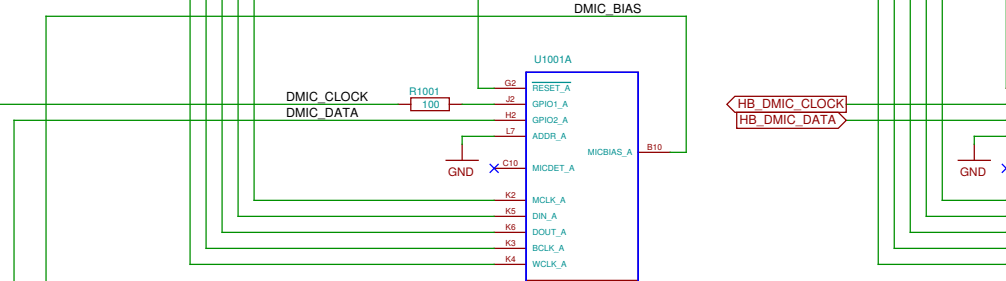
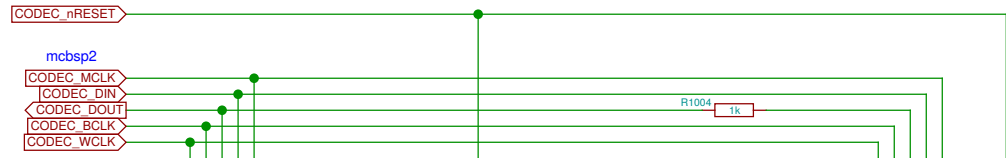
UPPER
LOWER

Stylus detect

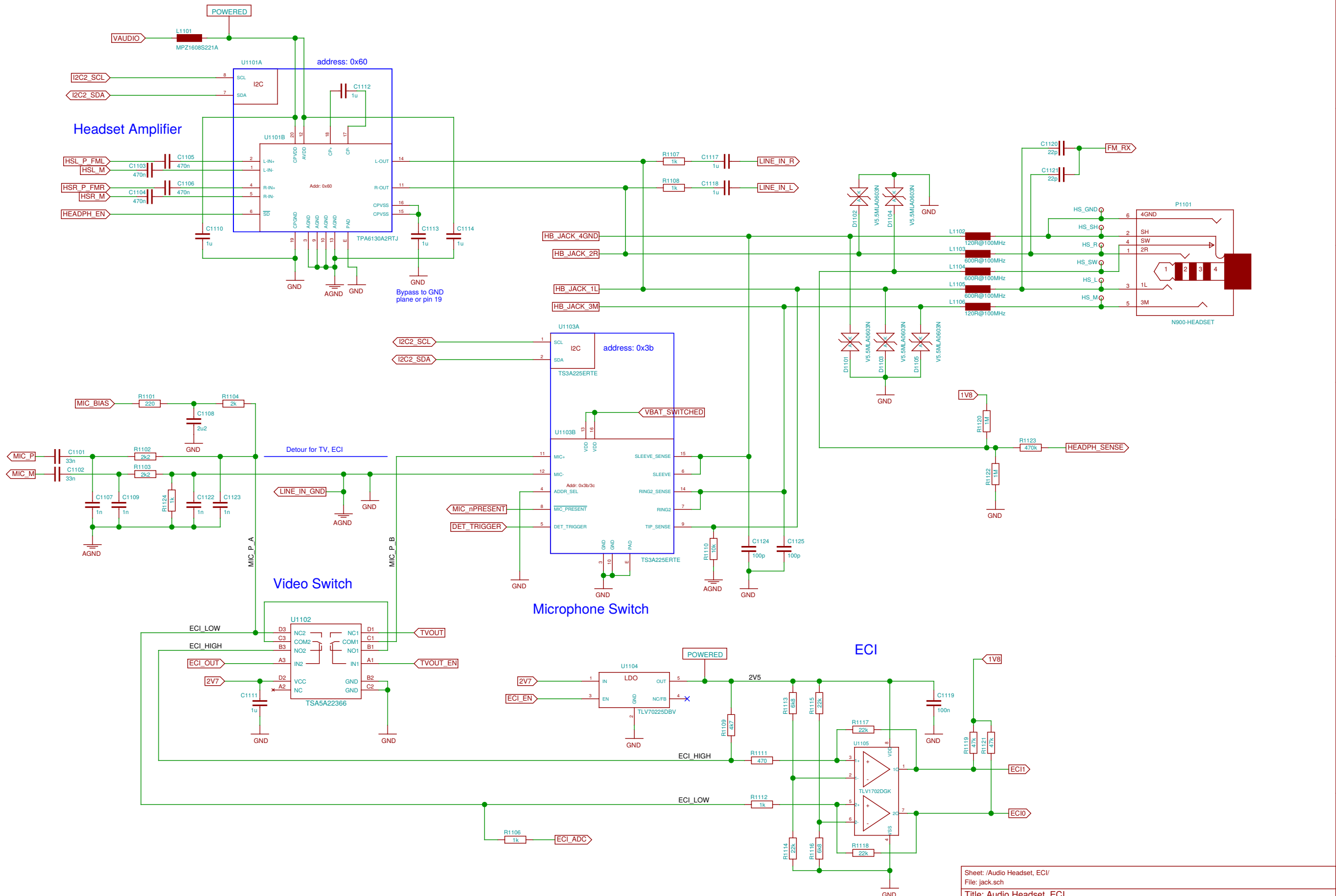


Slide sensor



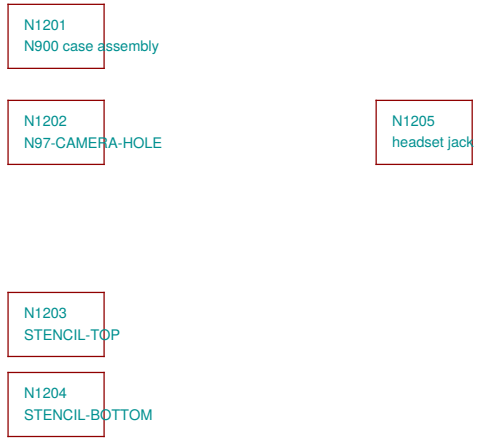


| | | | |
|----------------------|---------------------------|--|-----------|
| Sheet: /Audio Codec/ | | Date: 2016-11-18 15:49:26 | |
| File: codec.sch | | Rev: 1 | |
| Title: Audio Codec | | Plotted by eeshow e90e812+ 20161120-16:10Z | |
| Size: A3 | Date: 2016-11-18 15:49:26 | Rev: 1 | Id: 10/25 |

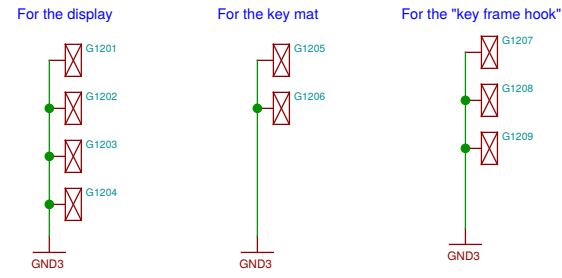


| | | | |
|-----------------------------|---------------------------|-----------------|--|
| Sheet: /Audio Headset, ECI/ | | File: jack.sch | |
| Title: Audio Headset, ECI | | | |
| Size: A3 | Date: 2016-11-18 15:49:26 | Rev: | |
| Plotted by: eeshow e90e812* | | 20161120-16:10Z | |
| Id: 11/25 | | |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

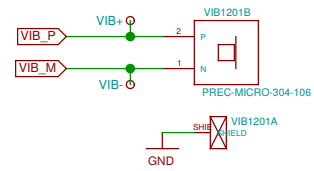
No-Solder Components



Shield Contacts on UPPER

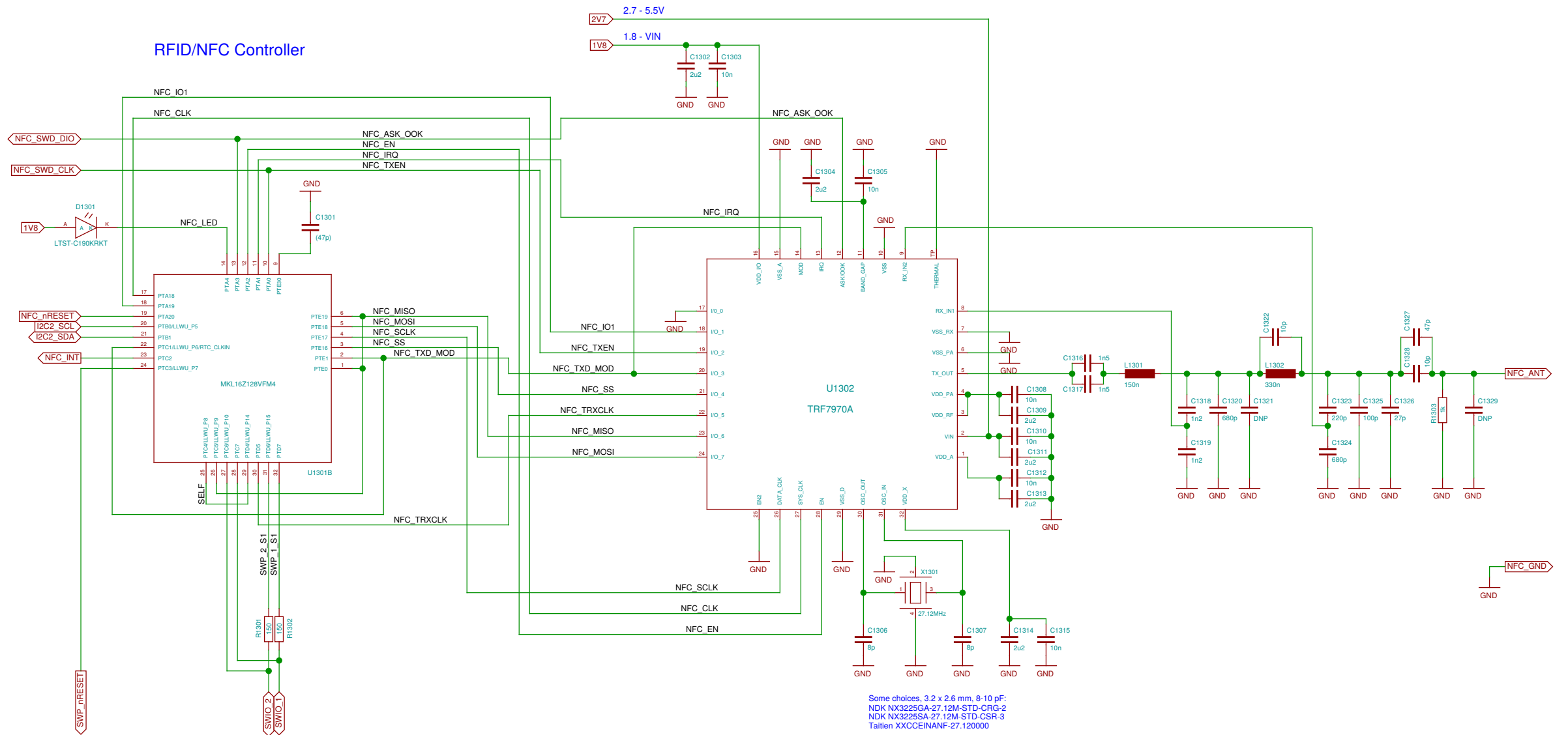


Vibramotor

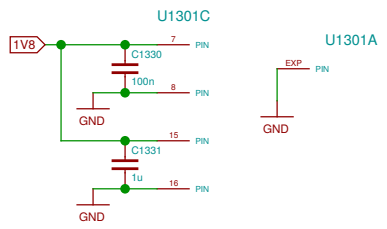


| | | |
|--|---------------------------|-----------|
| Sheet: /Misc/ | | |
| File: misc.sch | | |
| Title: Misc | | |
| Size: A3 | Date: 2016-11-18 15:49:26 | Rev: |
| Plotted by eeshow e90e612+ 20161120-16:10Z | | Id: 12/25 |

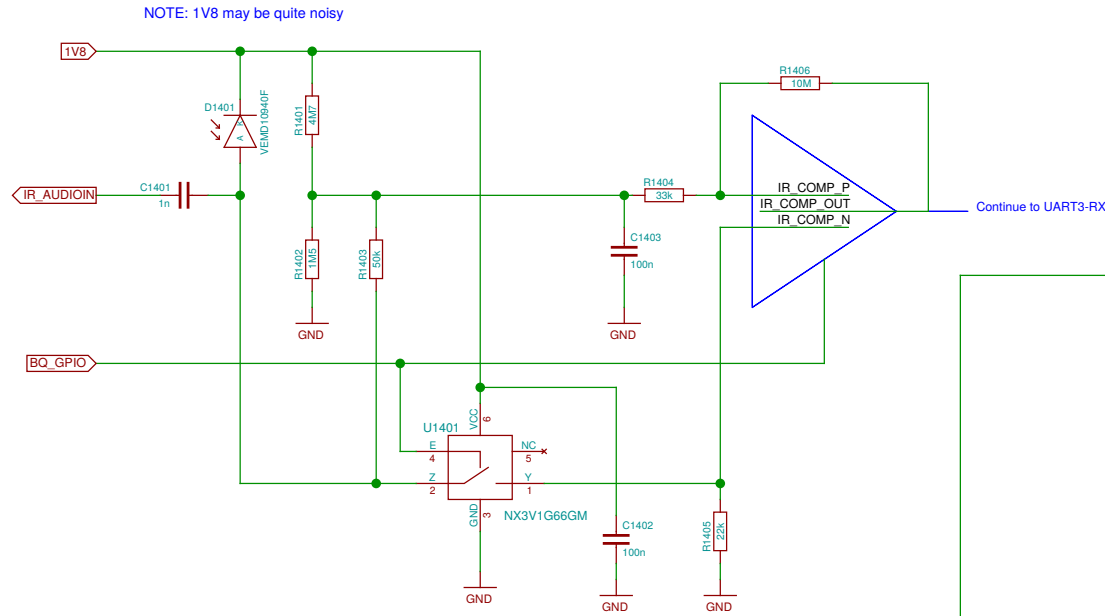
RFID/NFC Transceiver



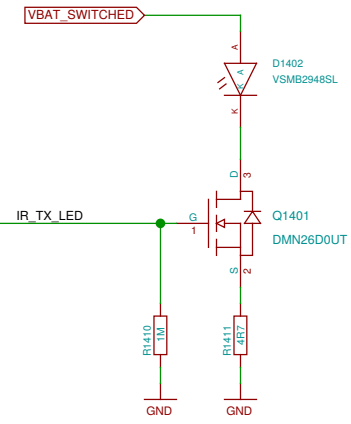
Some choices, 3.2 x 2.6 mm, 8-10 pF:
 NDK NX3225GA-27.12M-STD-CRG-2
 NDK NX3225SA-27.12M-STD-CSR-3
 Taillien XXCCEINANF-27.120000



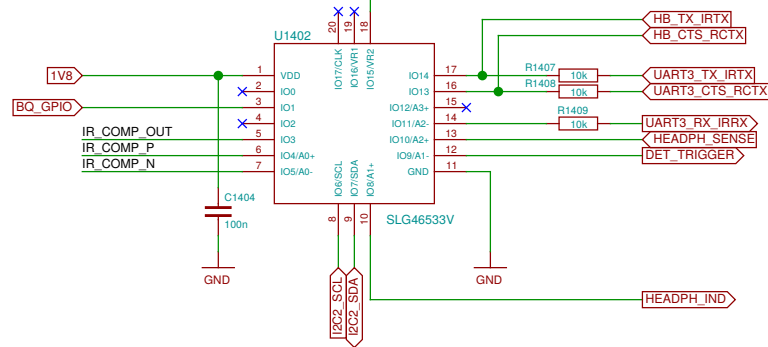
IR receiver



IR transmitter



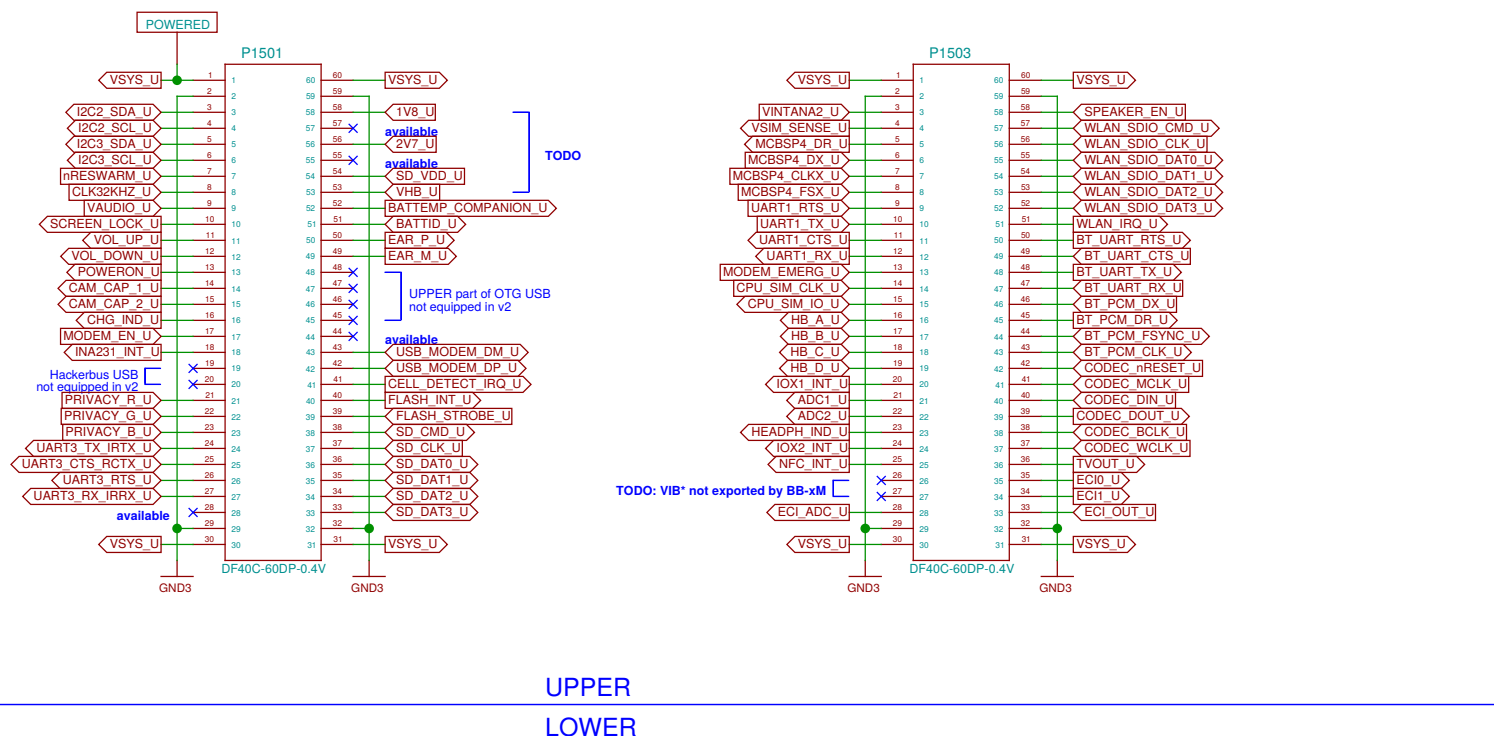
IR send/receive logic



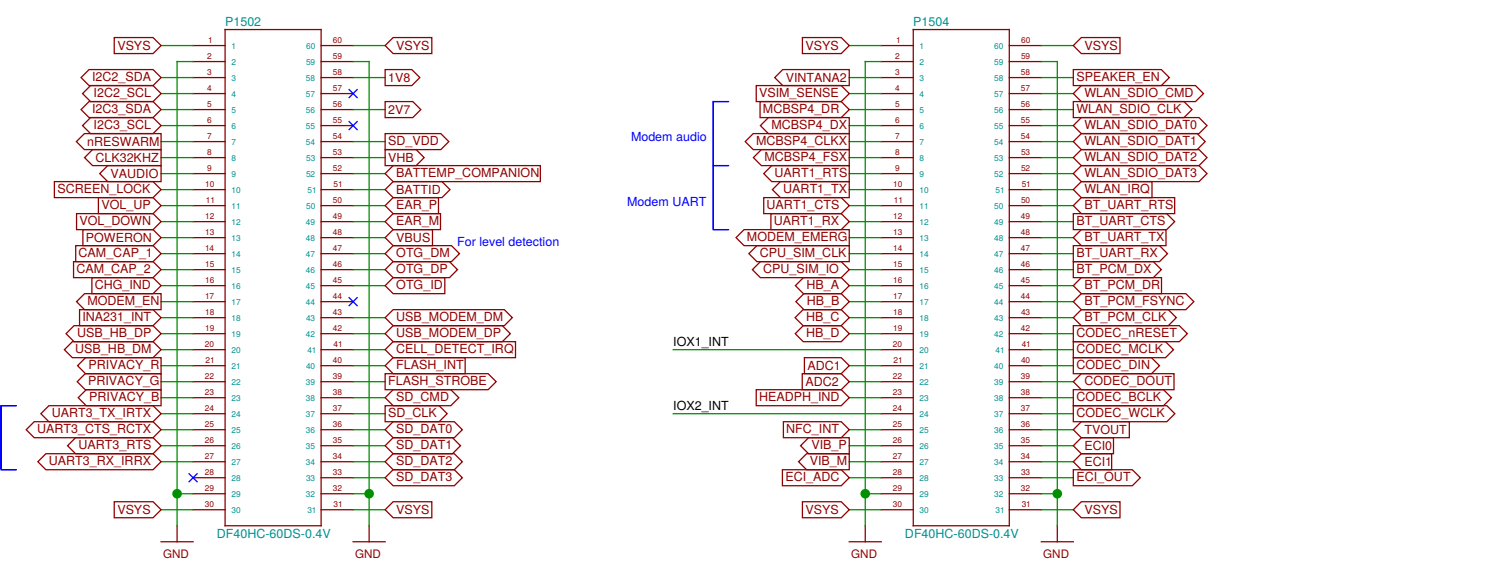
TODO: update D1401 footprint

| | | | |
|--|---------------------------|--------------|--|
| Sheet: /Infrared/ | | File: ir.sch | |
| Title: Infrared | | | |
| Size: A3 | Date: 2016-11-18 15:48:54 | Rev: | |
| Plotted by eeshow e90e612+ 20161120-16:10Z | | Id: 14/25 | |

This is just the collection of signals we have. Proper assignment still pending.

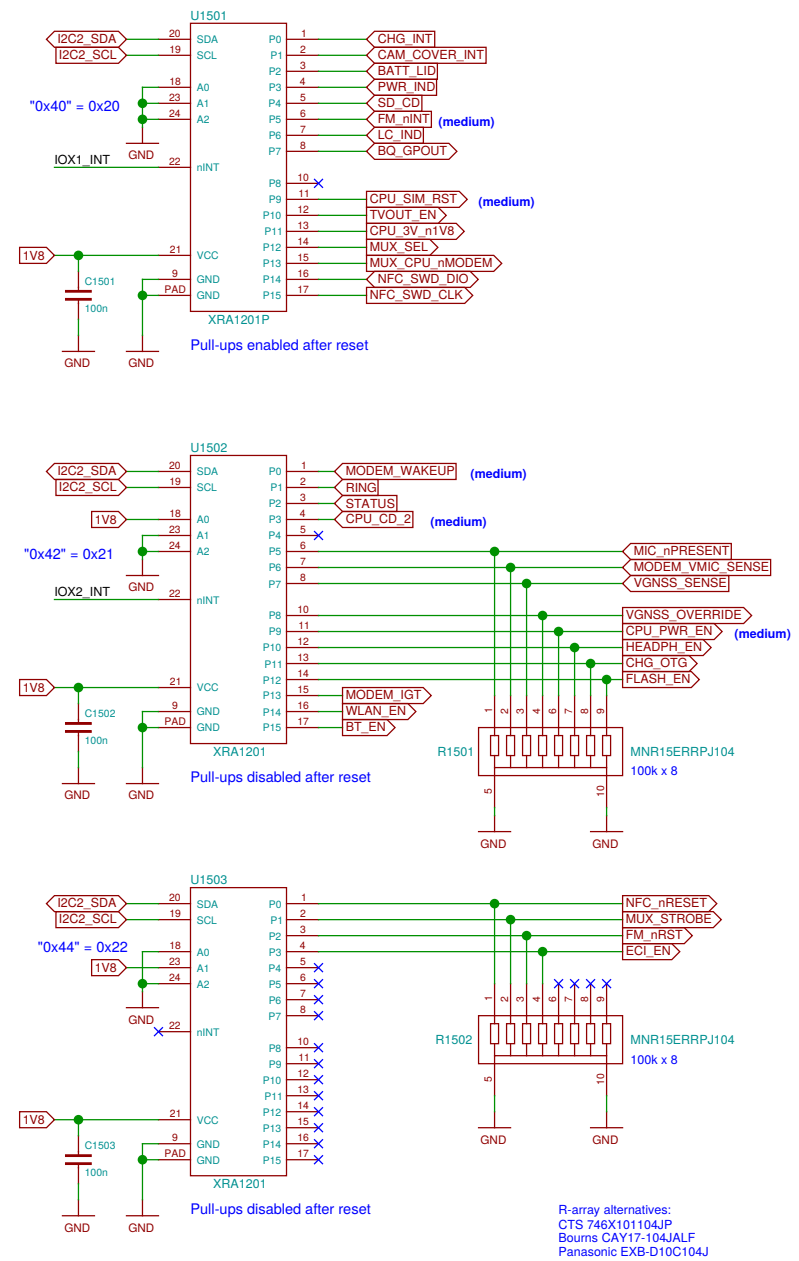


UPPER
LOWER



Current rating per contact: 0.3 A

IO expanders (on LOWER)

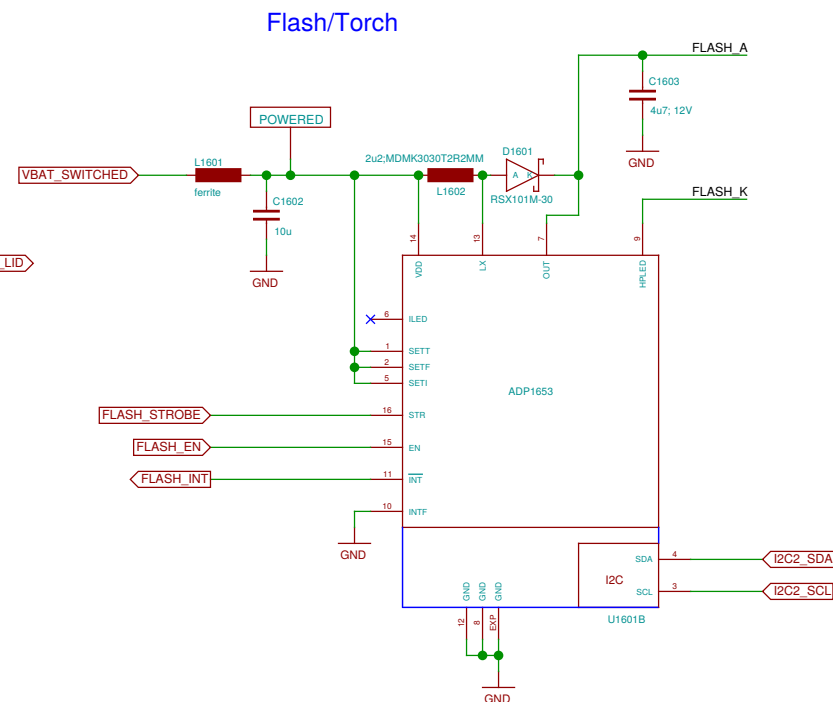
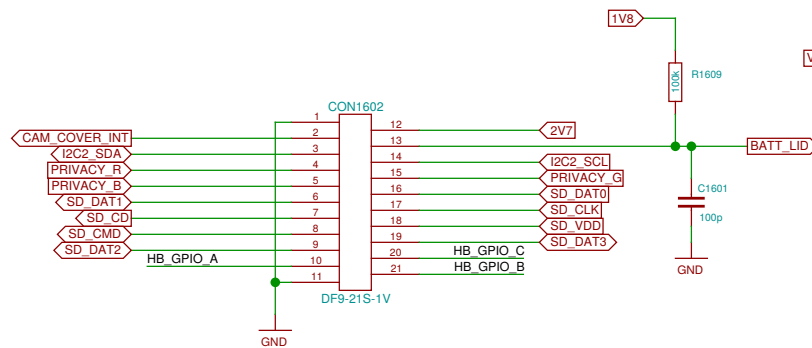
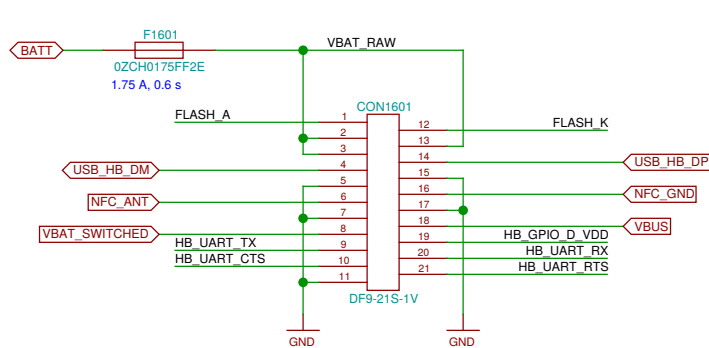


R-array alternatives:
CTS 746X101104JP
Bourns CAY17-104JALF
Panasonic EXB-D10C104J

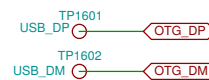
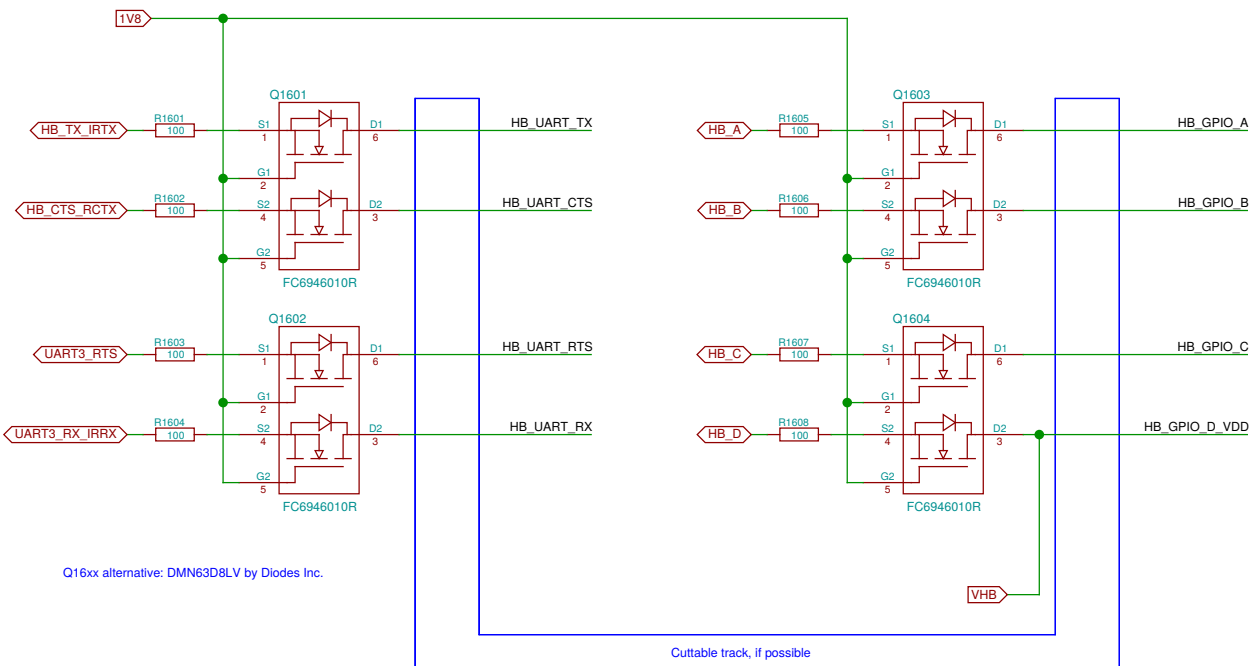
| | |
|---|---------------------------|
| Sheet: /B2B LOWER-UPPER/ File: b2b.sch | |
| Title: B2B LOWER-UPPER | |
| Size: A3 | Date: 2016-11-18 15:48:54 |
| Plotted by: eeshow e90e812 | 20161120-16:10:2 |
| Rev: | Id: 15/25 |

LOWER-BOB Interconnect (LOWER side)

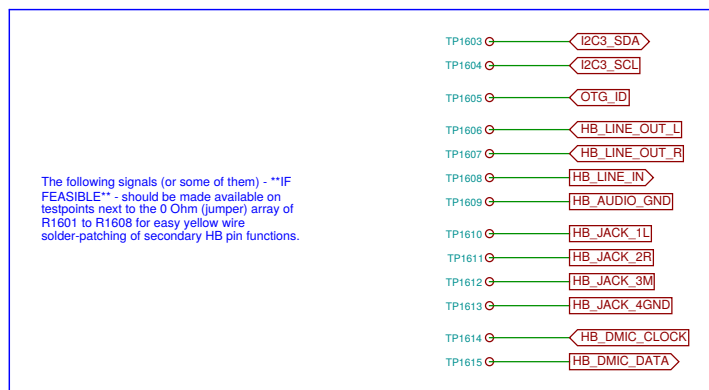
Defined in the Hackerbus specification, <http://neo900.org/stuff/papers/hb.pdf>



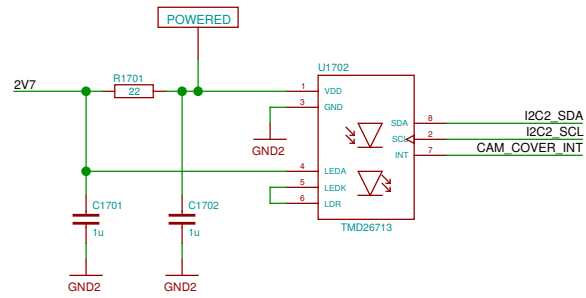
Level shifters for Hackerbus GPIO and UART



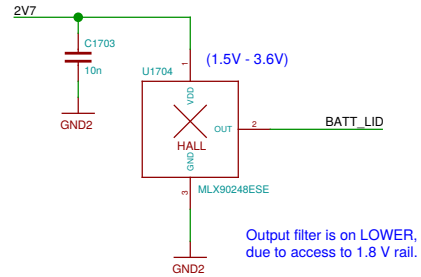
Patch field



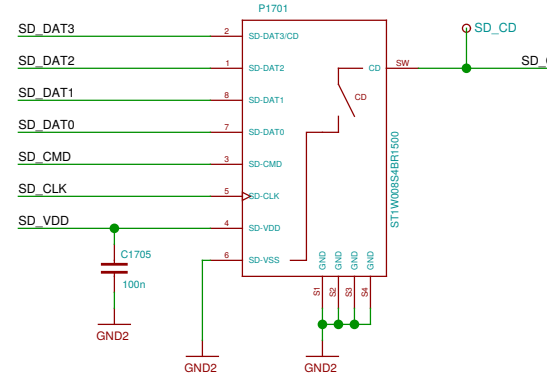
Camera Cover detect



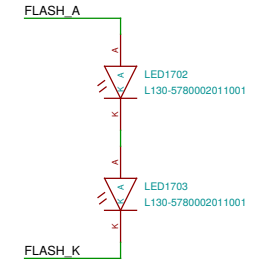
Battery Cover detect



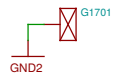
Memory card holder



Camera flash

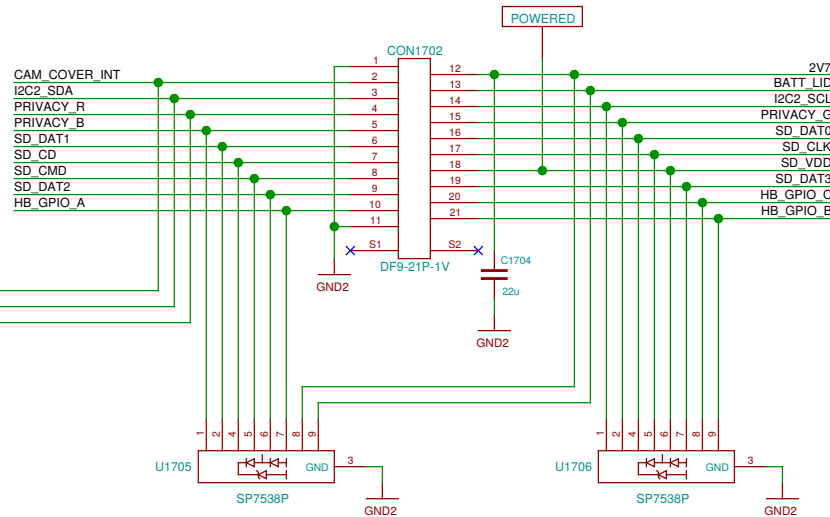
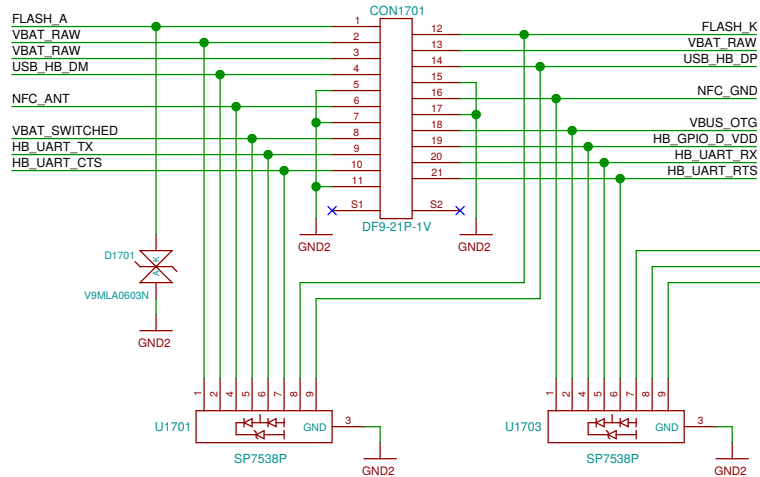


Camera lens plate

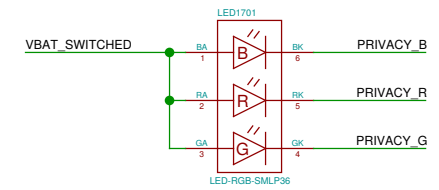


LOWER-BOB Interconnect (BOB side)

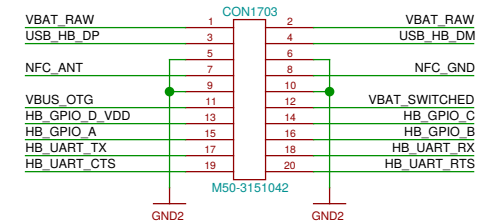
Defined in the Hackbus specification, <http://neo900.org/stuff/papers/hb.pdf>



Privacy LED

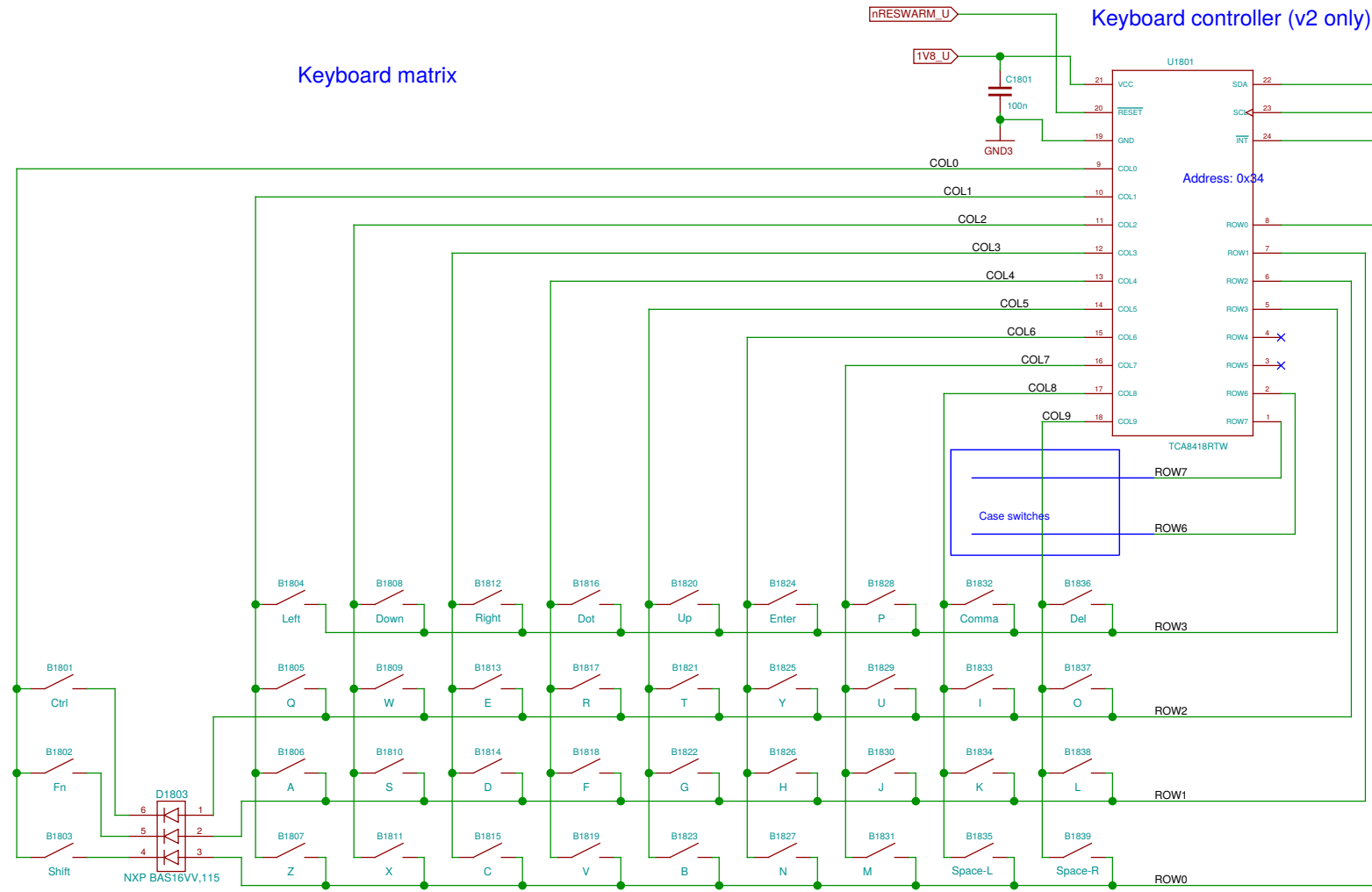


Hackbus

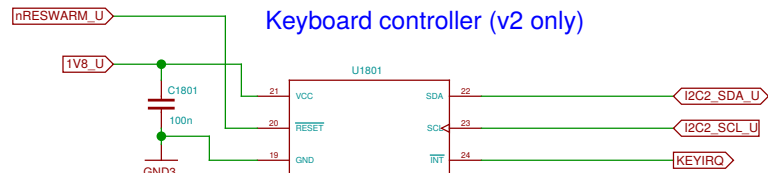


**ESD pin assignment is only indicative.
Actual assignment to be defined by layout.**

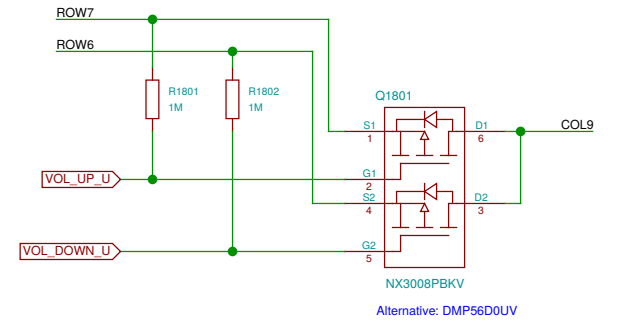
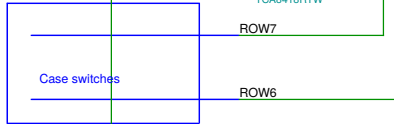
Keyboard matrix



Keyboard controller (v2 only)



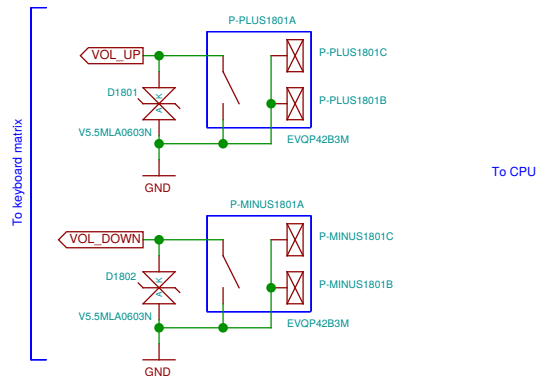
Address: 0x34



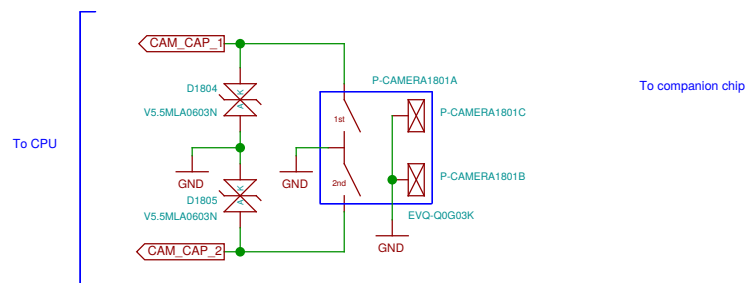
Alternative: Diodes Inc. BAS16VV-7
Warning: Diodes Inc. have cathodes on pin 1 side, NXP anodes!

UPPER
LOWER

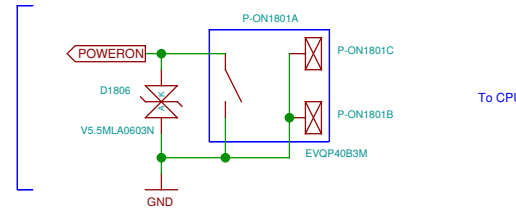
Volume



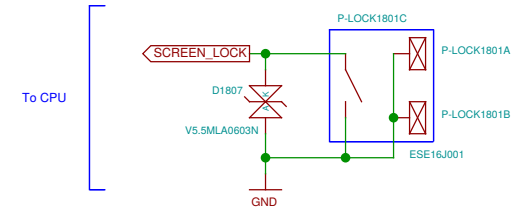
Camera trigger



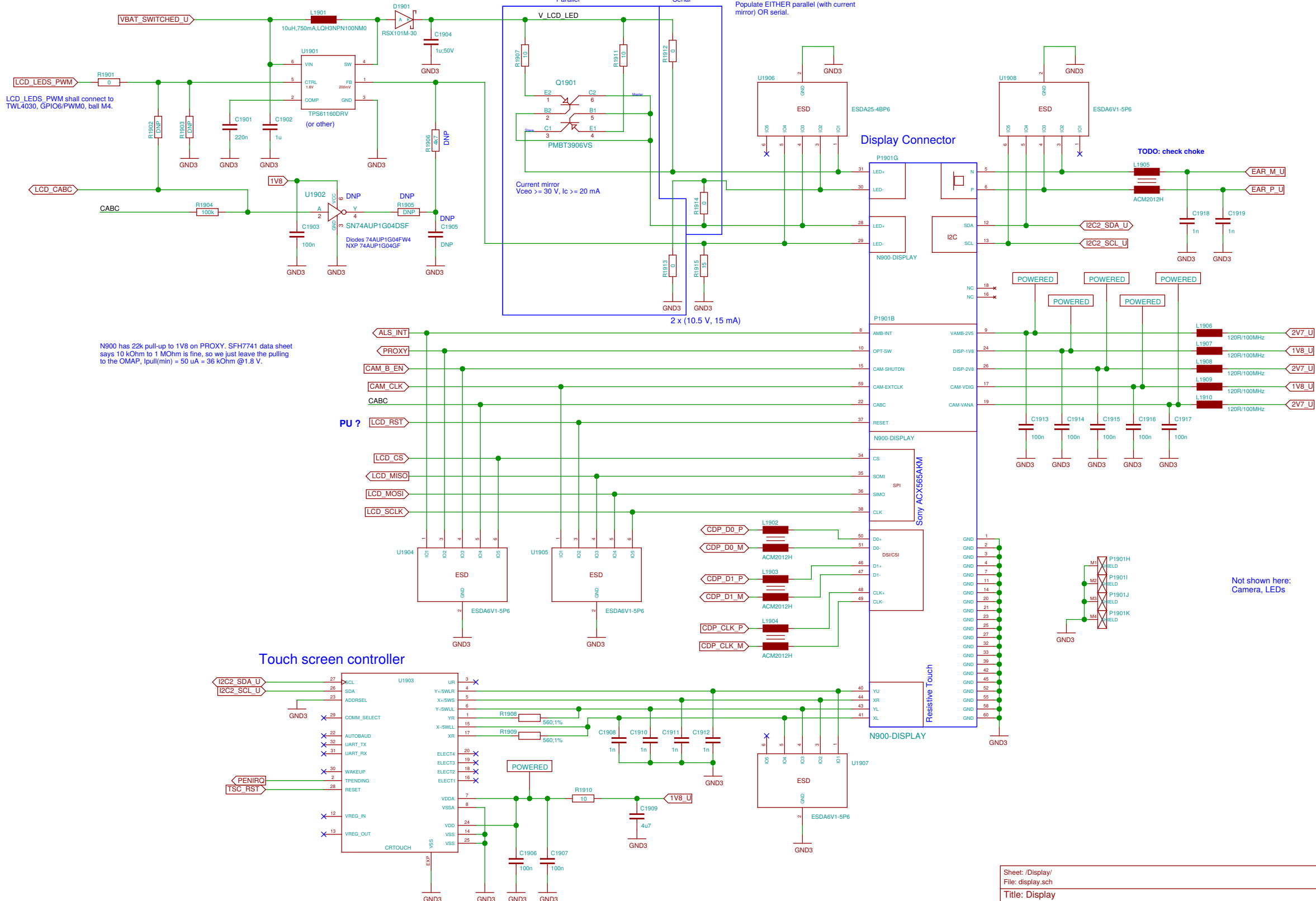
On-off

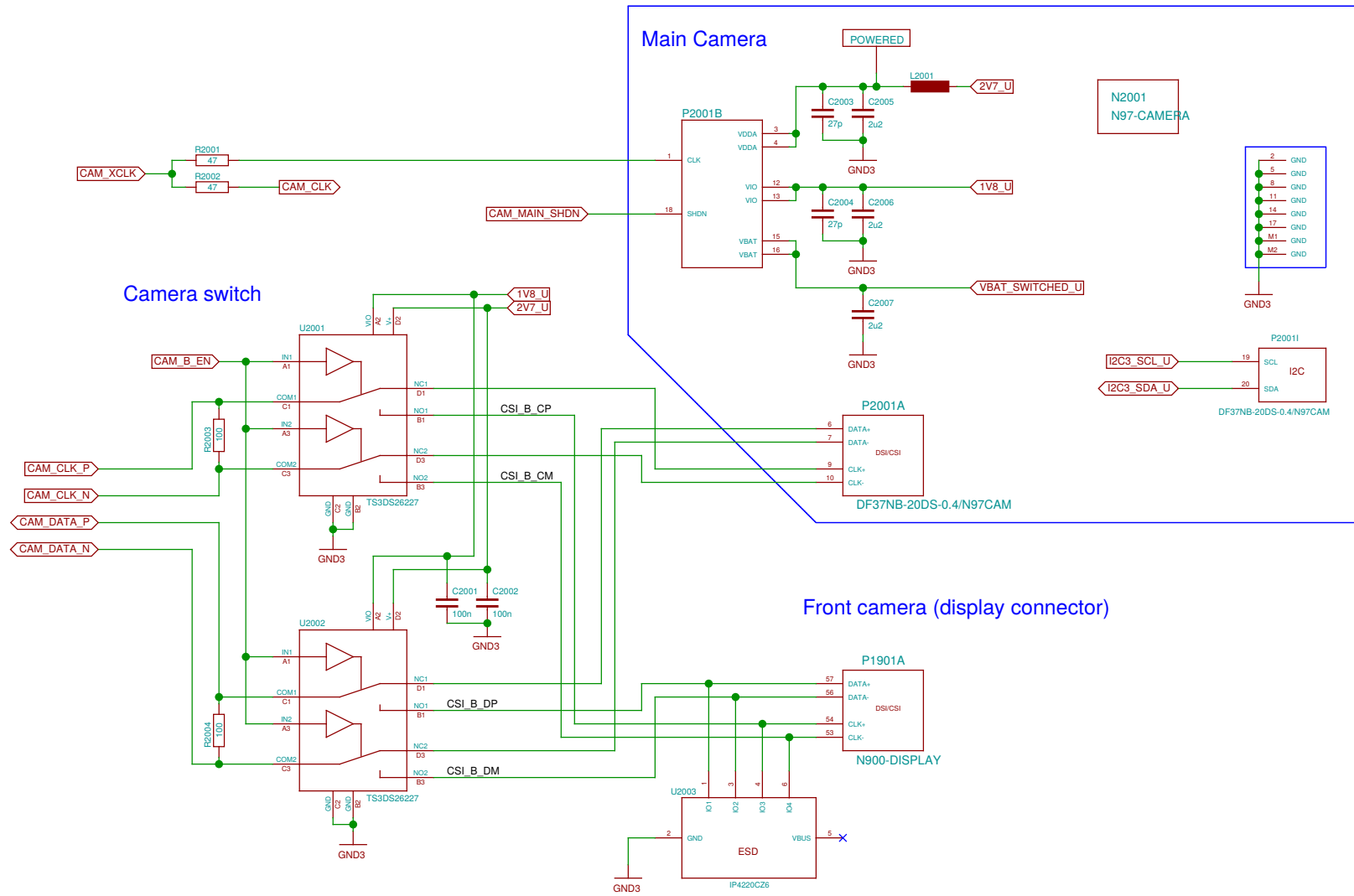


Lock switch

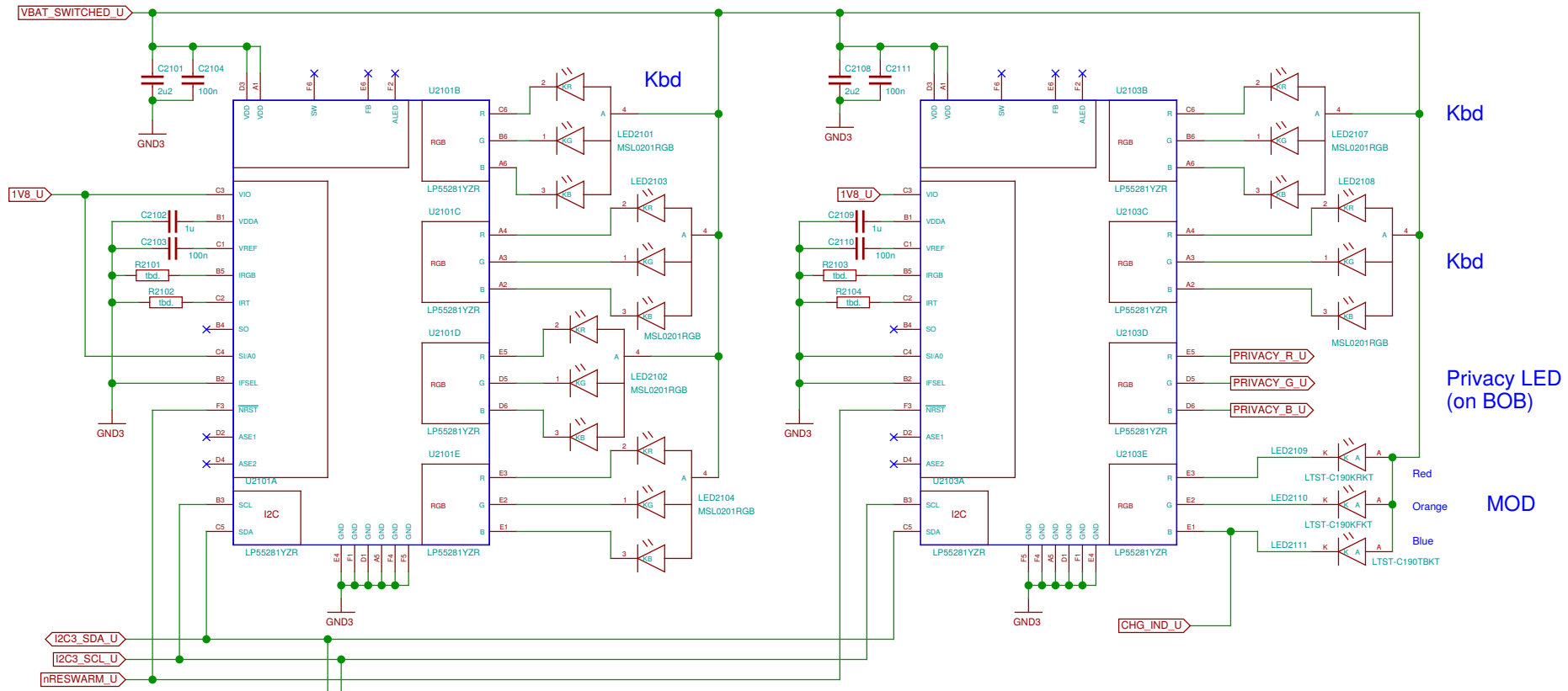


| | | |
|--|---------------------------|-----------|
| Sheet: /Keypad and buttons/ | | |
| File: keys.sch | | |
| Title: Keypad and buttons | | |
| Size: A3 | Date: 2016-11-18 15:48:54 | Rev: |
| Plotted by eeshow e90e612+ 20161120-16:10Z | | Id: 18/25 |

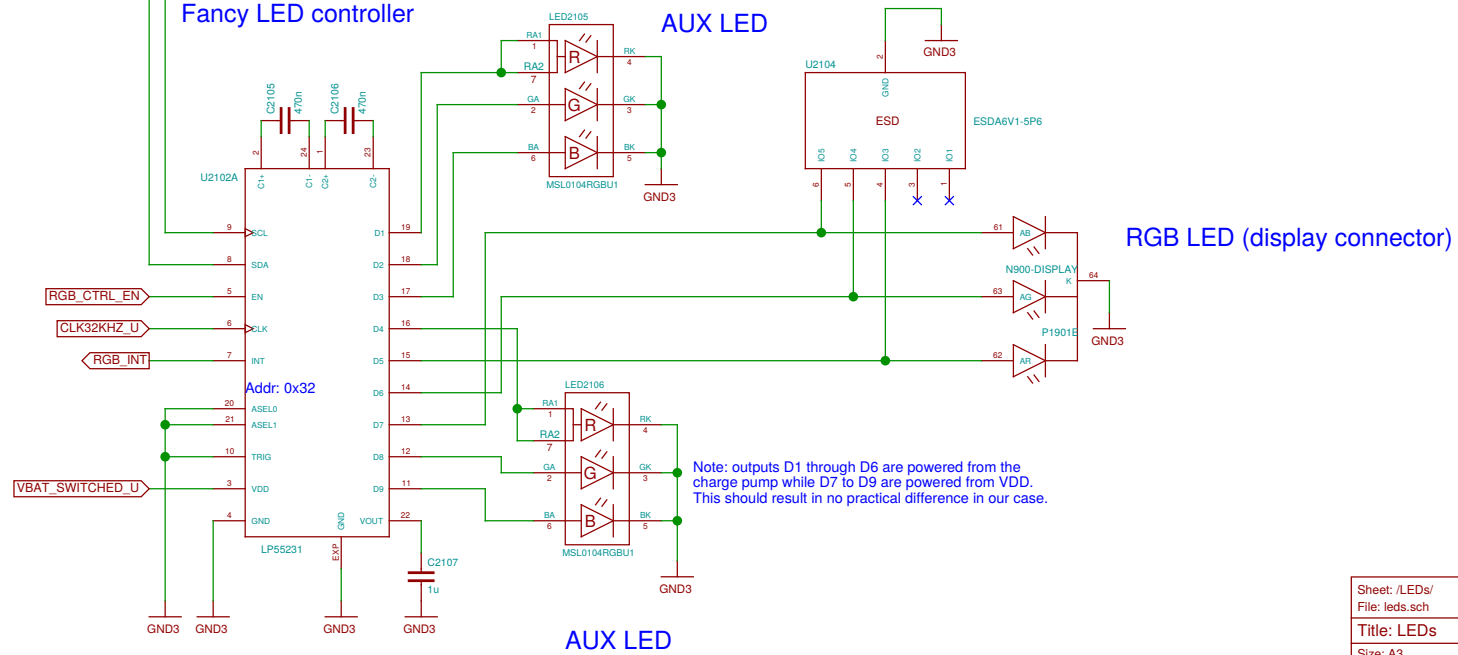




Basic LED controllers

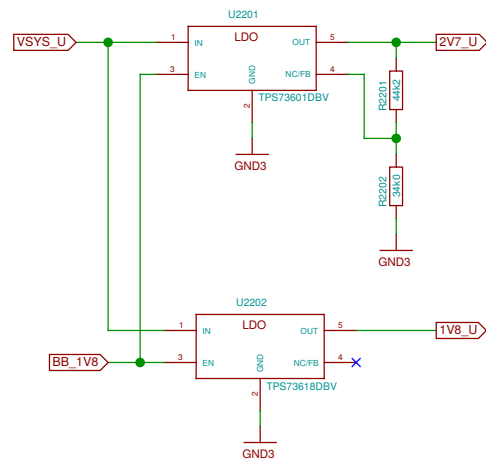


Fancy LED controller



| | | | |
|----------------|-----------------------------|---------------------------|--|
| Sheet: /LEDs/ | | Date: 2016-11-18 15:48:54 | |
| File: leds.sch | | Rev: | |
| Title: LEDs | | Id: 21/25 | |
| Size: A3 | Plotted by: eeshow e90e812+ | 20161120-16:10Z | |

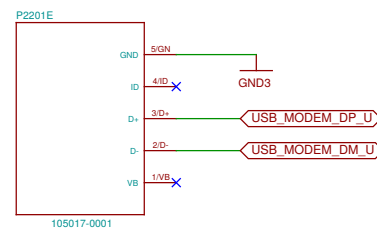
simple capless 400mA LDO for TPS65950 substitute
(only for prototype)



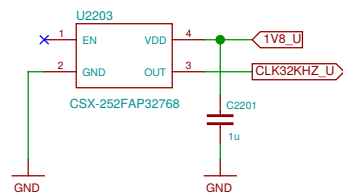
TODO: use REGEN ?

Modem USB

connect to BB
by some Micro-USB cable

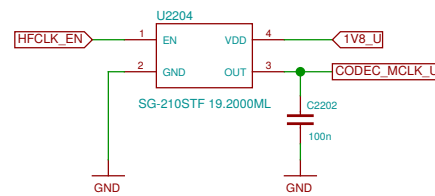


32 kHz clock



Alternative: OYKTGLJANF-0.032768

19.2 MHz clock

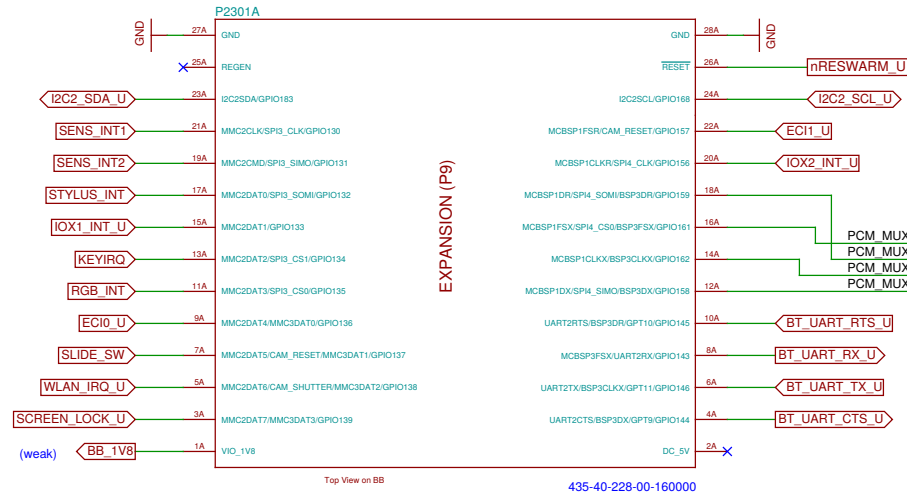


Alternative: KC2520B19.2000C1GE00

| | | |
|--|---------------------------|-----------|
| 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 |

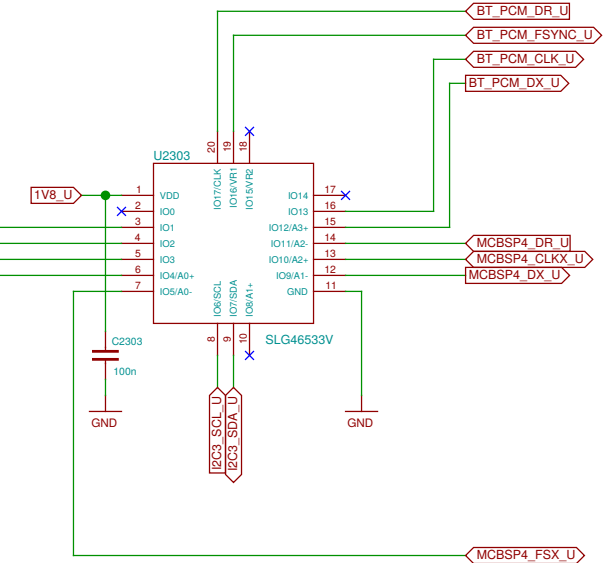
TODO: update pin names in footprint

BB-xM Main Expansion Header (P9, 7.24)

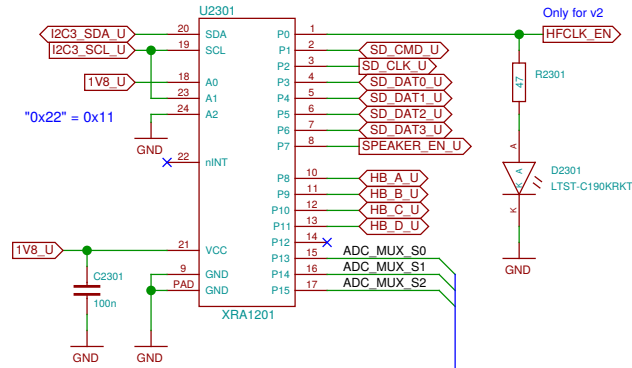


Same part, as "breakaway" strip (72 positions):
435-40-272-00-160000

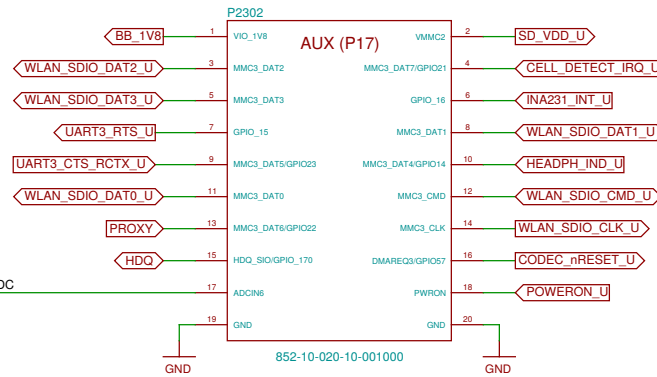
PCM switch



IO expander

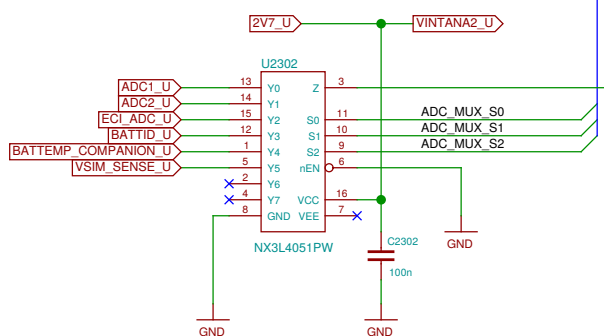


Auxiliary Expansion Header (P17, 7.26)



Same part, as "breakaway" strip (100 positions):
852-10-1000-10-001000

ADC multiplexer

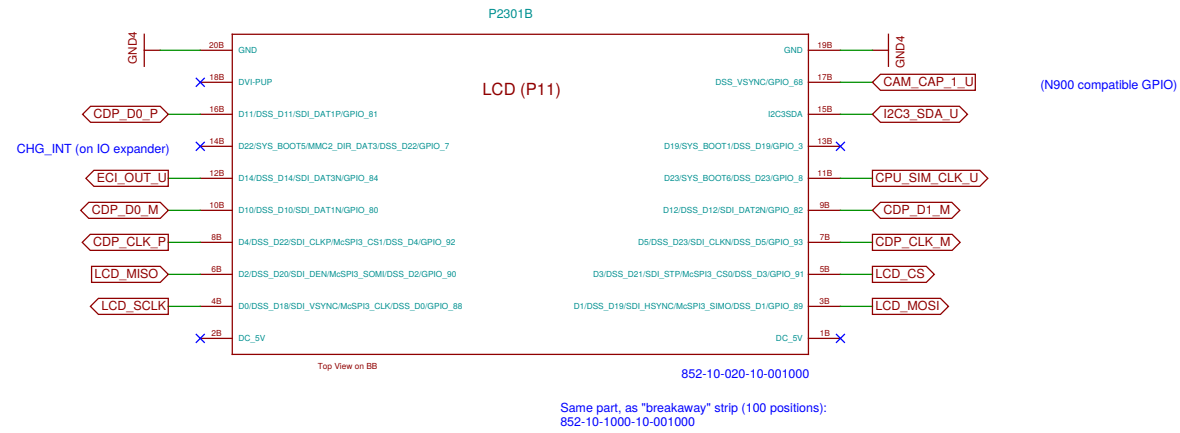


No UART3_RTS on BB-xM, using GPIO
No UART3_CTS on BB-xM, using GPIO

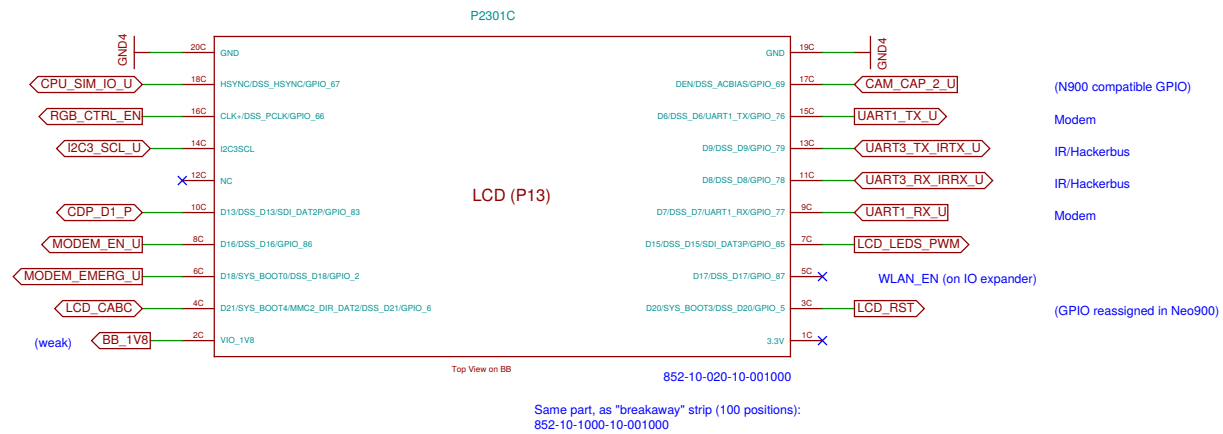
FM_nINT (on IO expander)

TODO: update pin names in footprint

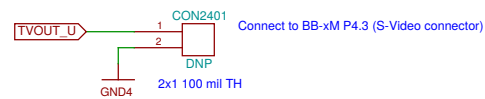
P11 (7.25)



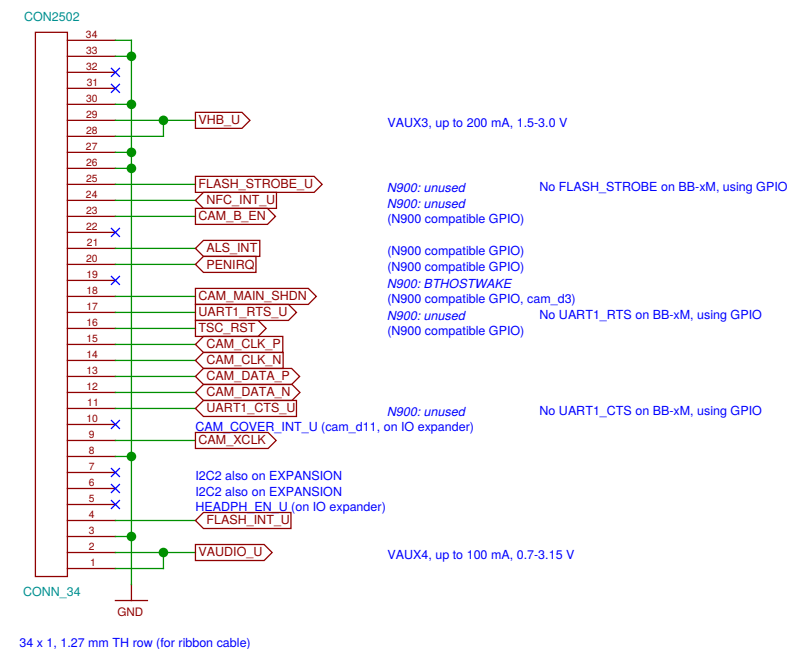
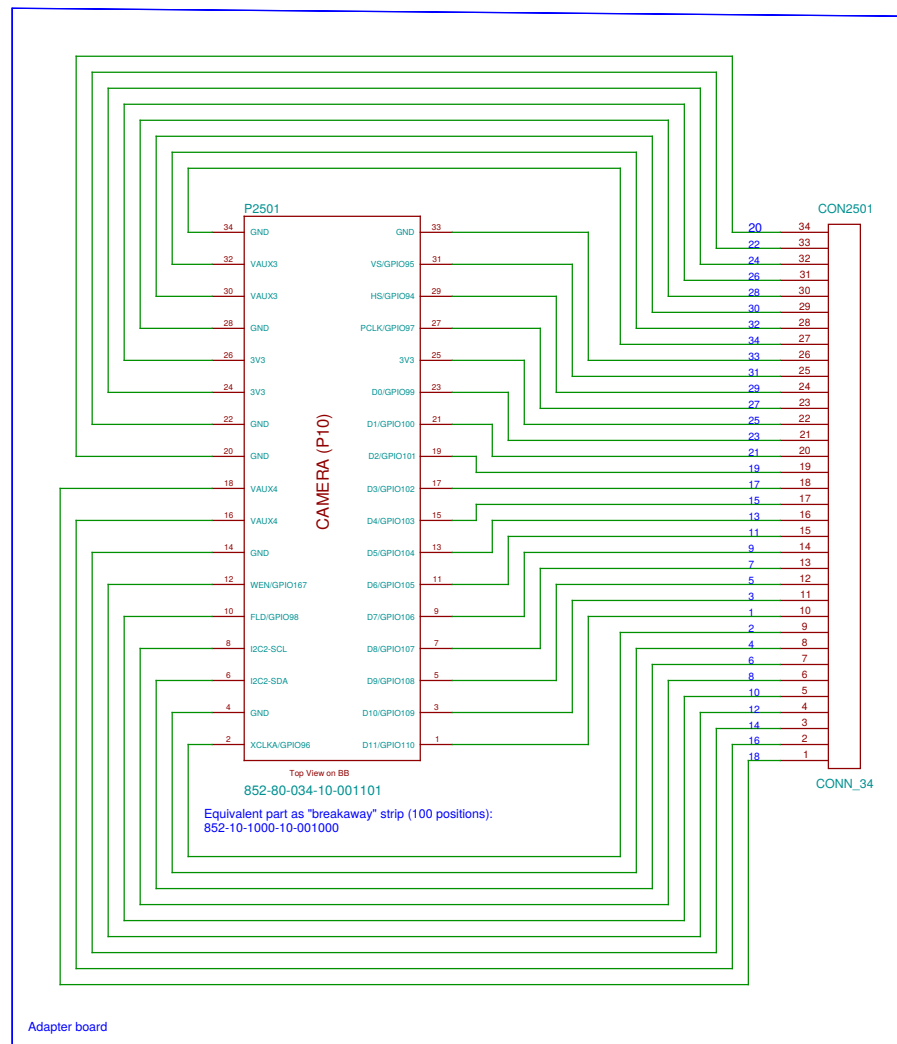
P13 (7.25)



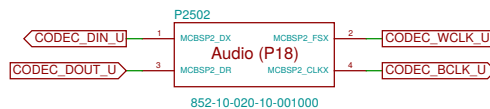
P4 (7.19)



Processor Camera Port Interface (P10, 7.20.3)



TODO: update pin names in footprint



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.