

Click ↓ Here

1 This sheet: index

Charger/OTG

2 Charger/OTG

charger.sch

Battery

3 Battery

battery.sch

Modem Power

4 Modem Power

modempwr.sch

3G/4G Modem

5 3G/4G Modem

modem.sch

SIM cards and switch

6 SIM cards and switch

sim.sch

Modem Antennas

7 Modem Antennas

ants.sch

WLAN, Bluetooth, FM

8 WLAN, Bluetooth, FM

wlan.sch

Sensors

9 Sensors

sensors.sch

Audio Codec

10 Audio Codec

codec.sch

Audio Headset, ECI

11 Audio Headset, ECI

jack.sch

Misc

12 Misc

misc.sch

Click ↓ Here

RFID/NFC

13 RFID/NFC

nfc.sch

Infrared

14 Infrared

ir.sch

B2B LOWER-UPPER

15 B2B LOWER-UPPER

b2b.sch

Hackerbus

16 Hackerbus

hb.sch

uSD Breakout Board

17 uSD Breakout Board

bob.sch

Keypad and buttons

18 Keypad and buttons

keys.sch

Display

19 Display

display.sch

Cameras

20 Cameras

cams.sch

LEDs

21 LEDs

leds.sch

Click ↓ Here

Adaptation (v2 only)

22 Adaptation (v2 only)

v2.sch

BB-xM Adapter (CPU)

23 BB-xM Adapter (CPU)

bbcpu.sch

BB-xM Adapter (DISP)

24 BB-xM Adapter (DISP)

bbdisp.sch

BB-xM Adapter (CAM)

25 BB-xM Adapter (CAM)

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.

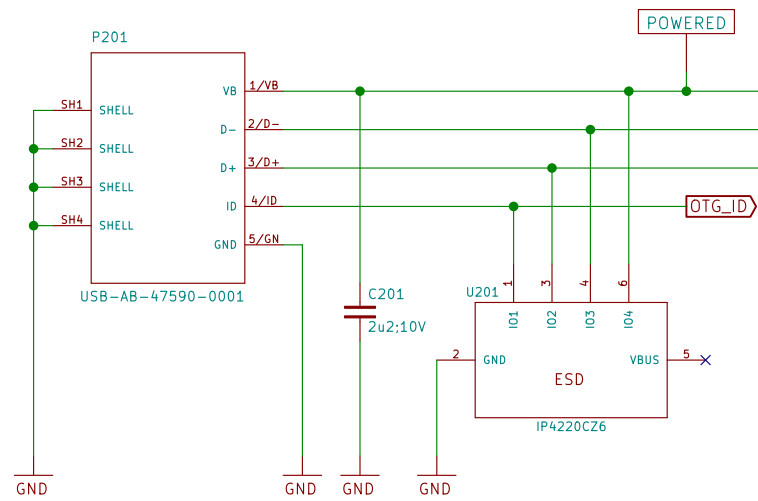
Unless indicated otherwise, all capacitors should be X5R or X6S, or better (X7R, NPO, etc.) If no voltage is specified, use >= 6.3 V.

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

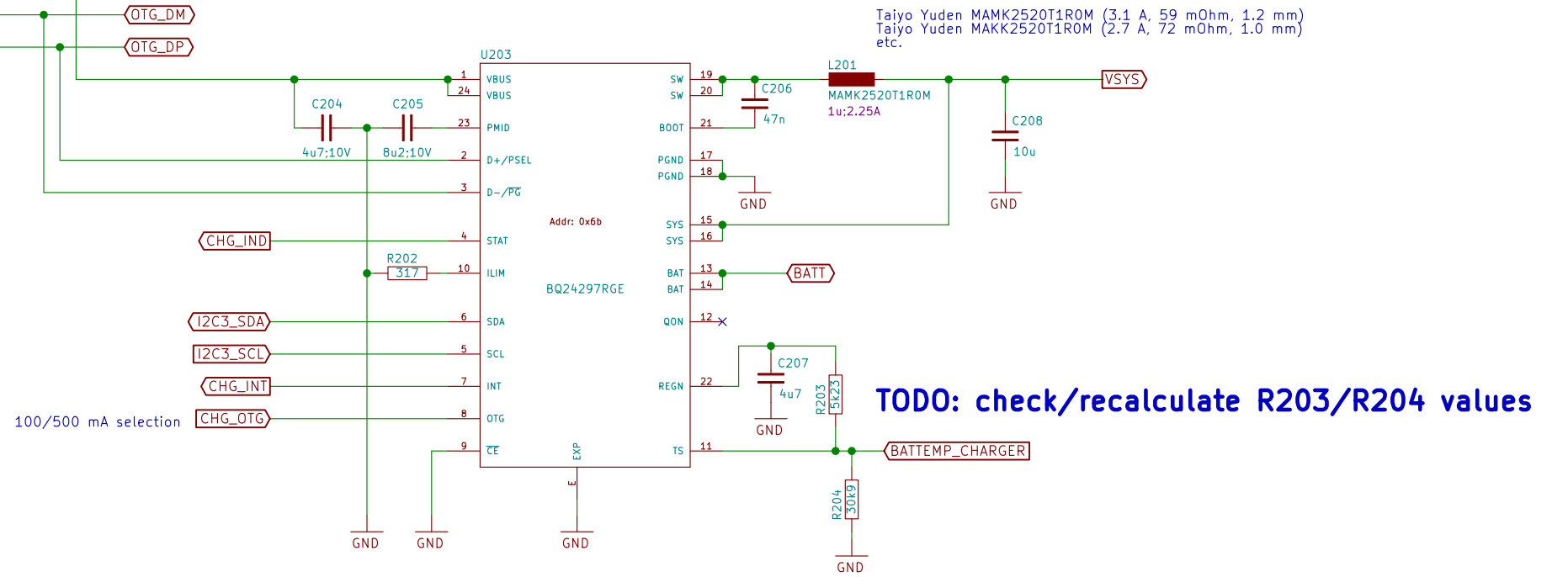
Signals that exist on both LOWER and UPPER (and maybe also BOB) have a _U suffix on UPPER. No suffix is needed to distinguish between LOWER and BOB because all BOB components are on the same sheet and wires connecting them use sheet-local labels.

Sheet: /		
File: neo900.sch		
Title: Neo900		
Size: A3	Date: Intentionally Left Blank	Rev:
KiCad E.D.A. kicad 4.0.2-stable		Id: 1/25

USB OTG connector

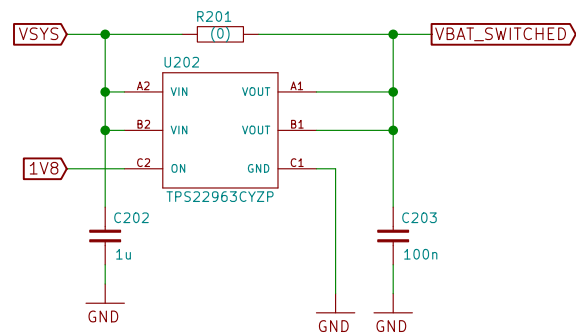


Battery charger with USB OTG

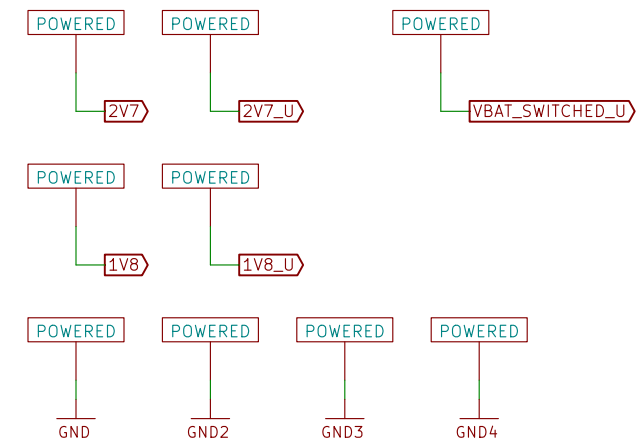


Power distribution and sequencing

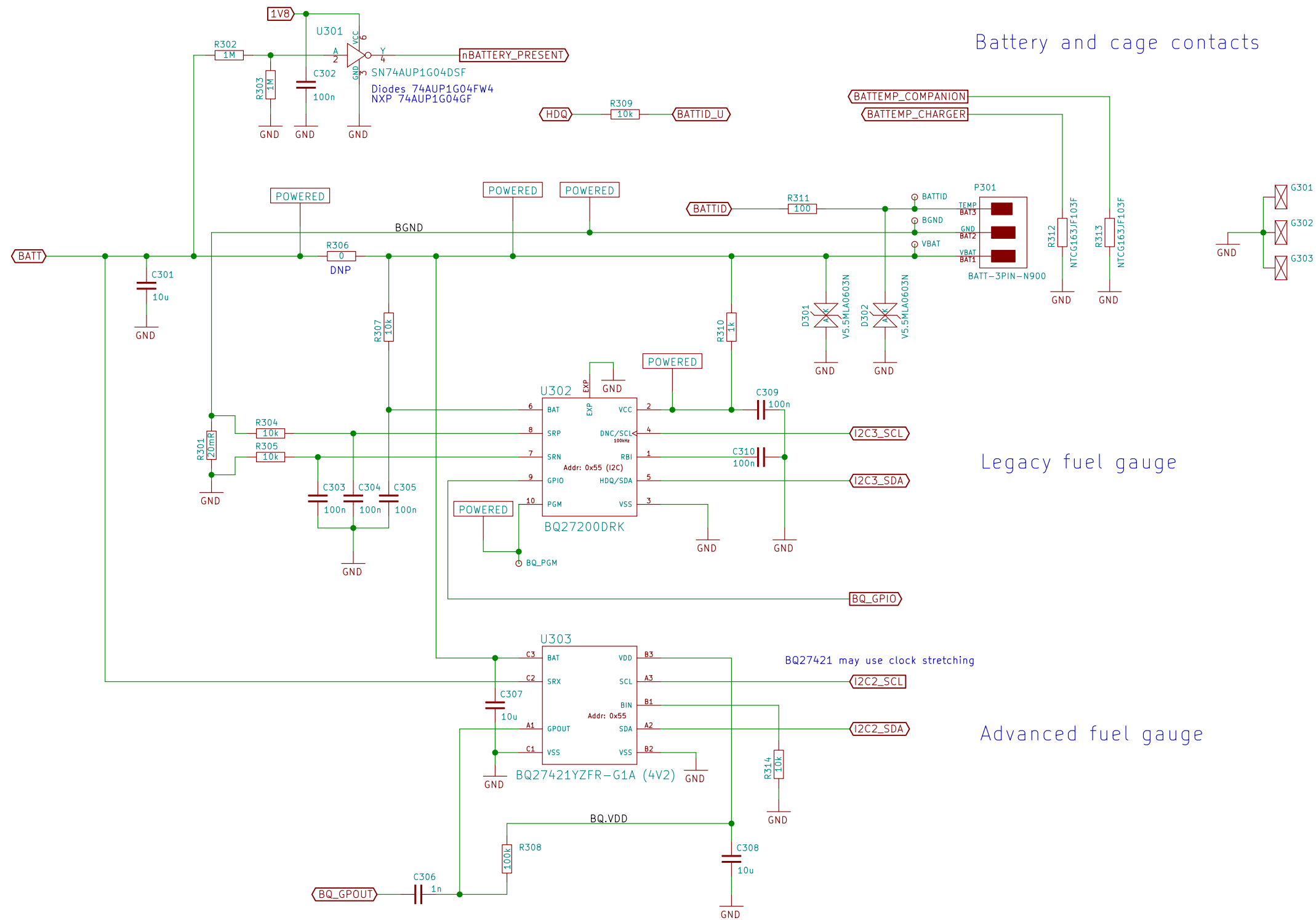
Most high-current consumers are on VBAT_SWITCHED. 1V8 signals that the regulators on UPPER are operational.



KiCad bureaucracy



Sheet: /Charger/OTG/ File: charger.sch		
Title: Charger/OTG		
Size: A3	Date: Intentionally Left Blank	Rev:
KiCad E.D.A. kicad 4.0.2-stable		Id: 2/25



Battery and cage contacts

Legacy fuel gauge

Advanced fuel gauge

BQ27421 may use clock stretching

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

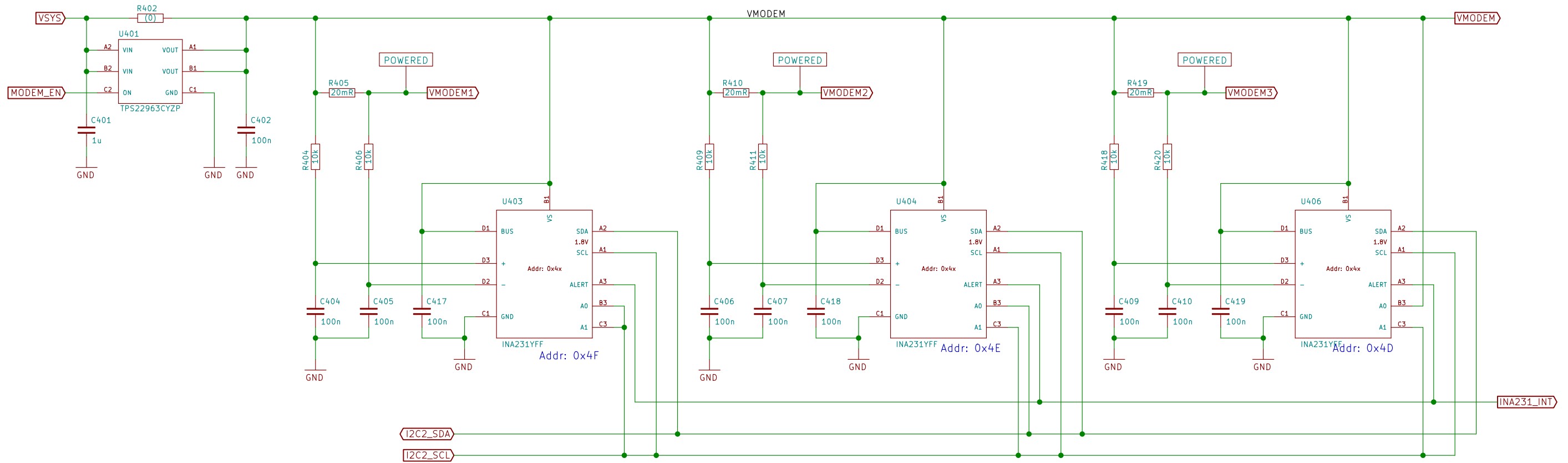
Sheet: /Battery/
File: battery.sch

Title: Battery

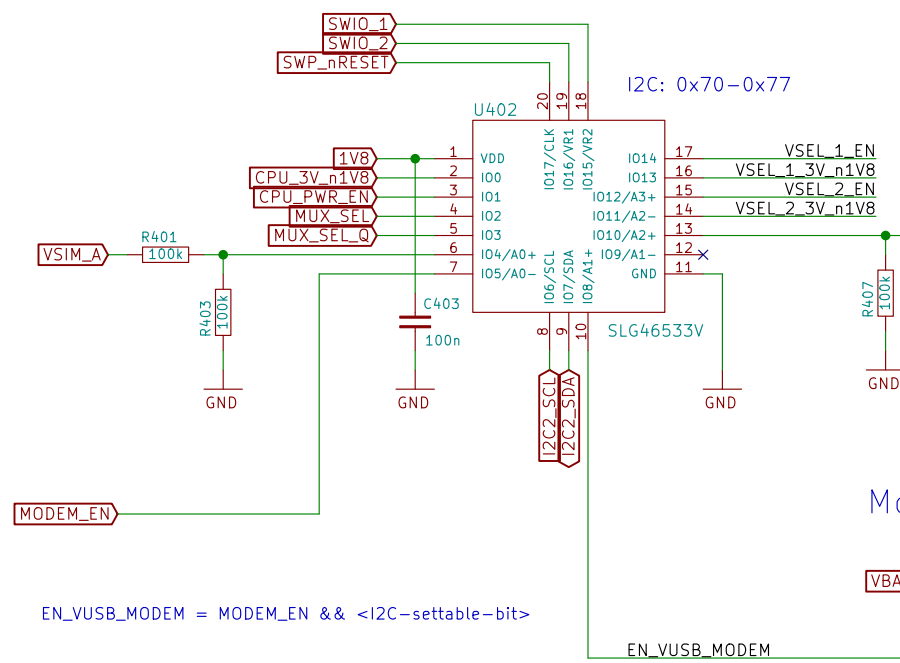
Size: A3 Date: Intentionally Left Blank

Rev:
Id: 3/25

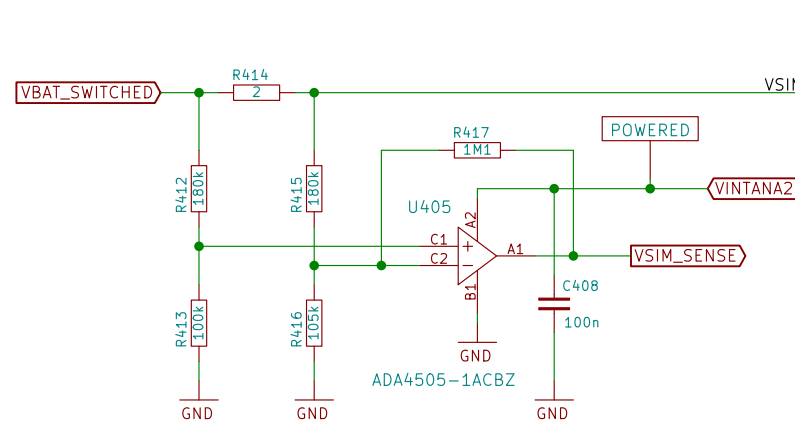
Modem current monitor



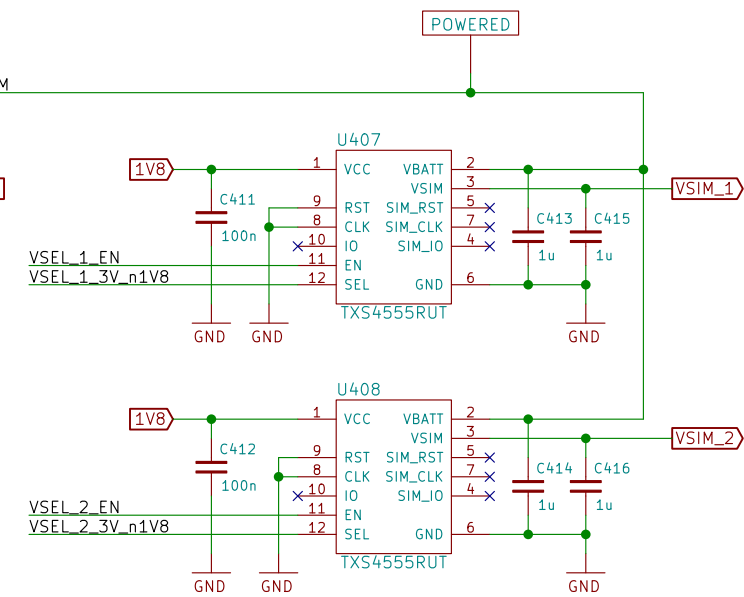
SIM power selection



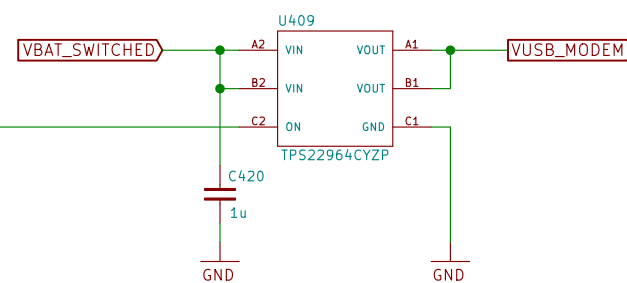
SIM current sensing



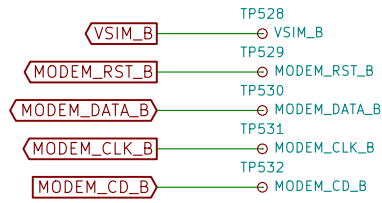
SIM power supply



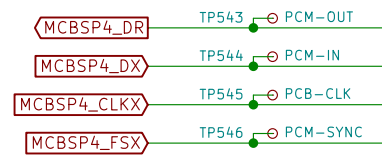
Modem VUSB control (experimental)



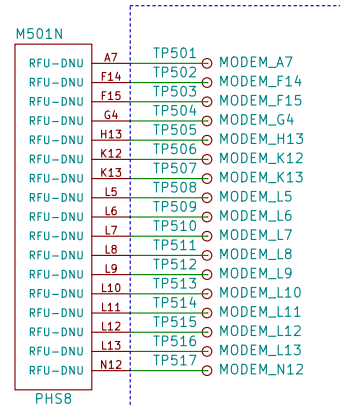
SIM B bus



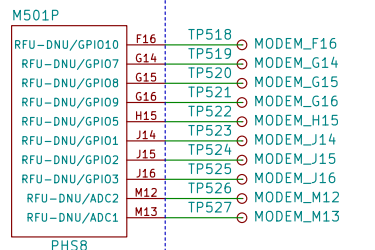
Modem (module)



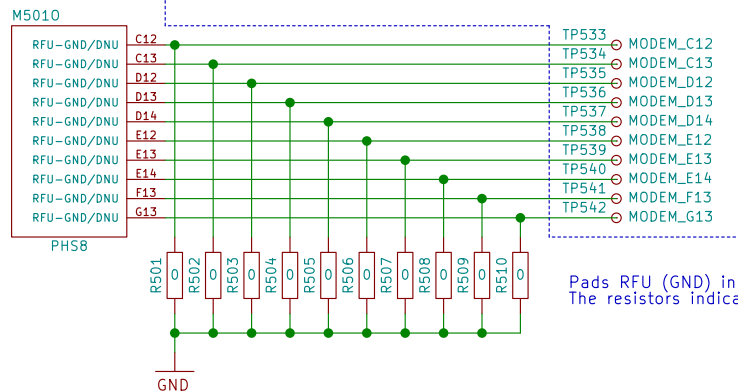
17+10+10 = 37 test points. PCB space permitting, to be arranged in a 6 x 6 + 1 grid with 1.0 mm pitch. This patch field is to be placed adjacent to the SIM B bus test points.



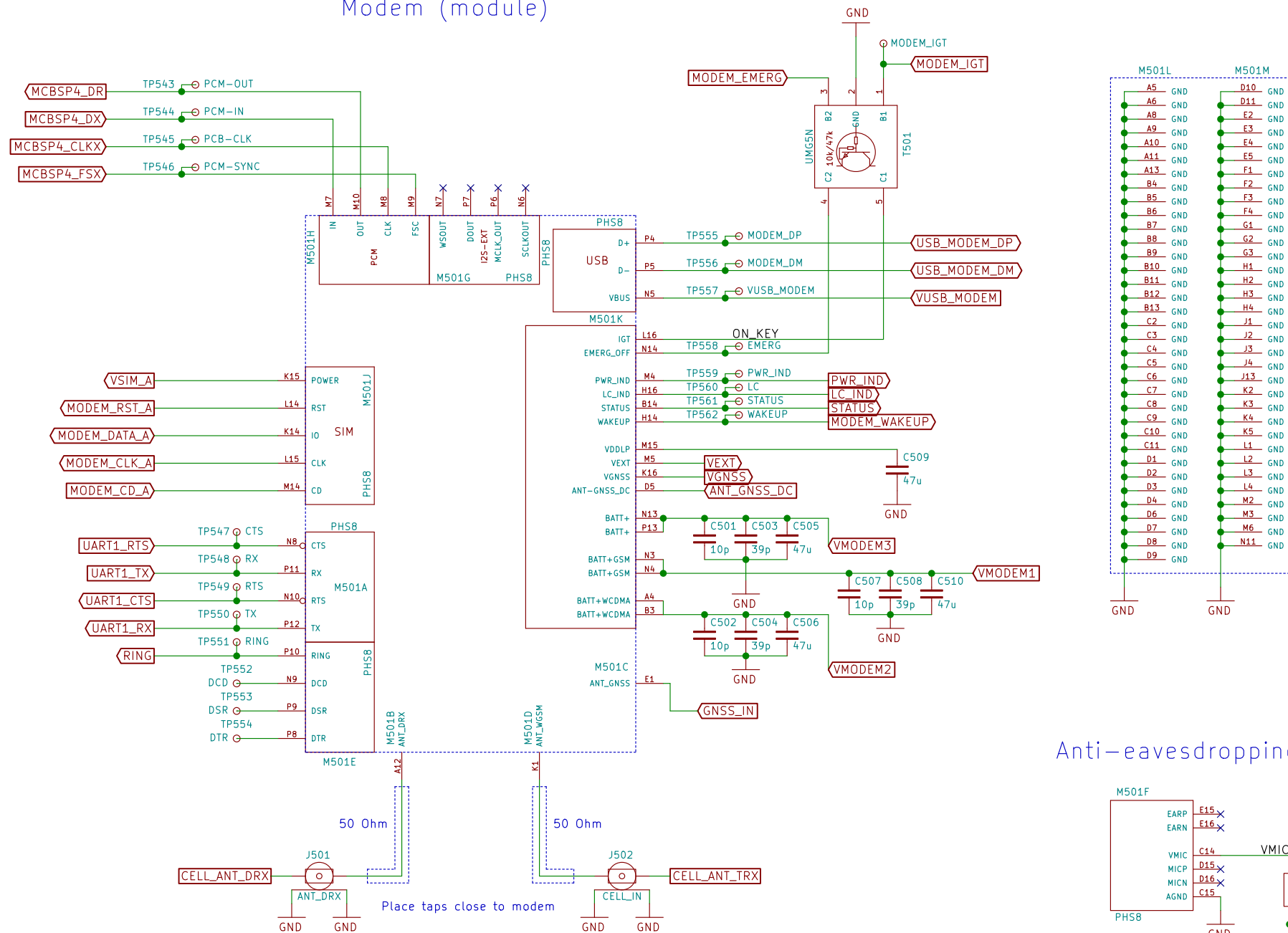
Pads that are DNU in PHS8 and PLS8.



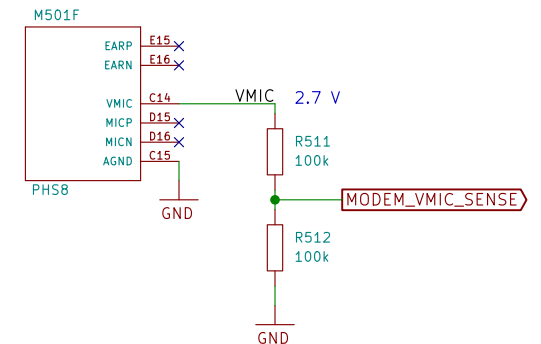
Pads that are DNU in PHS8 but have a GPIO or ADC function assigned to them in PLS8.

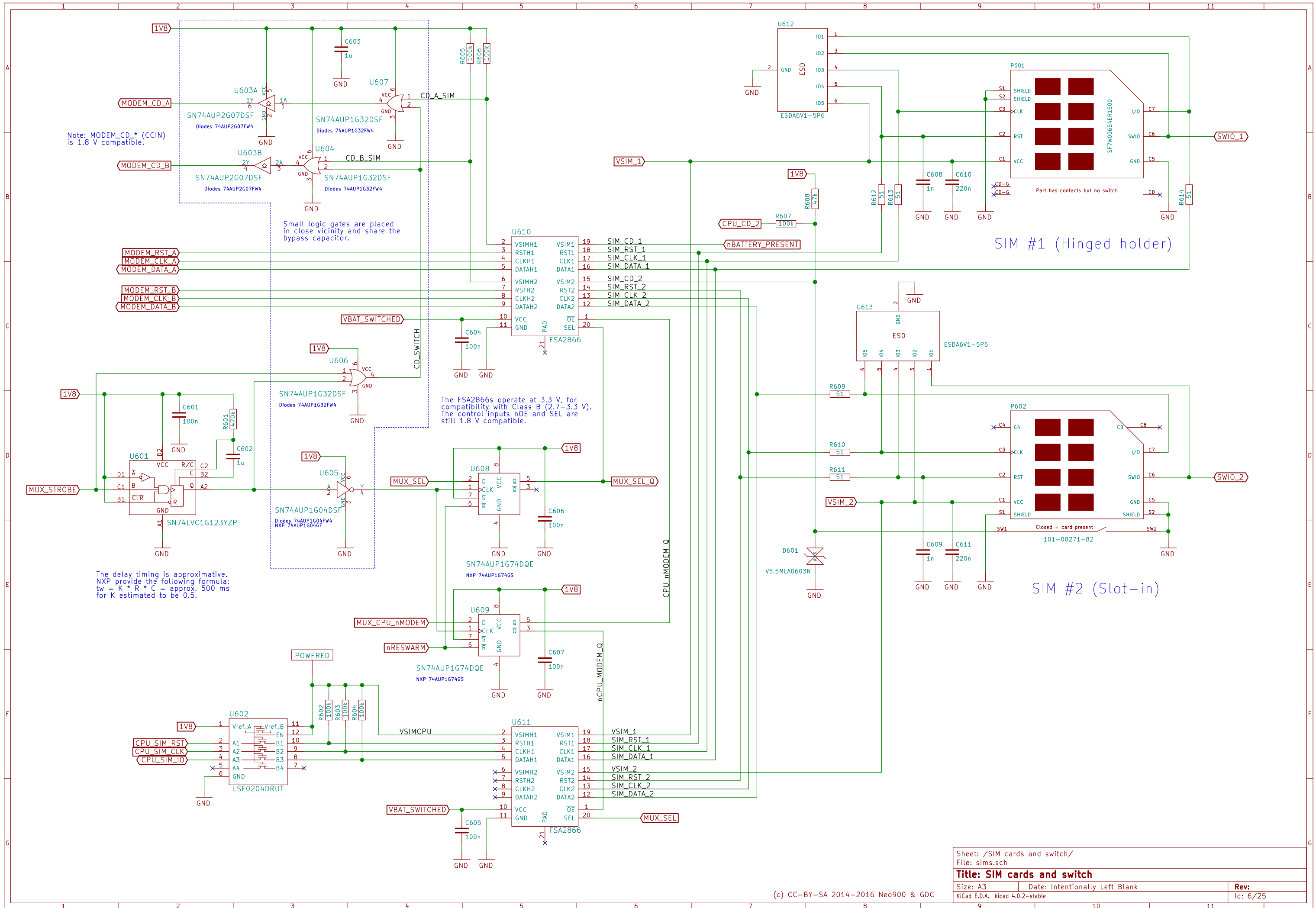


Pads RFU (GND) in PHS8 and RFU (DNU) in PLS8. The resistors indicate cuttable traces.



Anti-eavesdropping





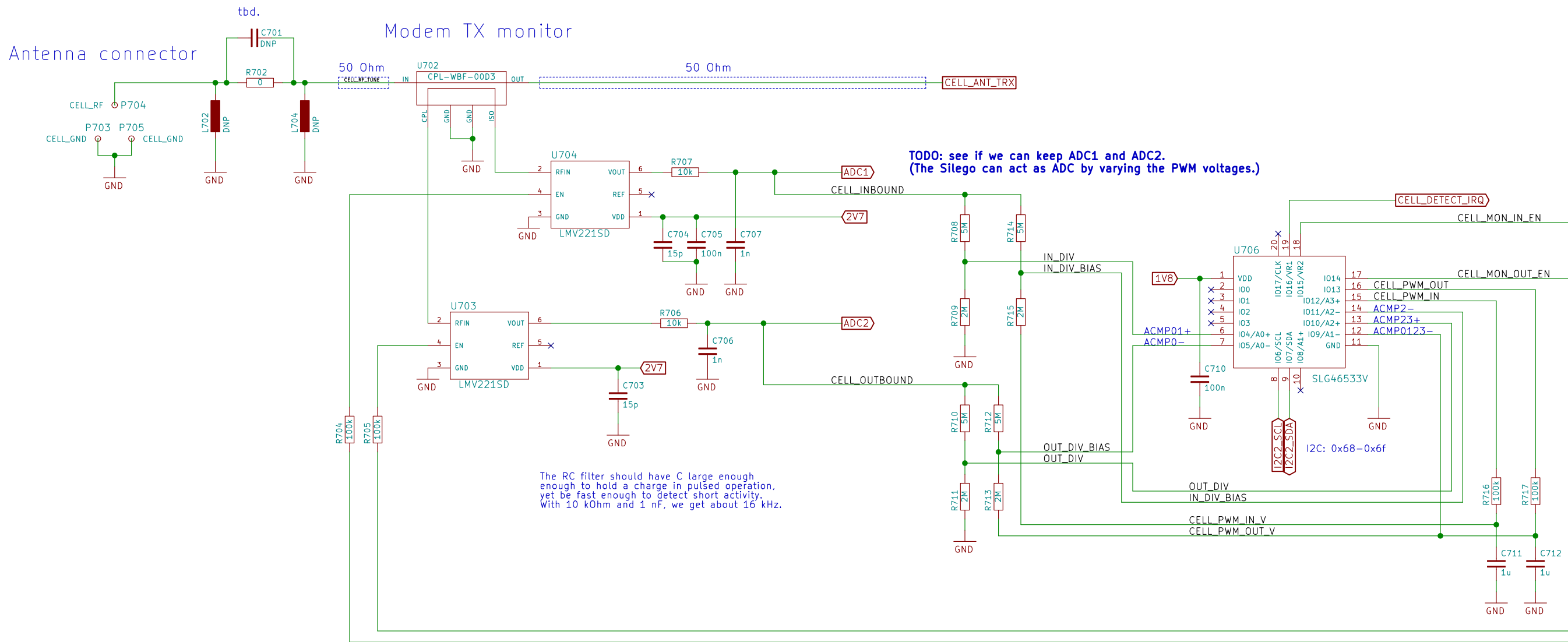
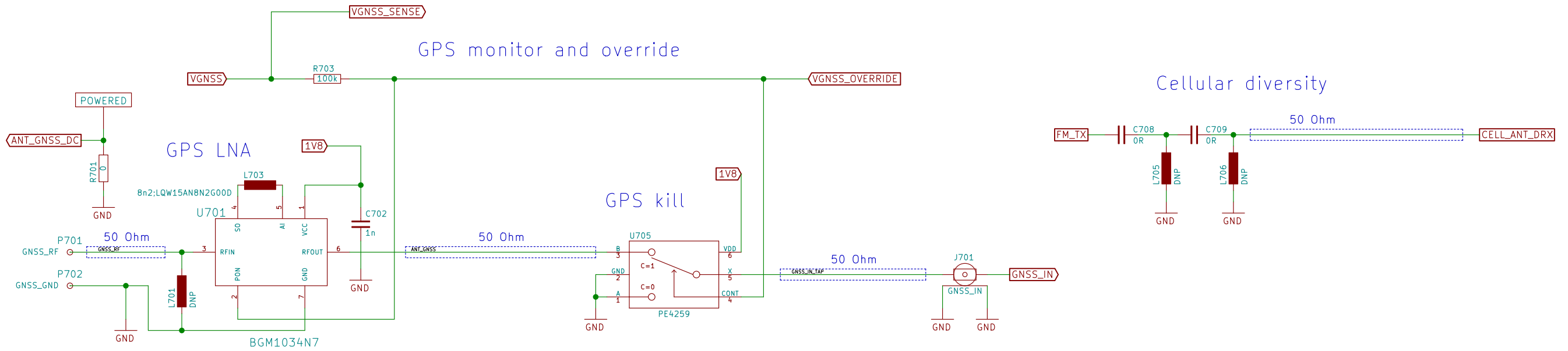
Note: MODEM_CD* (CCIN) is 1.8 V compatible.

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.

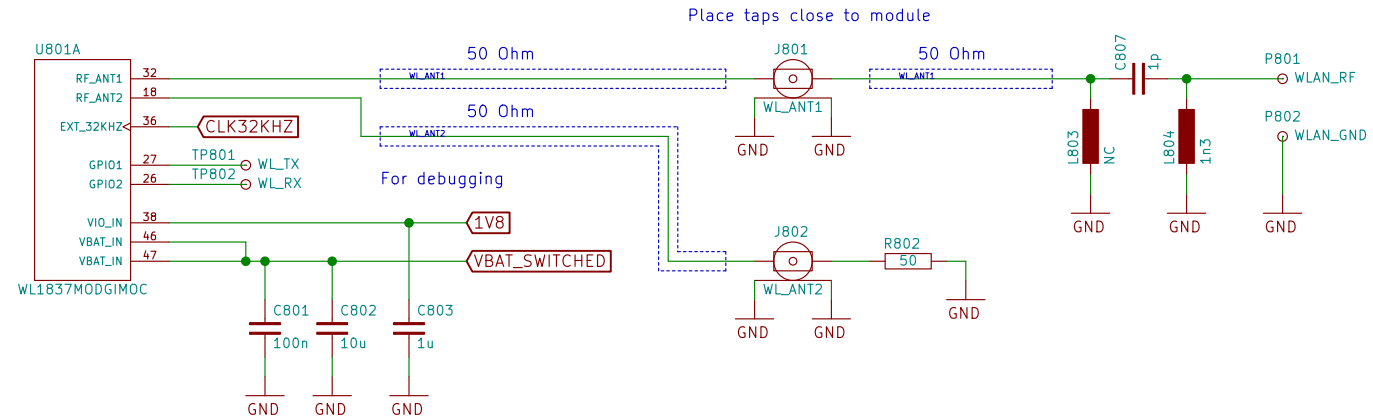
The delay timing is approximative. NXP provide the following formula: $t_w = K * R * C = \text{approx. } 500 \text{ ms}$ for K estimated to be 0.5.

Sheet: /SIM cards and switch/ File: sims.sch		
Title: SIM cards and switch		
Size: A3	Date: Intentionally Left Blank	Rev:
KiCad E.D.A. kicad 4.0.2-stable		Id: 6/25

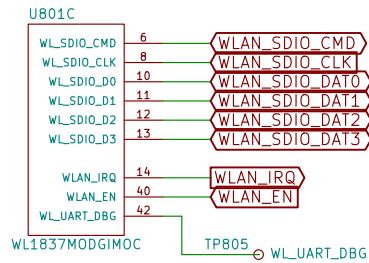


TODO: assign footprints for c-spring contacts

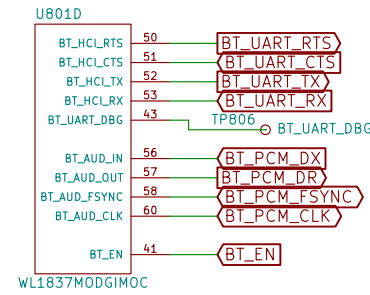
WLAN/BT antenna



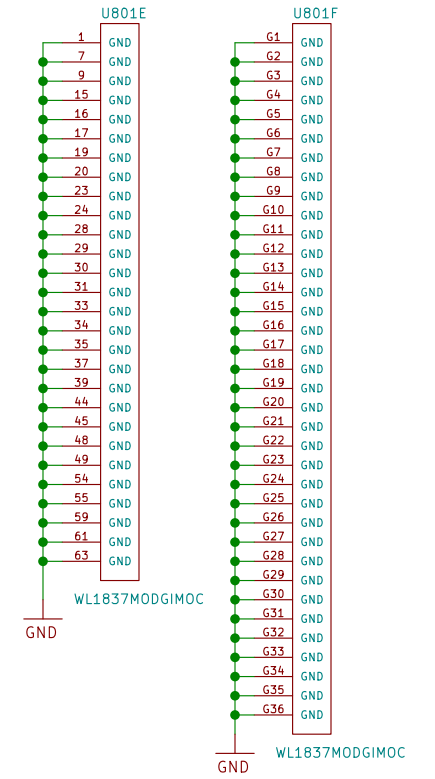
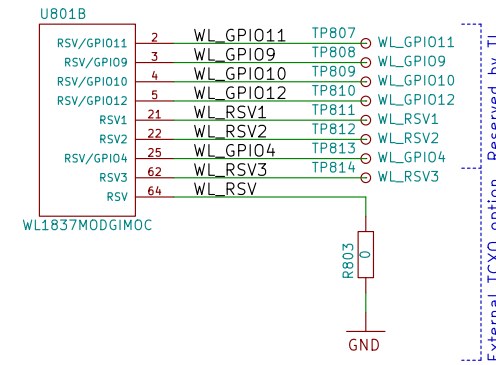
WLAN



Bluetooth

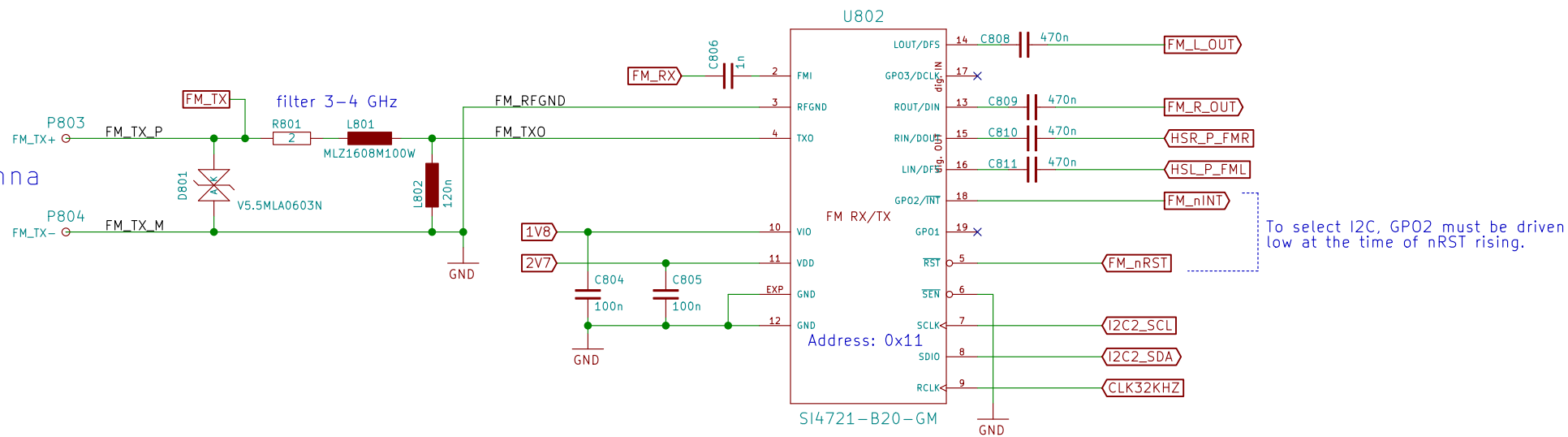


Reserved / Debugging



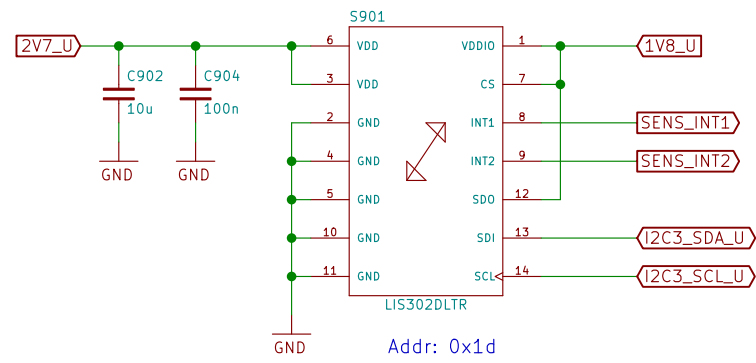
FM Radio (TX/RX)

FM TX antenna

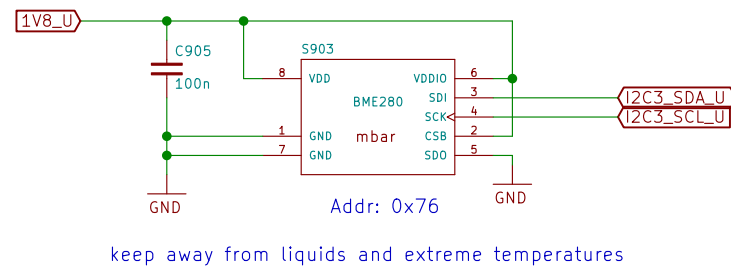


Si4705 is pin compatible (mostly) but RX-only

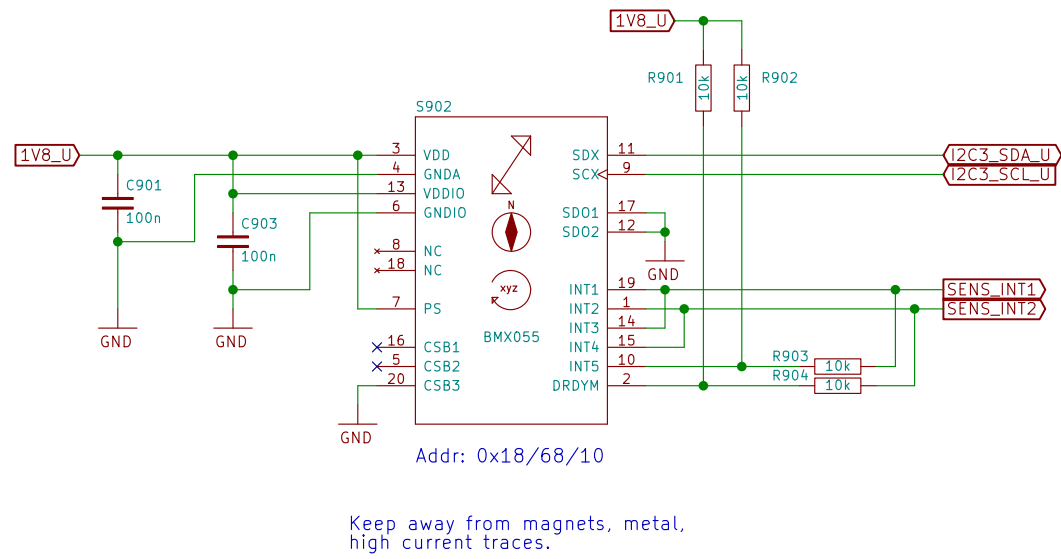
Acceleration (legacy)



Pressure, humidity

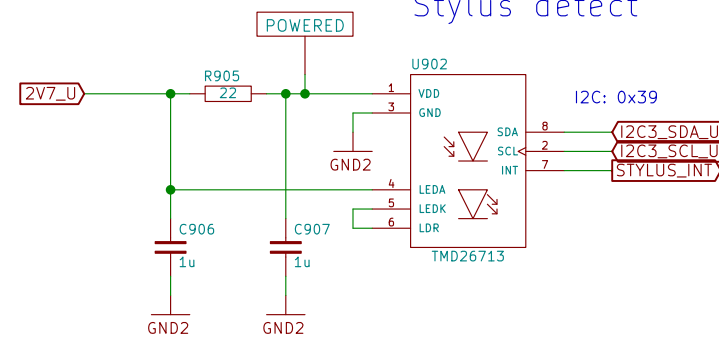


9-axis (acceleration, gyroscope, magnetometer)

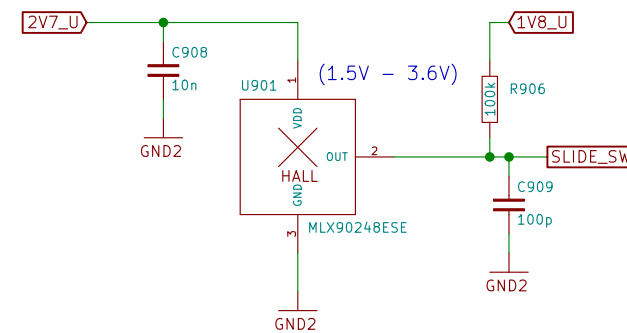


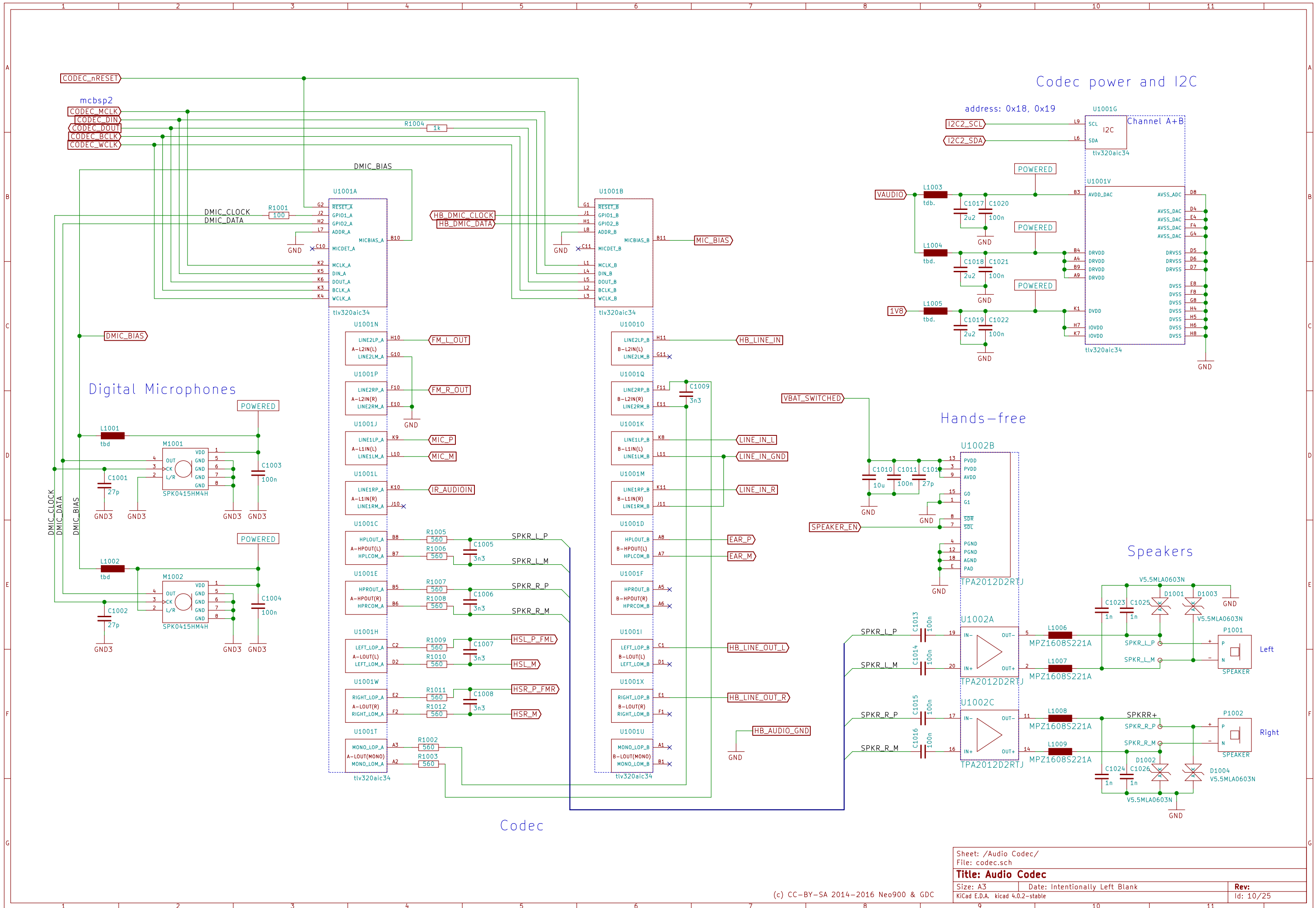
UPPER
LOWER

Stylus detect

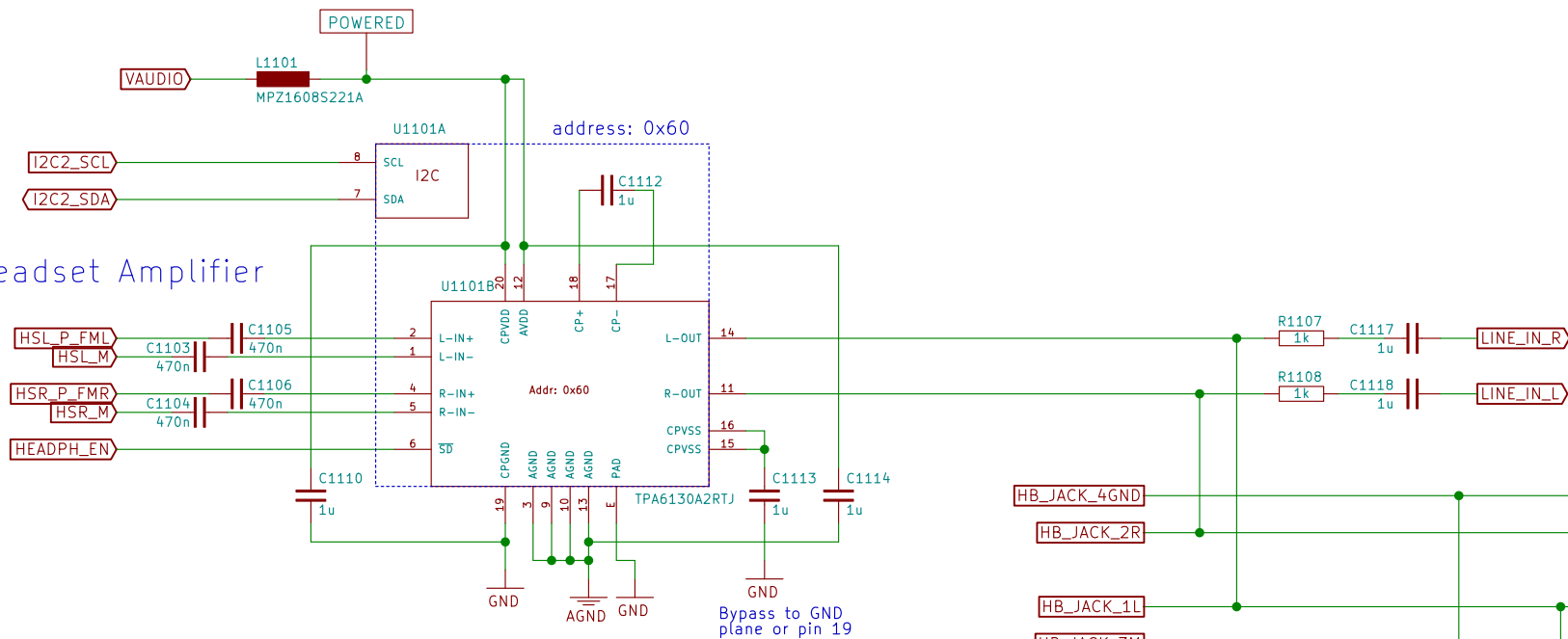


Slide sensor

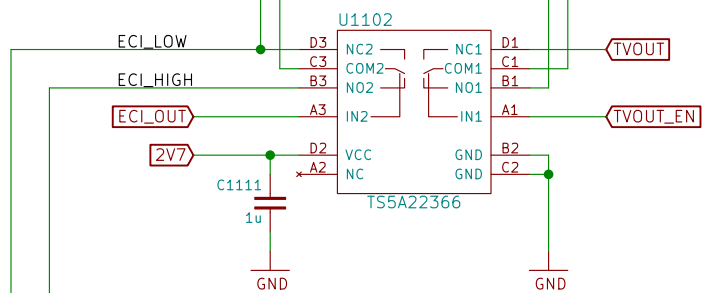




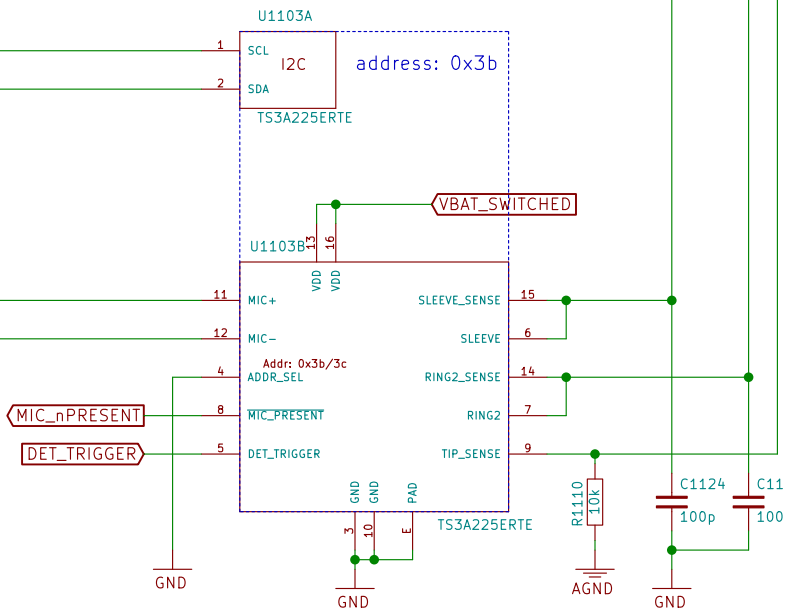
Headset Amplifier



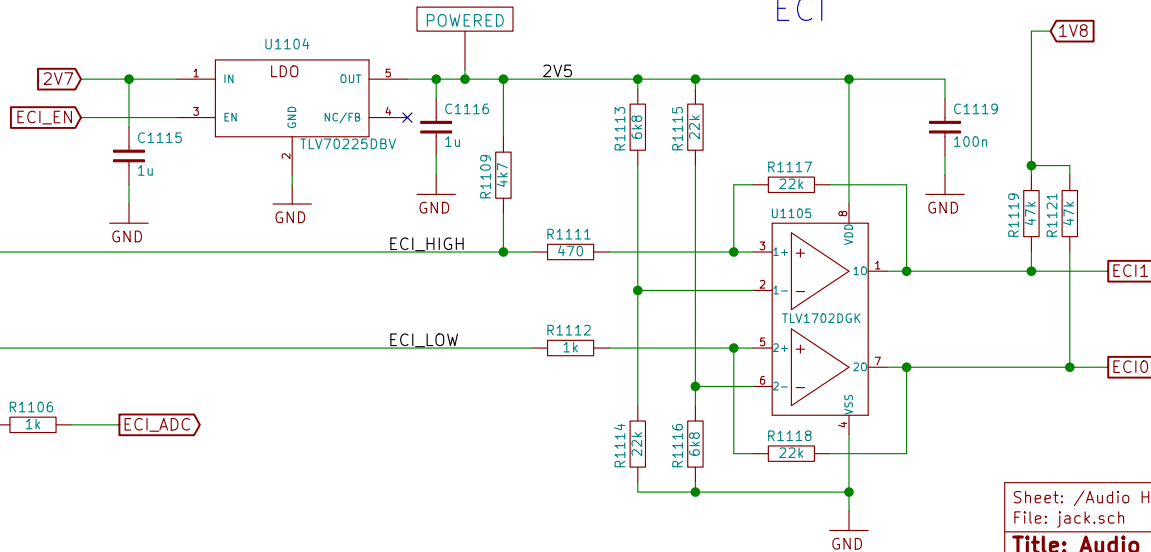
Video Switch



Microphone Switch

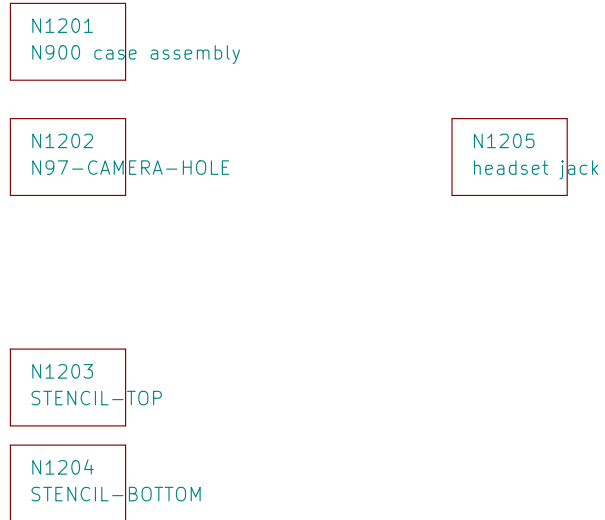


ECI

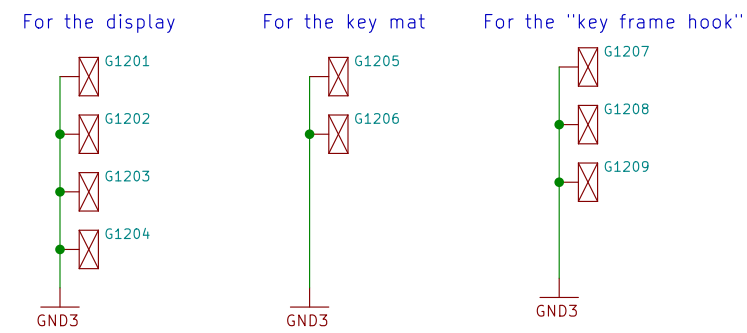


Sheet: /Audio Headset, ECI/		File: jack.sch	
Title: Audio Headset, ECI		Date: Intentionally Left Blank	
Size: A3	KiCad E.D.A. kicad 4.0.2-stable	Rev:	Id: 11/25

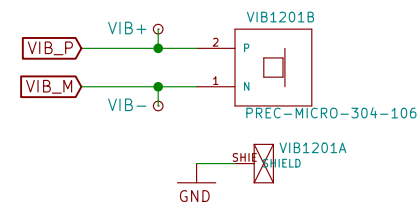
No-Solder Components



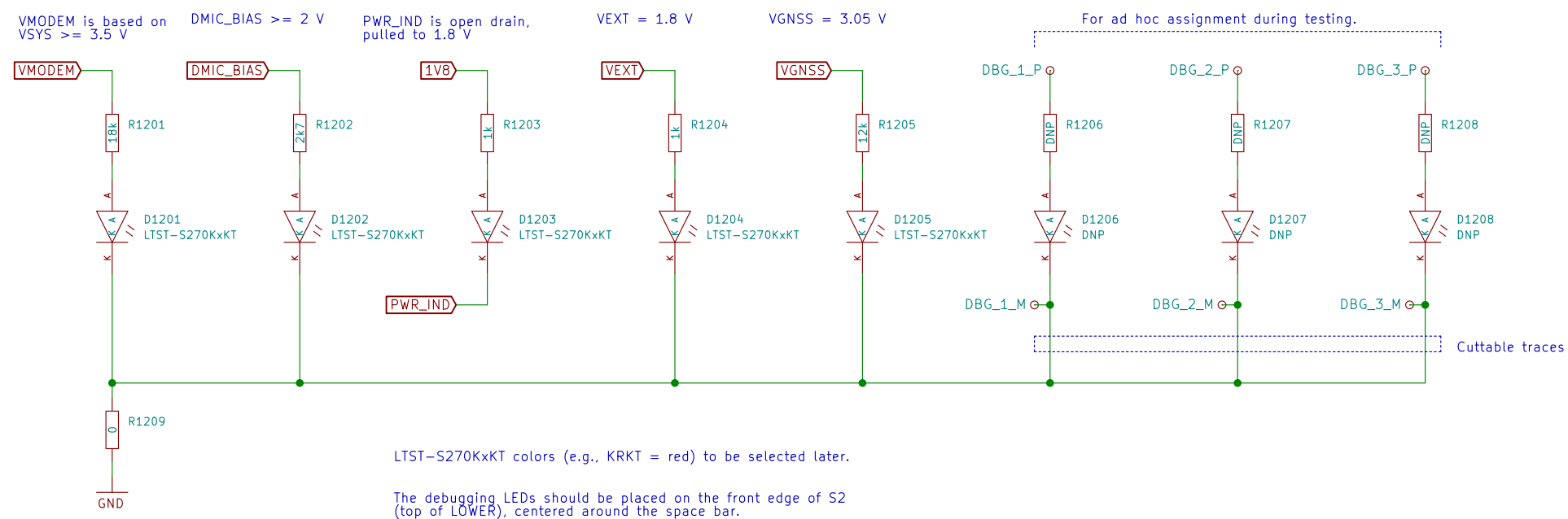
Shield Contacts on UPPER



Vibramotor



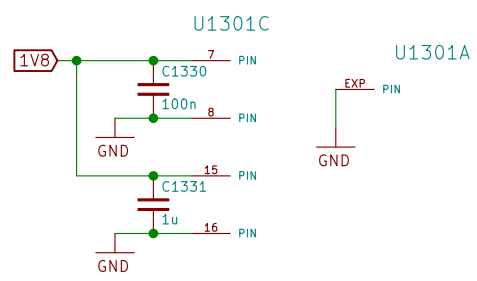
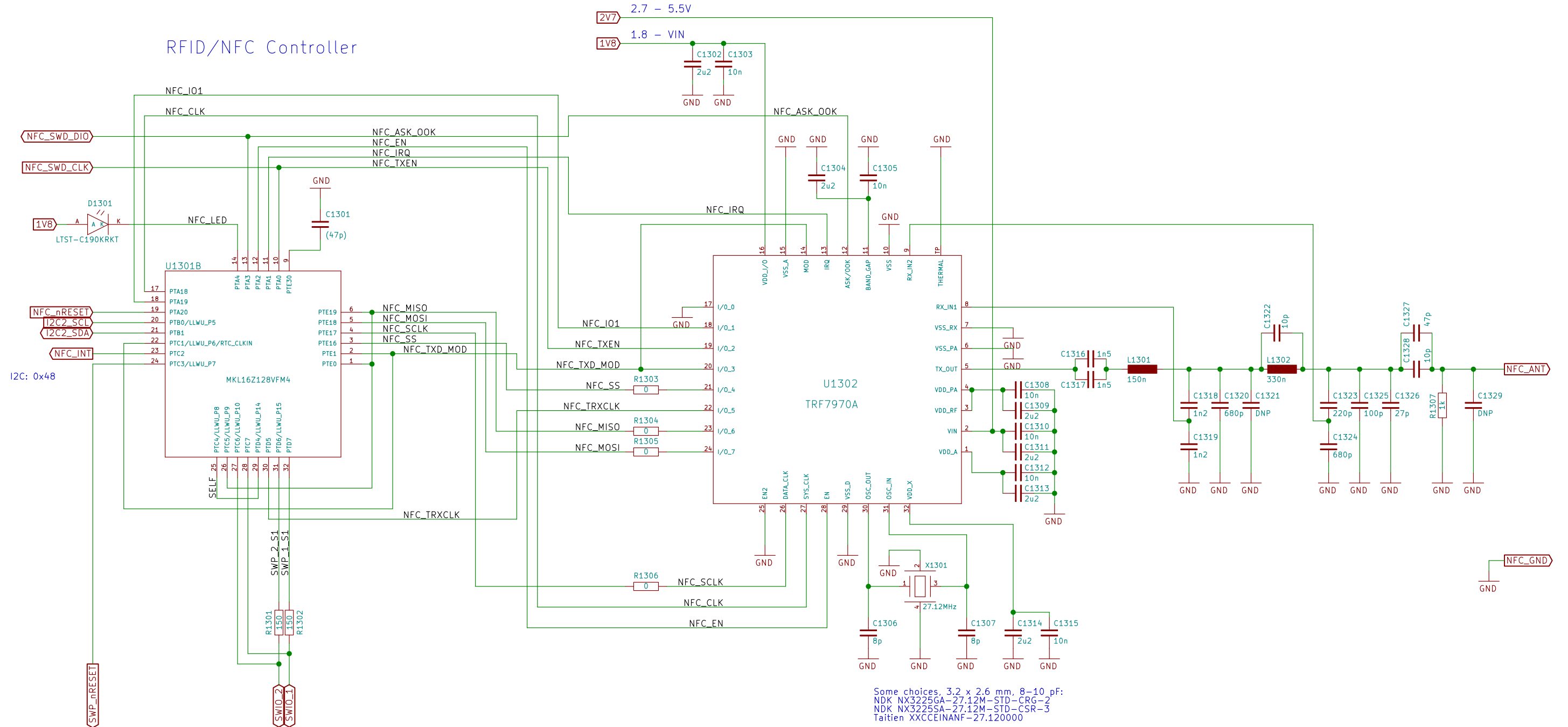
Hardware scrutiny LEDs



Sheet: /Misc/ File: misc.sch		
Title: Misc		
Size: A3	Date: Intentionally Left Blank	Rev:
KiCad E.D.A. kicad 4.0.2-stable		Id: 12/25

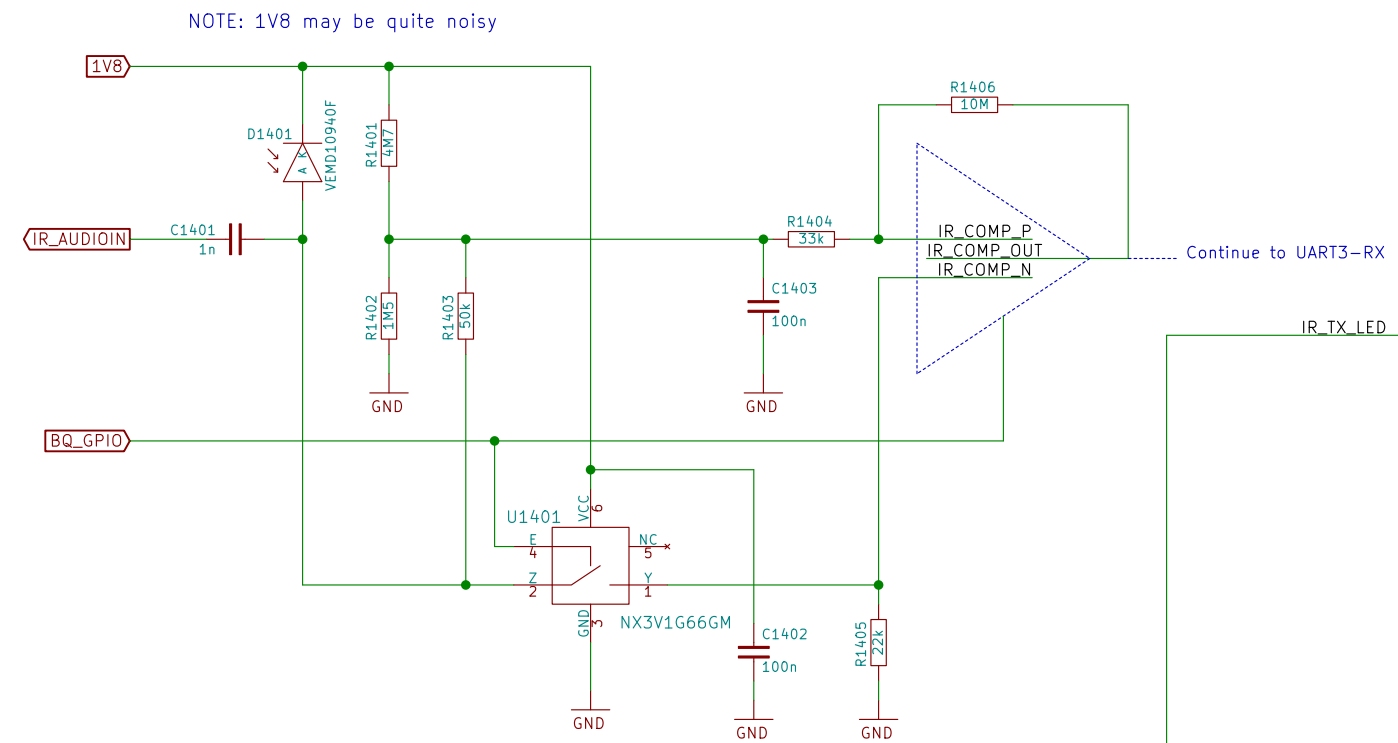
RFID/NFC Transceiver

RFID/NFC Controller

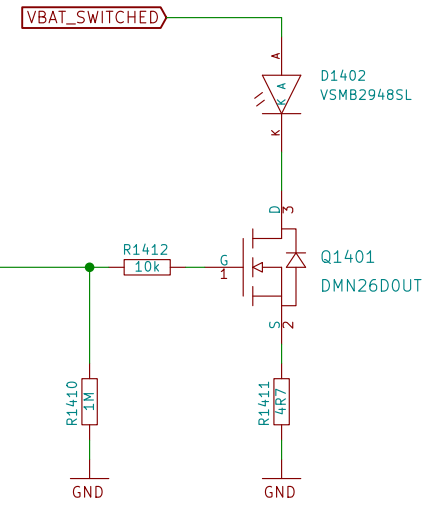


Sheet: /RFID/NFC/		
File: nfc.sch		
Title: RFID/NFC		
Size: A3	Date: Intentionally Left Blank	Rev:
KiCad E.D.A. kicad 4.0.2-stable		Id: 13/25

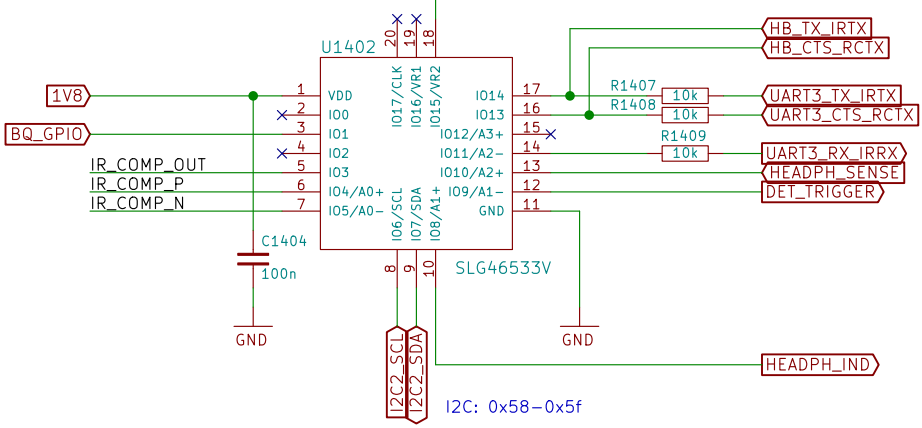
IR receiver



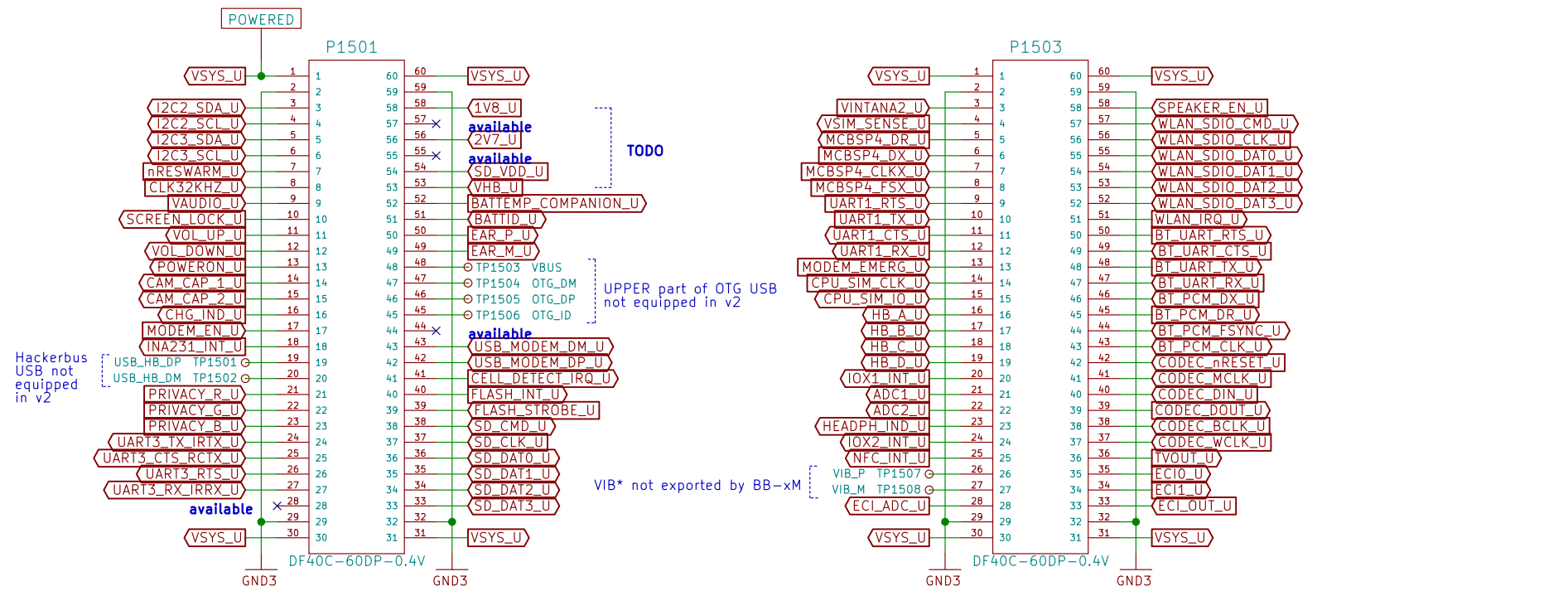
IR transmitter



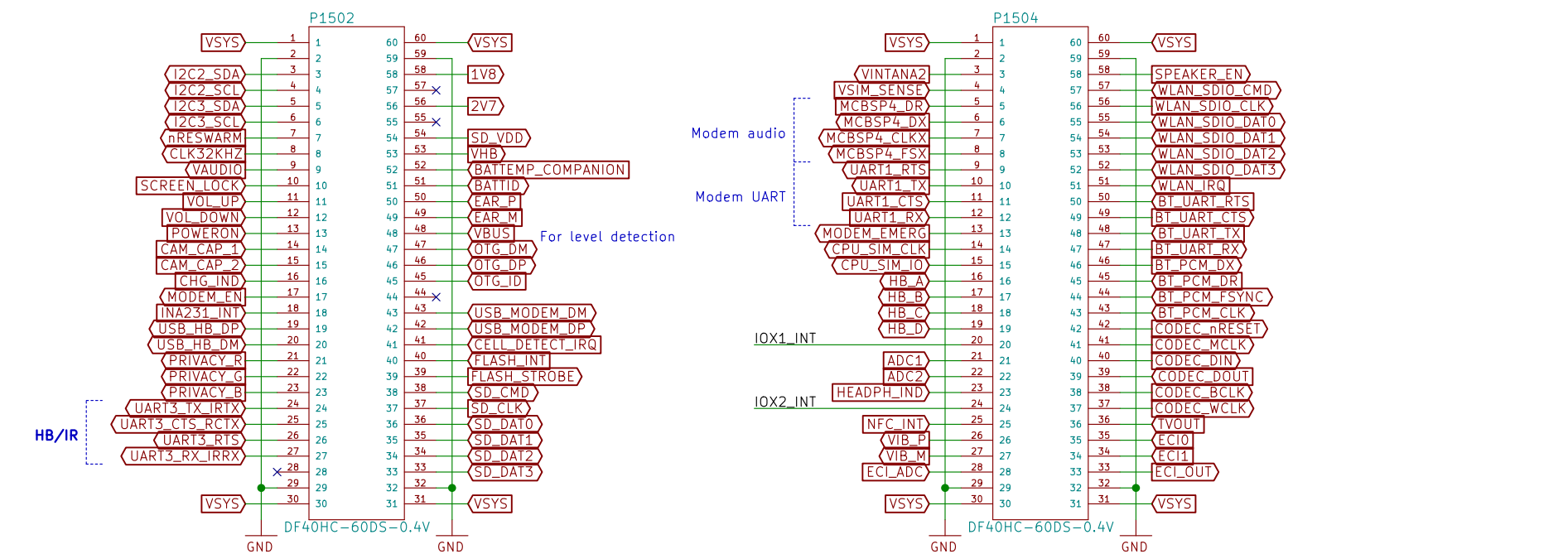
IR send/receive logic



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

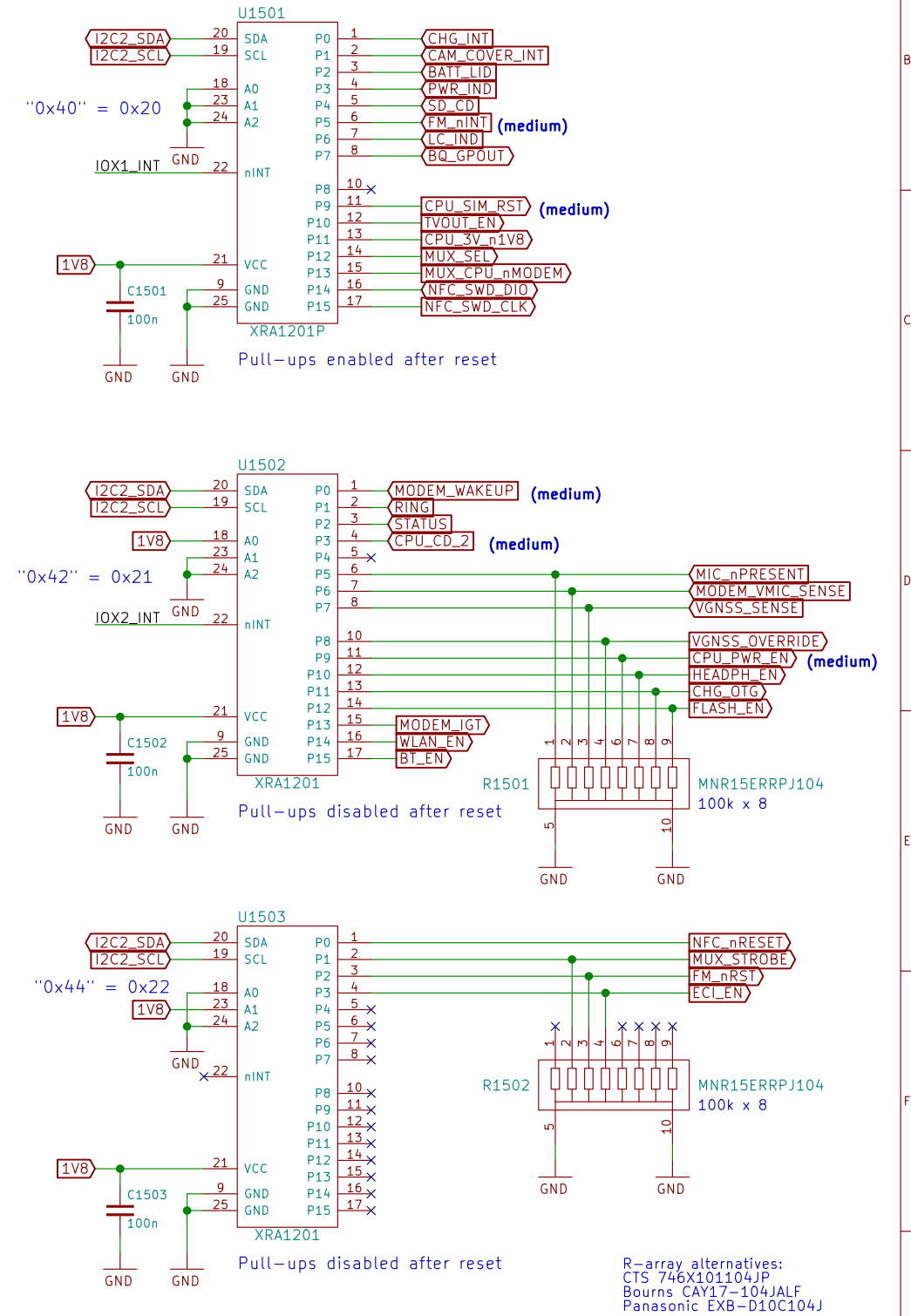


UPPER
LOWER



Current rating per contact: 0.3 A

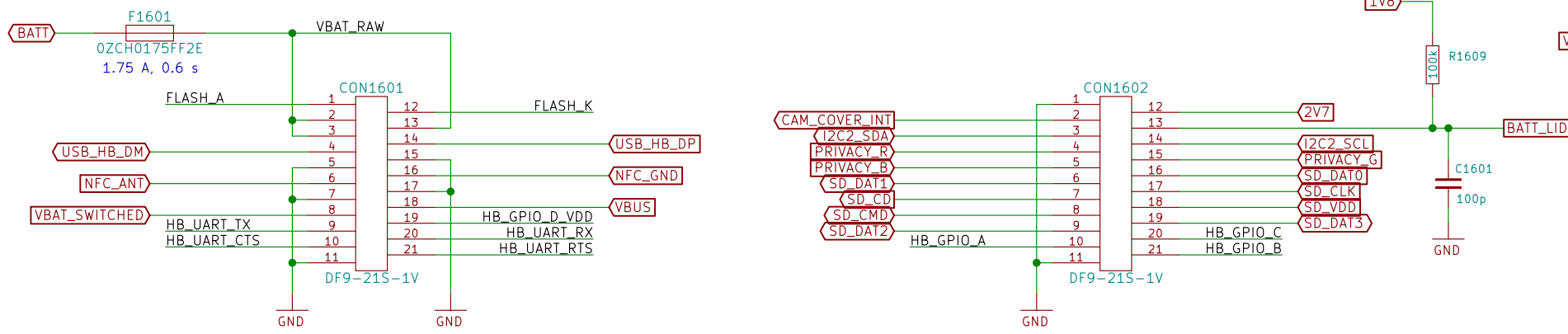
IO expanders (on LOWER)



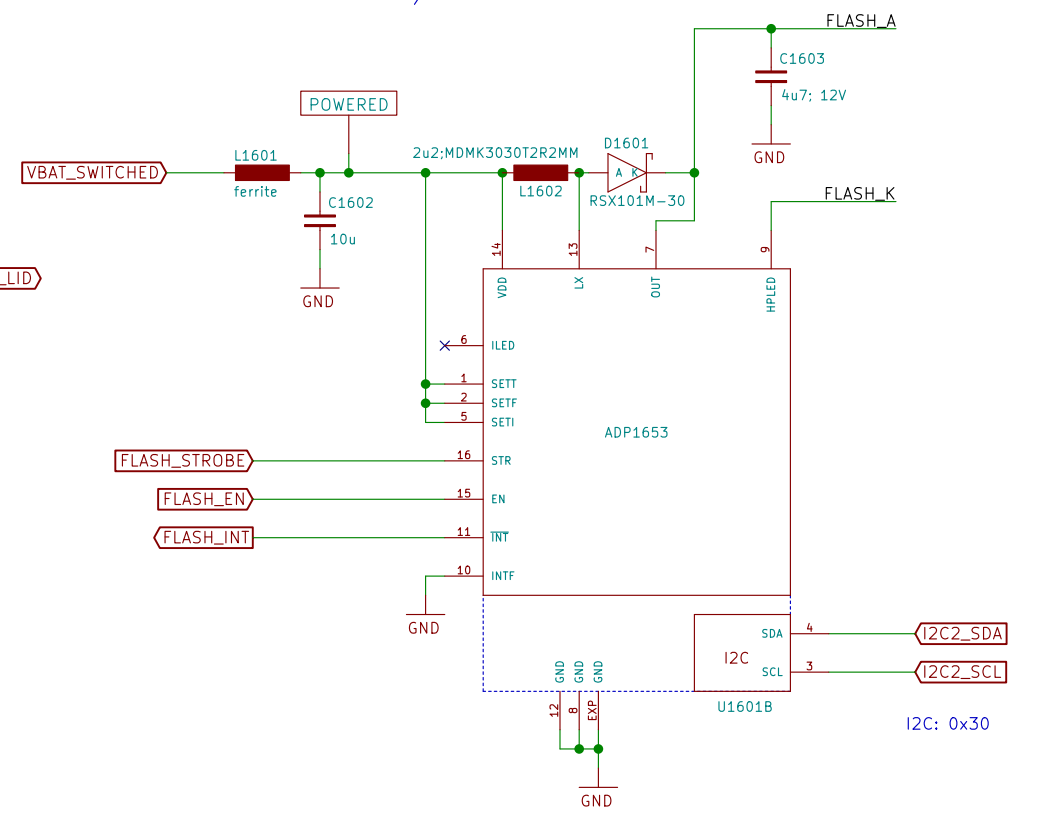
R-array alternatives:
CTS 746X101104JP
Bourns CAY17-104JALF
Panasonic EXB-D10C104J

LOWER-BOB Interconnect (LOWER side)

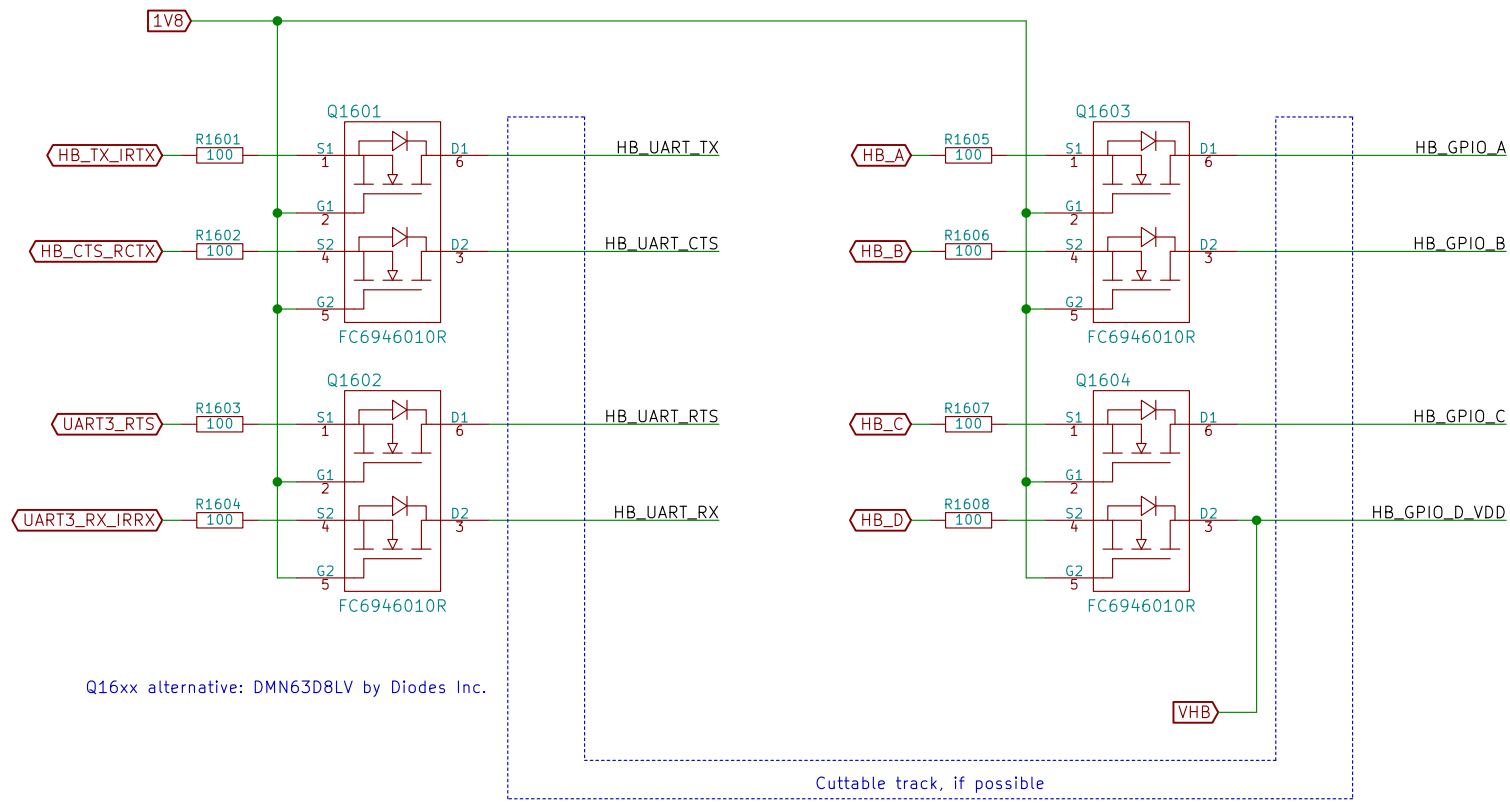
Defined in the Hackerbus specification, <http://neo900.org/stuff/papers/hb.pdf>



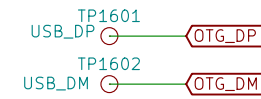
Flash/Torch



Level shifters for Hackerbus GPIO and UART



Q16xx alternative: DMN63D8LV by Diodes Inc.

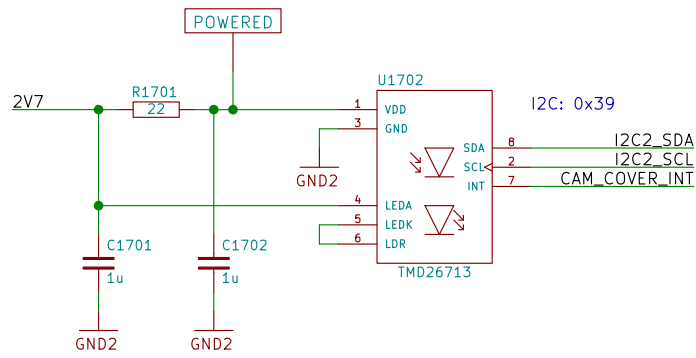


Patch field

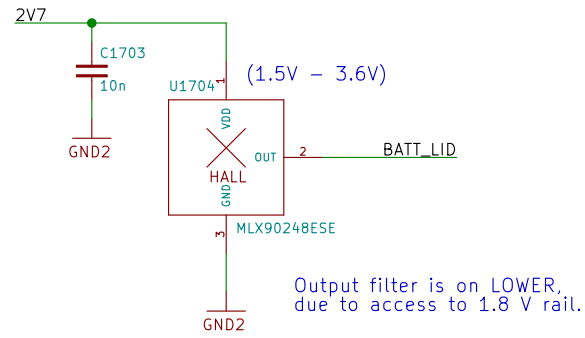
The following signals (or some of them) – **IF FEASIBLE** – should be made available on testpoints next to the 0 Ohm (jumper) array of R1601 to R1608 for easy yellow wire solder-patching of secondary HB pin functions.

- TP1603 ○ — I2C3_SDA
- TP1604 ○ — I2C3_SCL
- TP1605 ○ — OTG_ID
- TP1606 ○ — HB_LINE_OUT_L
- TP1607 ○ — HB_LINE_OUT_R
- TP1608 ○ — HB_LINE_IN
- TP1609 ○ — HB_AUDIO_GND
- TP1610 ○ — HB_JACK_1L
- TP1611 ○ — HB_JACK_2R
- TP1612 ○ — HB_JACK_3M
- TP1613 ○ — HB_JACK_4GND
- TP1614 ○ — HB_DMIC_CLOCK
- TP1615 ○ — HB_DMIC_DATA

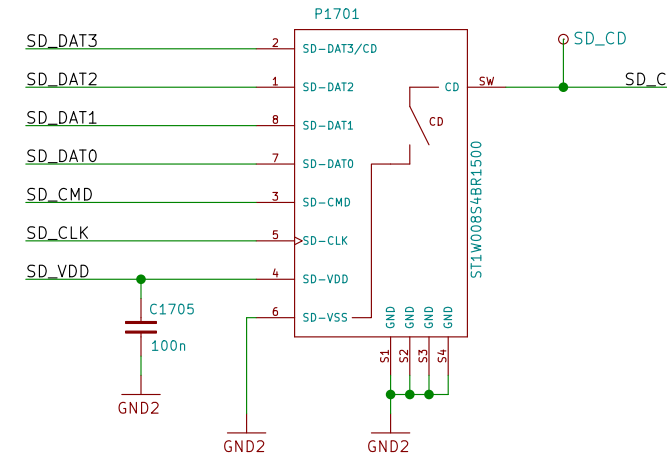
Camera Cover detect



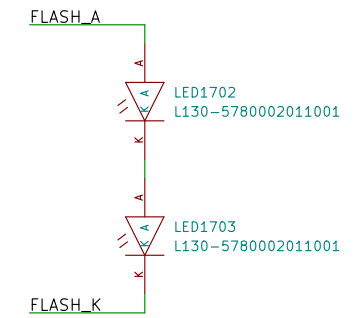
Battery Cover detect



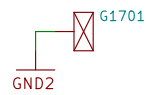
Memory card holder



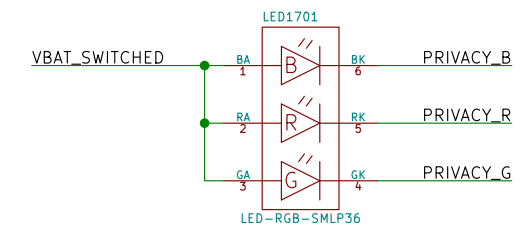
Camera flash



Camera lens plate

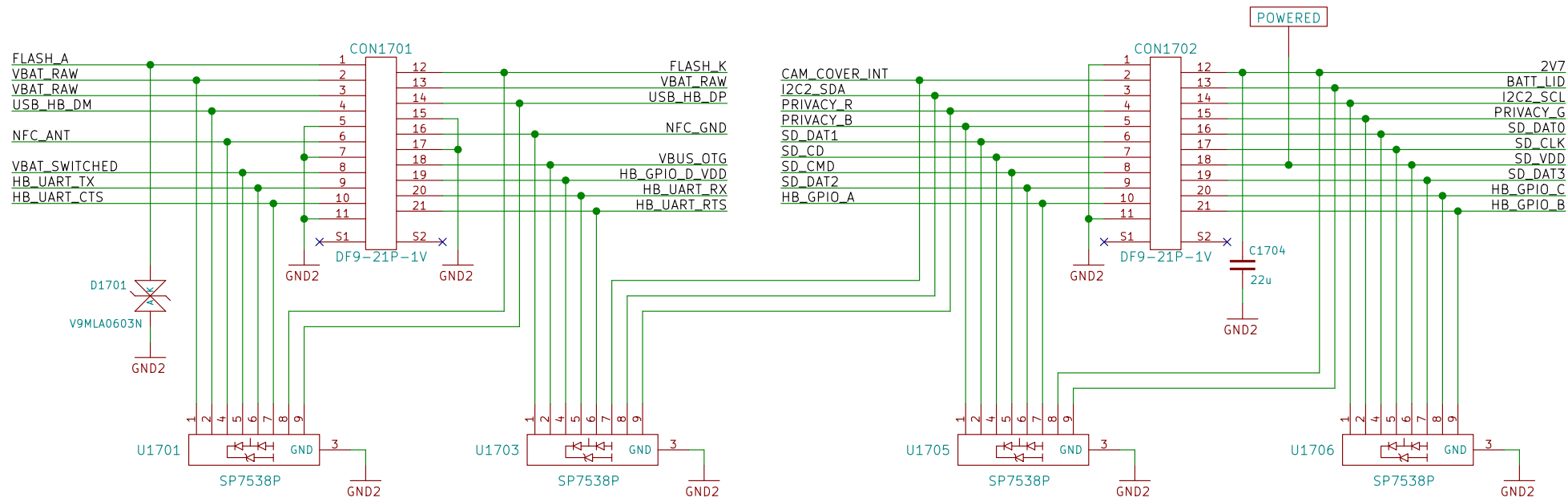


Privacy LED

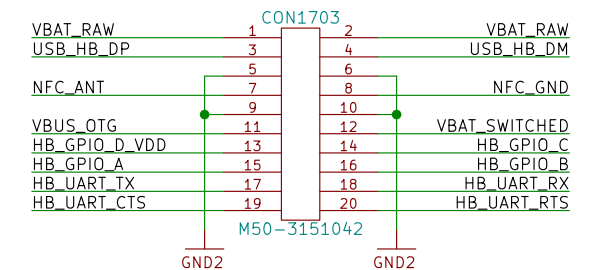


LOWER-BOB Interconnect (BOB side)

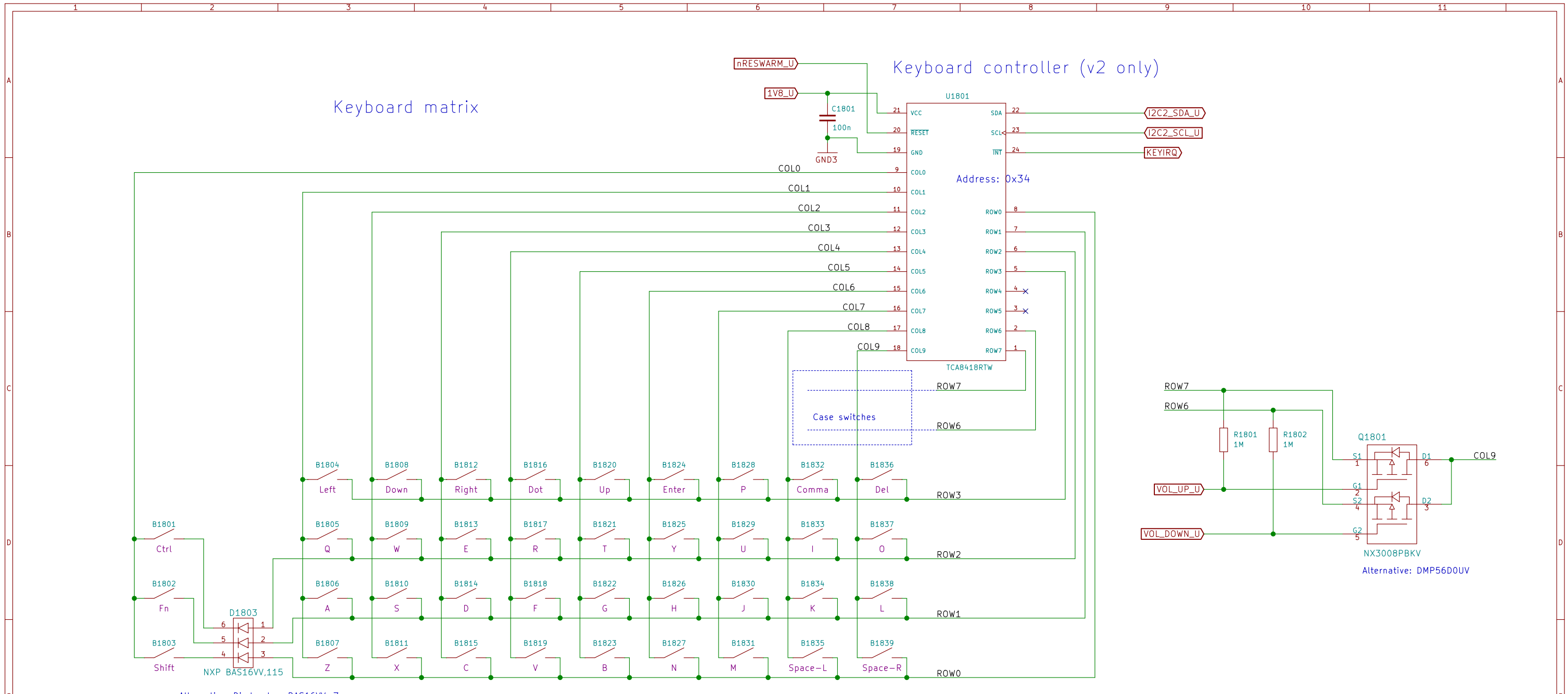
Defined in the Hackerbus specification, <http://neo900.org/stuff/papers/hb.pdf>



Hackerbus



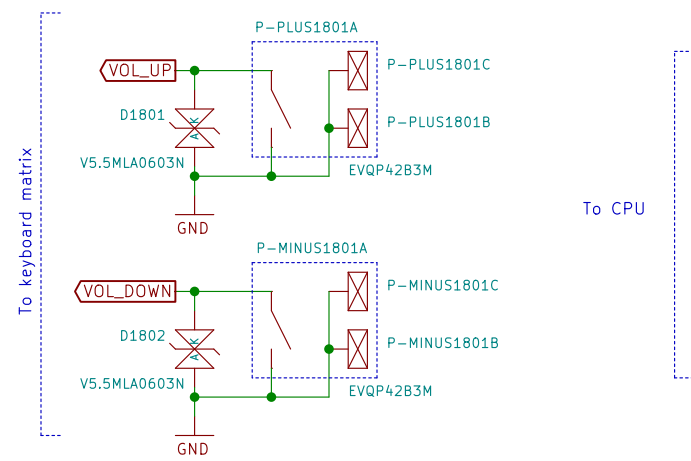
**ESD pin assignment is only indicative.
Actual assignment to be defined by layout.**



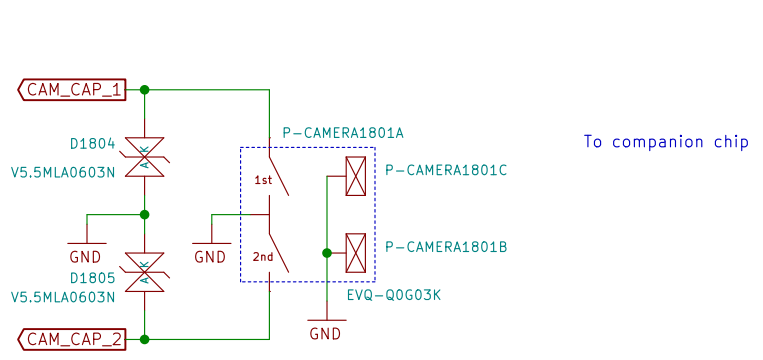
Alternative: Diodes Inc. BAS16VV-7
Warning: Diodes Inc. have cathodes on pin 1 side, NXP anodes !

UPPER
LOWER

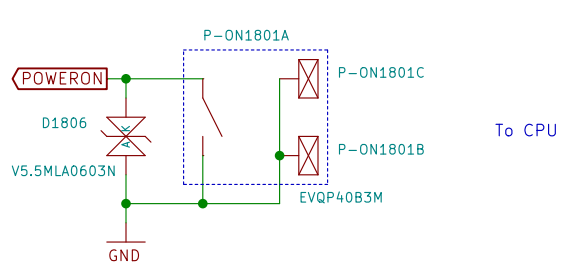
Volume



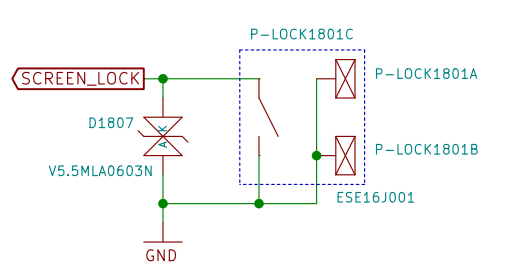
Camera trigger



On-off



Lock switch

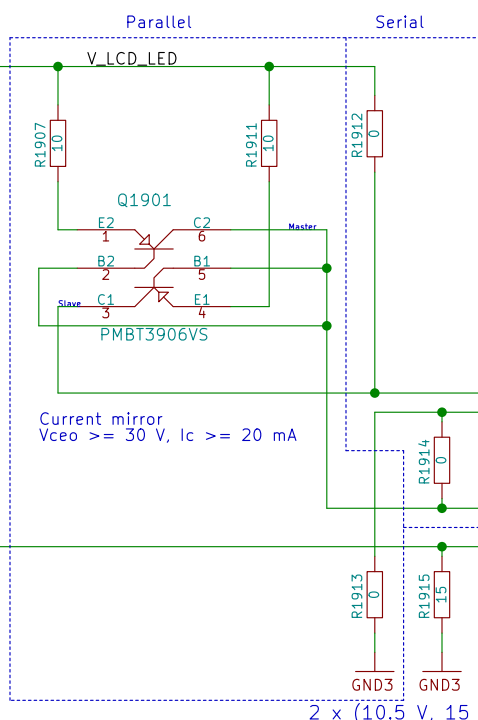
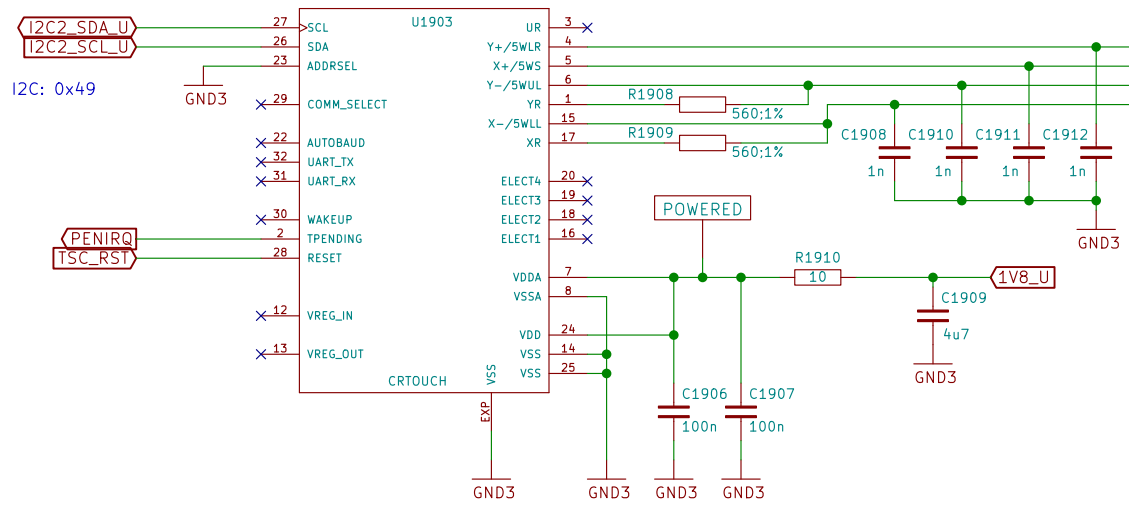


LCD_LEDS_PWM shall connect to TWL4030, GPIO6/PWM0, ball M4.

CABC

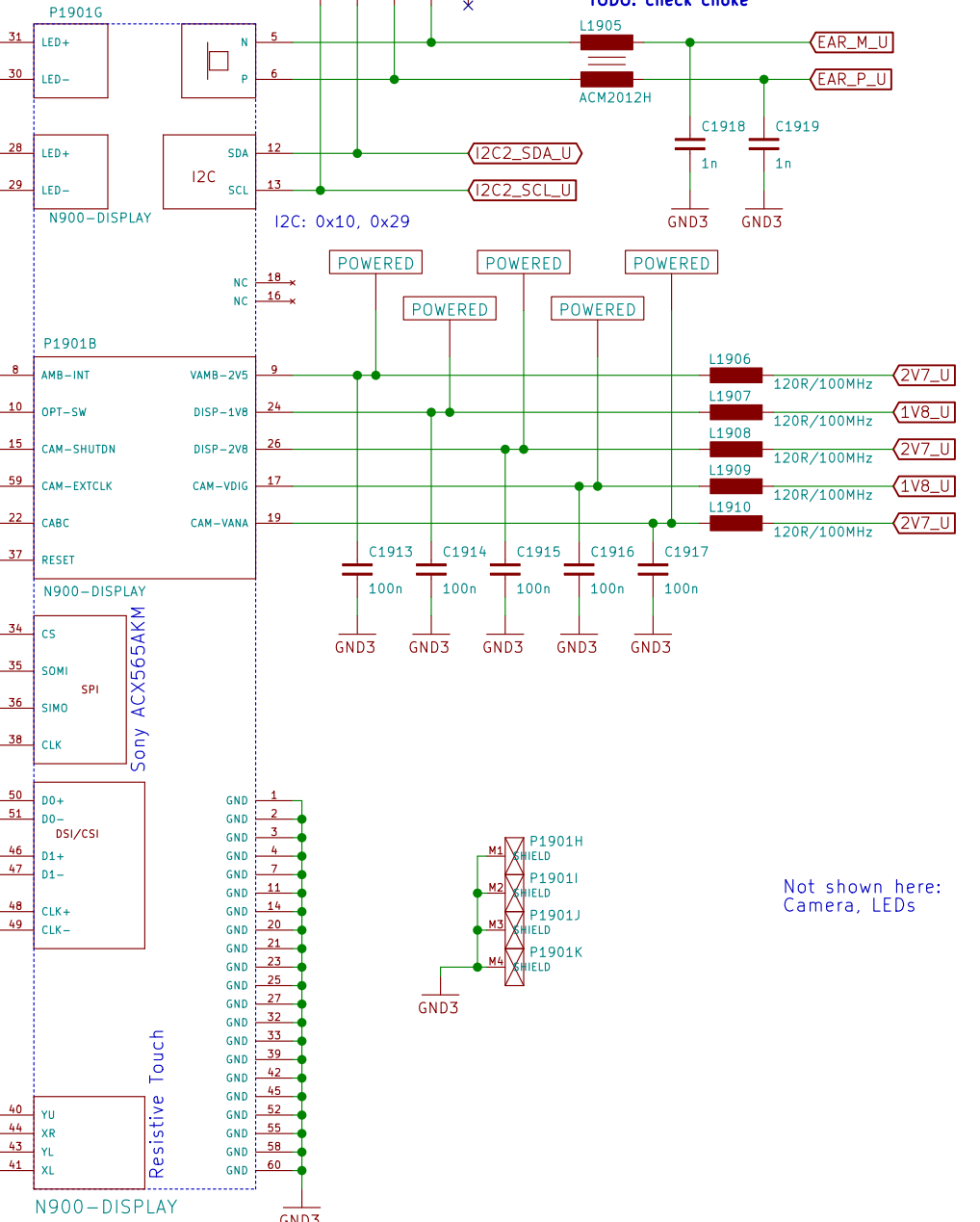
N900 has 22k pull-up to 1V8 on PROXY. SFH7741 data sheet says 10 kOhm to 1 MOhm is fine, so we just leave the pulling to the OMAP, $I_{pull(min)} = 50 \mu A = 36 k\Omega @ 1.8 V$.

Touch screen controller

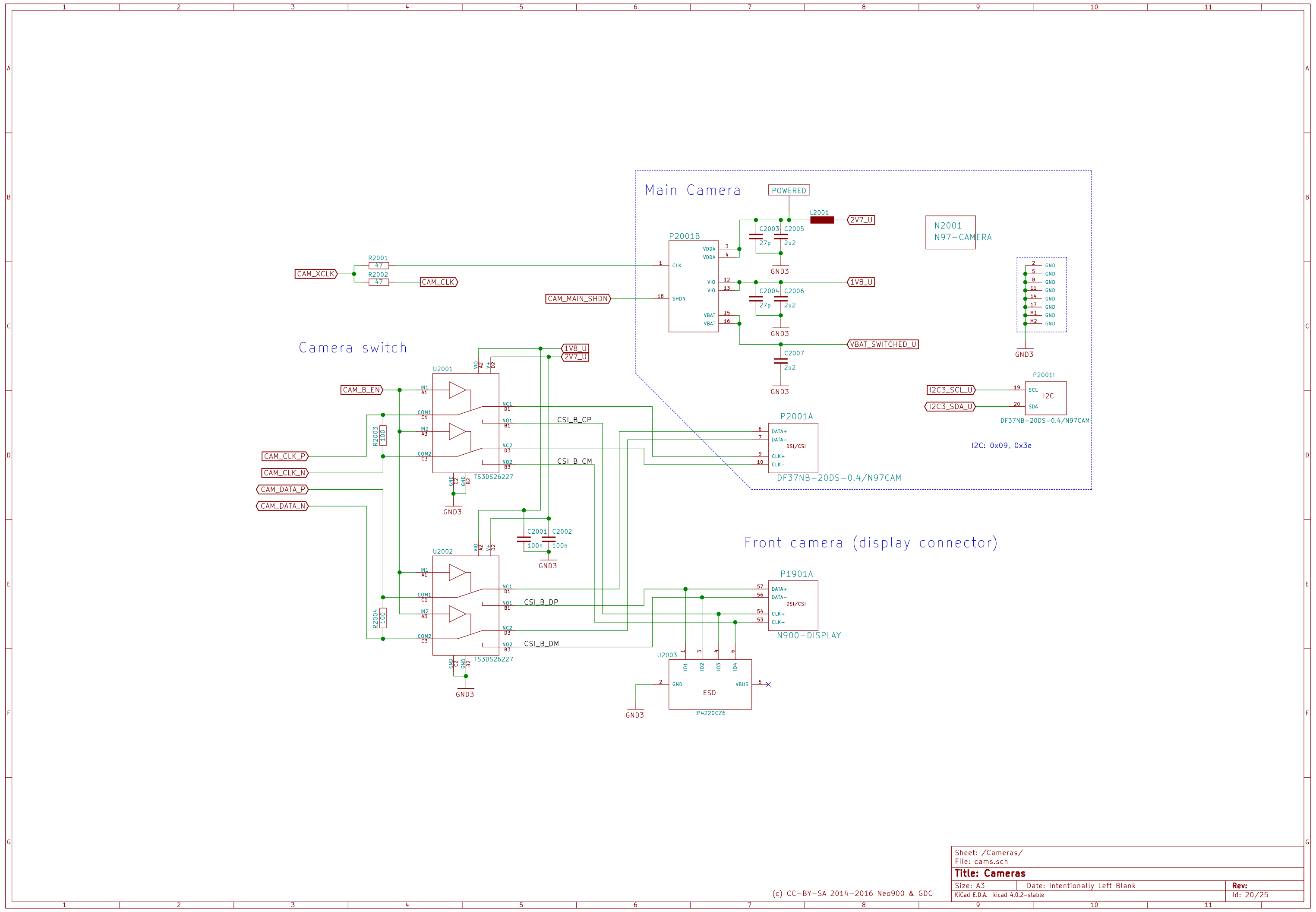


Populate EITHER parallel (with current mirror) OR serial.

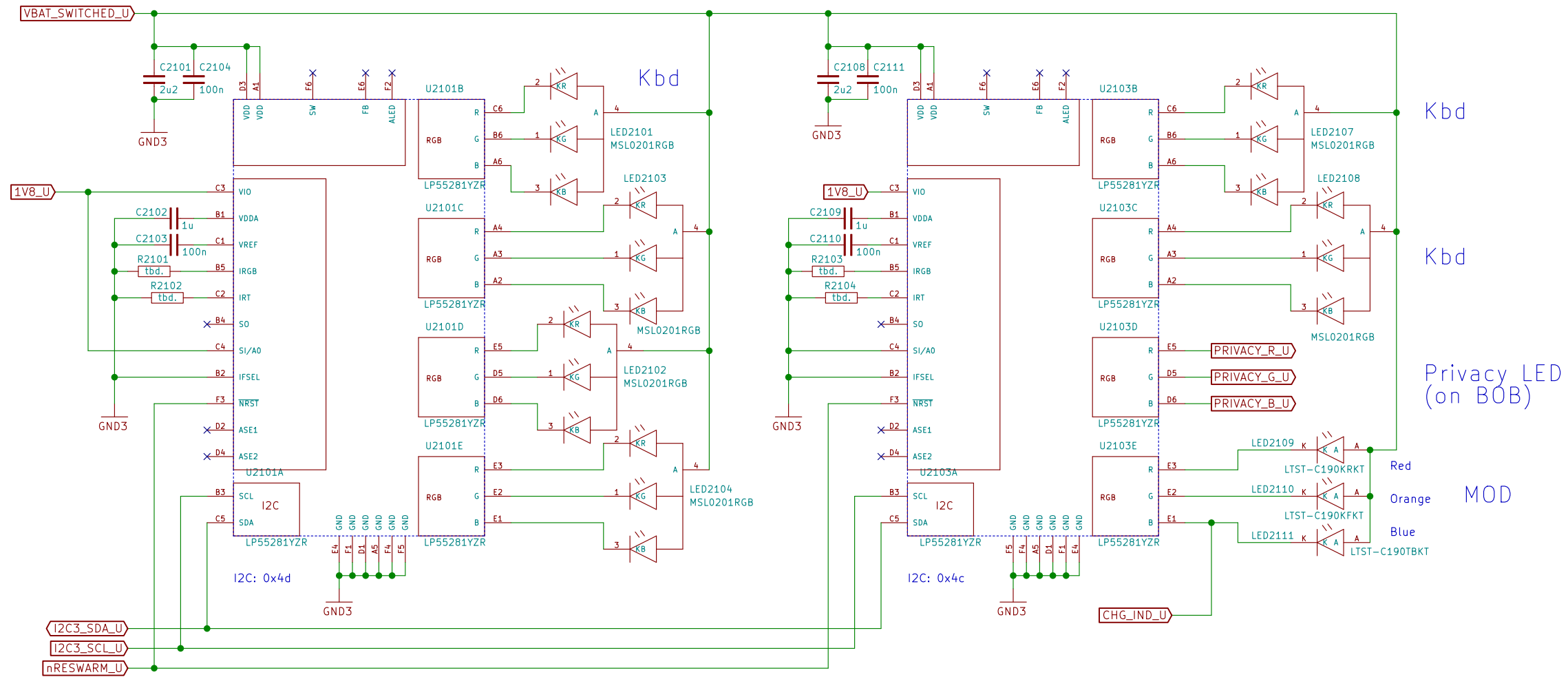
Display Connector



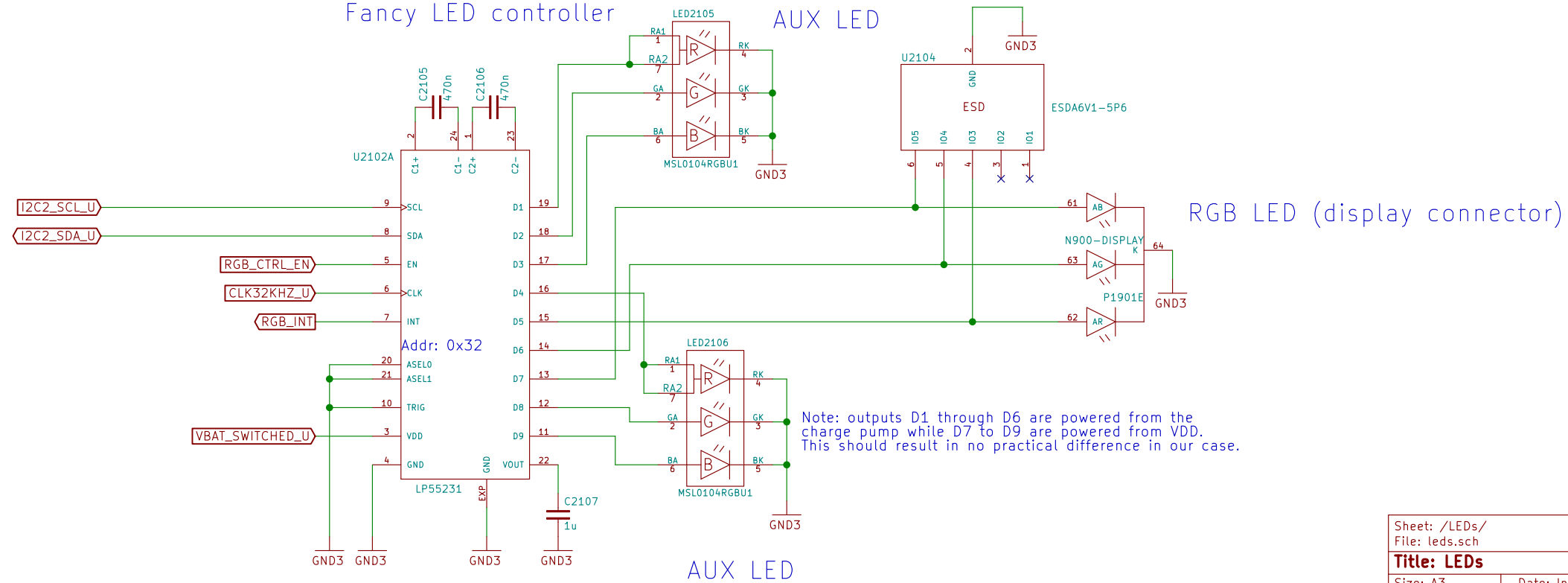
Not shown here: Camera, LEDs



Basic LED controllers

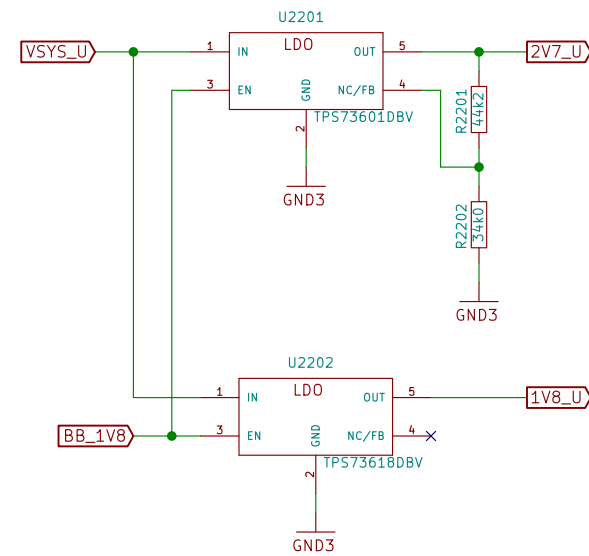


Fancy LED controller AUX LED



Sheet: /LEDs/ File: leds.sch		
Title: LEDs		
Size: A3	Date: Intentionally Left Blank	Rev:
KiCad E.D.A. kicad 4.0.2-stable		Id: 21/25

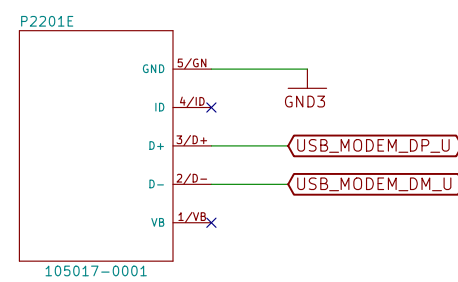
simple capless 400mA LDO for TPS65950 substitute
(only for prototype)



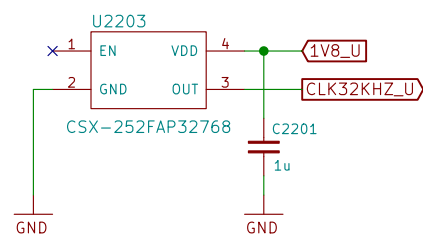
TODO: use REGEN ?

Modem USB

connect to BB
by some Micro-USB cable

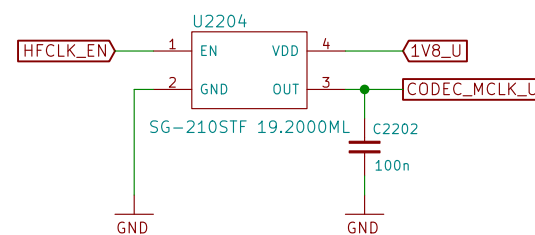


32 kHz clock



Alternative: OYKTGLJANF-0.032768

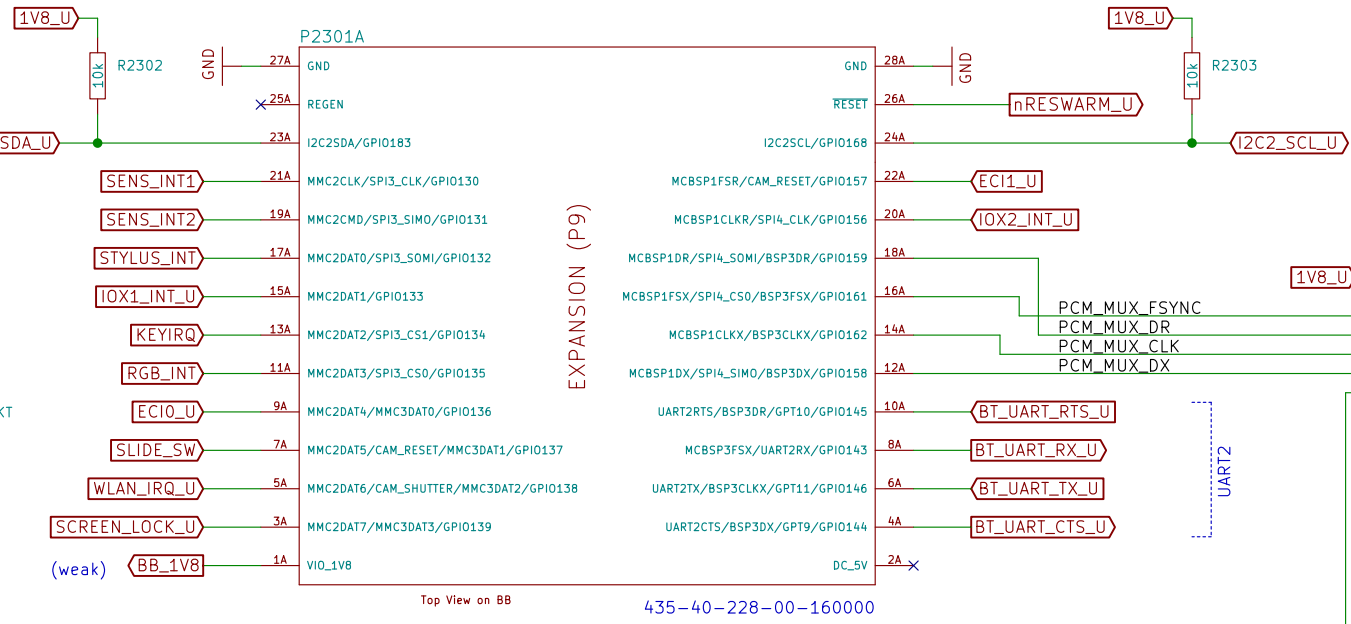
19.2 MHz clock



Alternative: KC2520B19.2000C1GE00

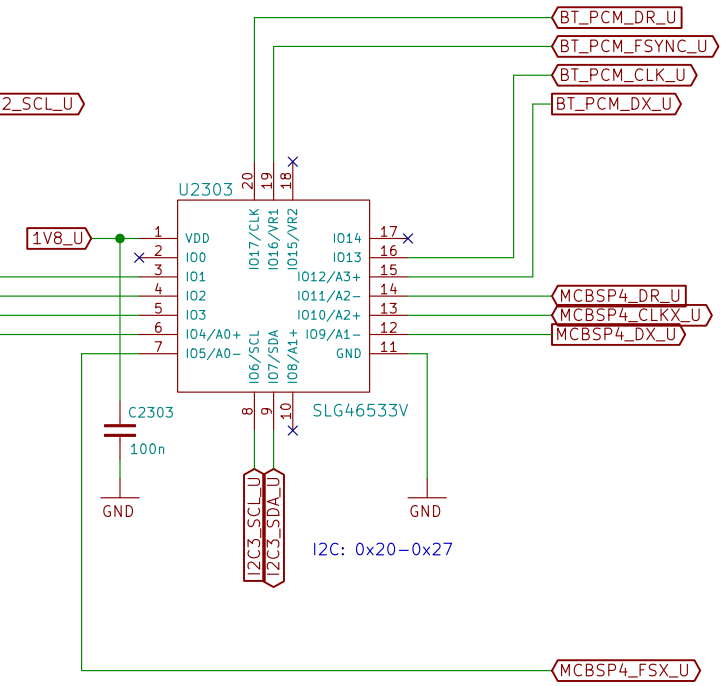
Sheet: /Adaptation (v2 only)/		
File: v2.sch		
Title: Adaptation (v2 only)		
Size: A3	Date: Intentionally Left Blank	Rev:
KiCad E.D.A. kicad 4.0.2-stable		Id: 22/25

BB-xM Main Expansion Header (P9, 7.24)

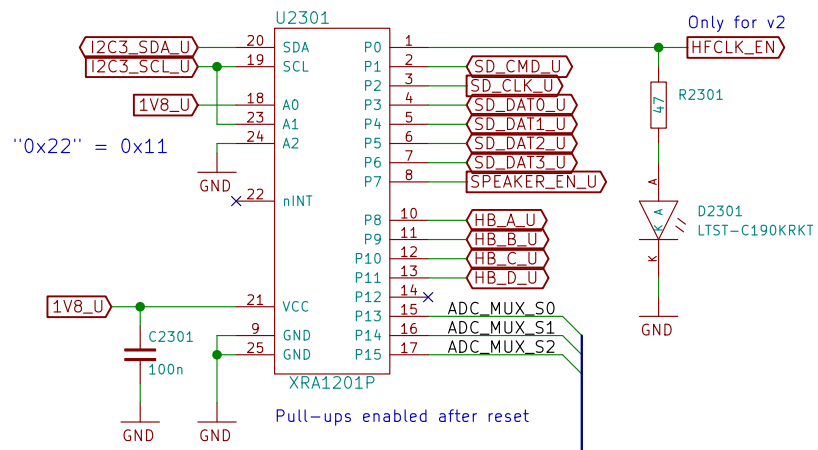


Same part as "breakaway" strip (72 positions):
435-40-272-00-160000

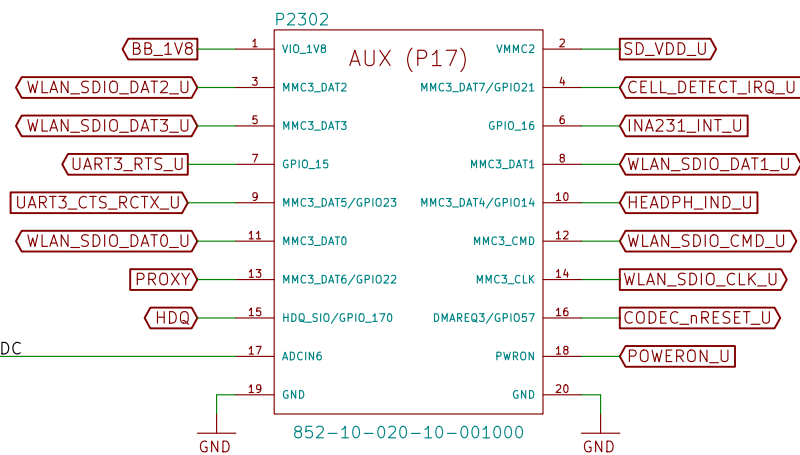
PCM switch



IO expander

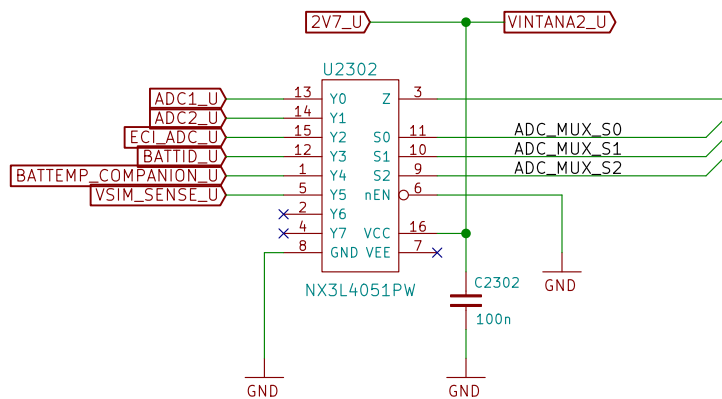


Auxiliary Expansion Header (P17, 7.26)



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

ADC multiplexer

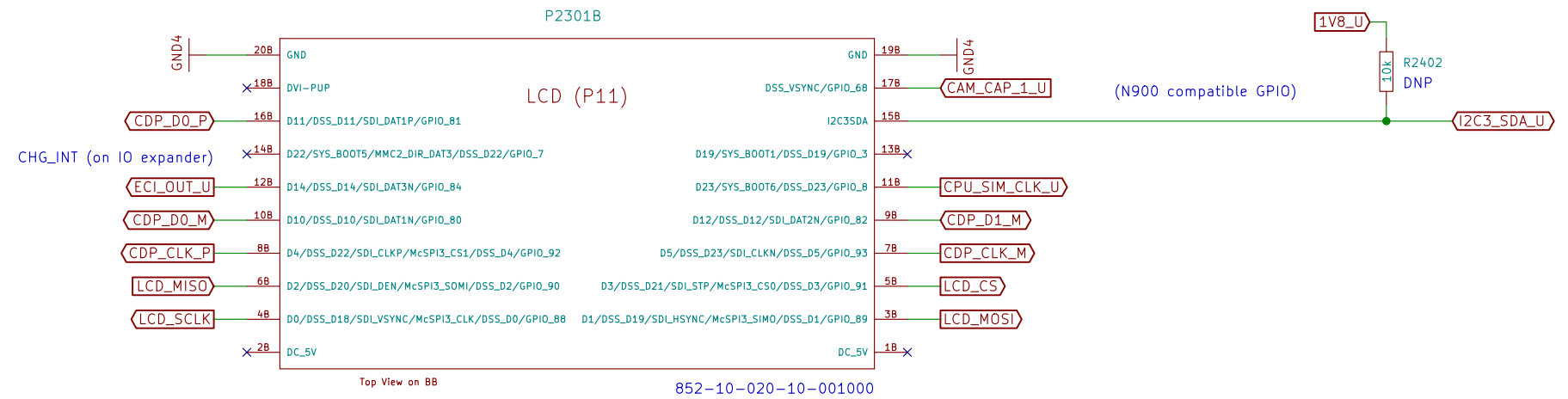


No UART3_RTS on BB-xM, using GPIO
No UART3_CTS on BB-xM, using GPIO

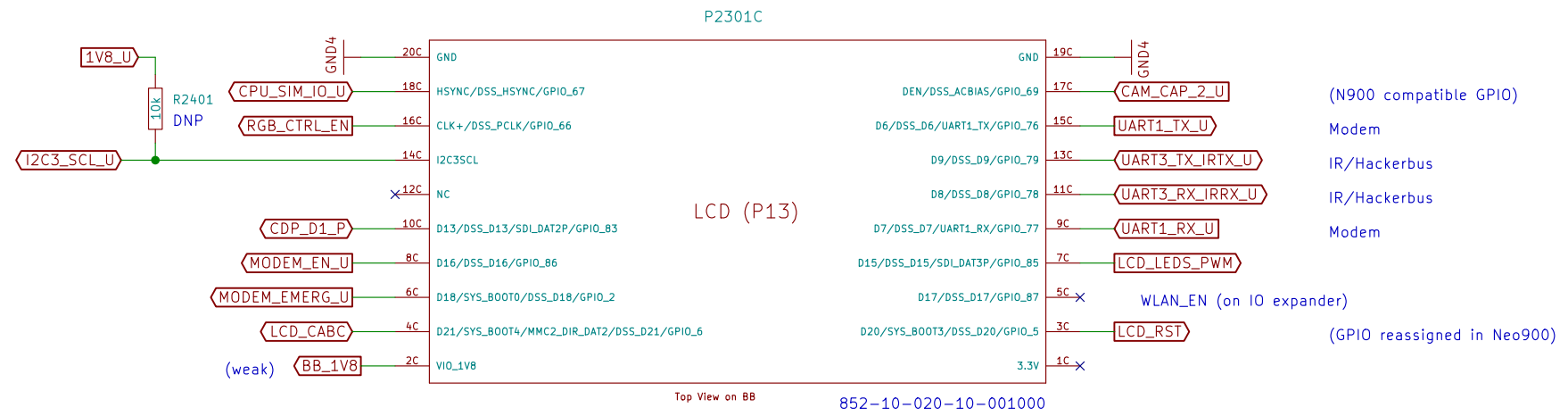
FM_nINT (on IO expander)

Sheet: /BB-xM Adapter (CPU)/		
File: bbcpu.sch		
Title: BB-xM Adapter (CPU)		
Size: A3	Date: Intentionally Left Blank	Rev:
KiCad E.D.A. kicad 4.0.2-stable		Id: 23/25

P11 (7.25)



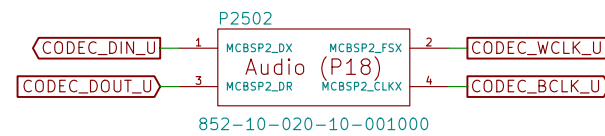
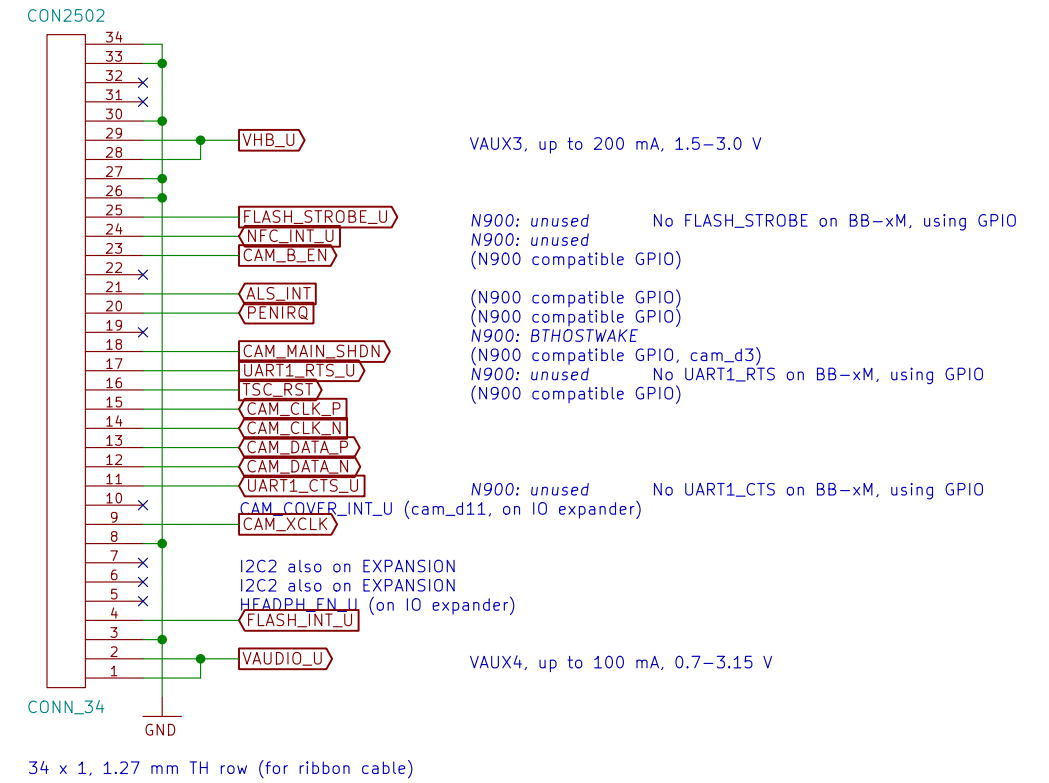
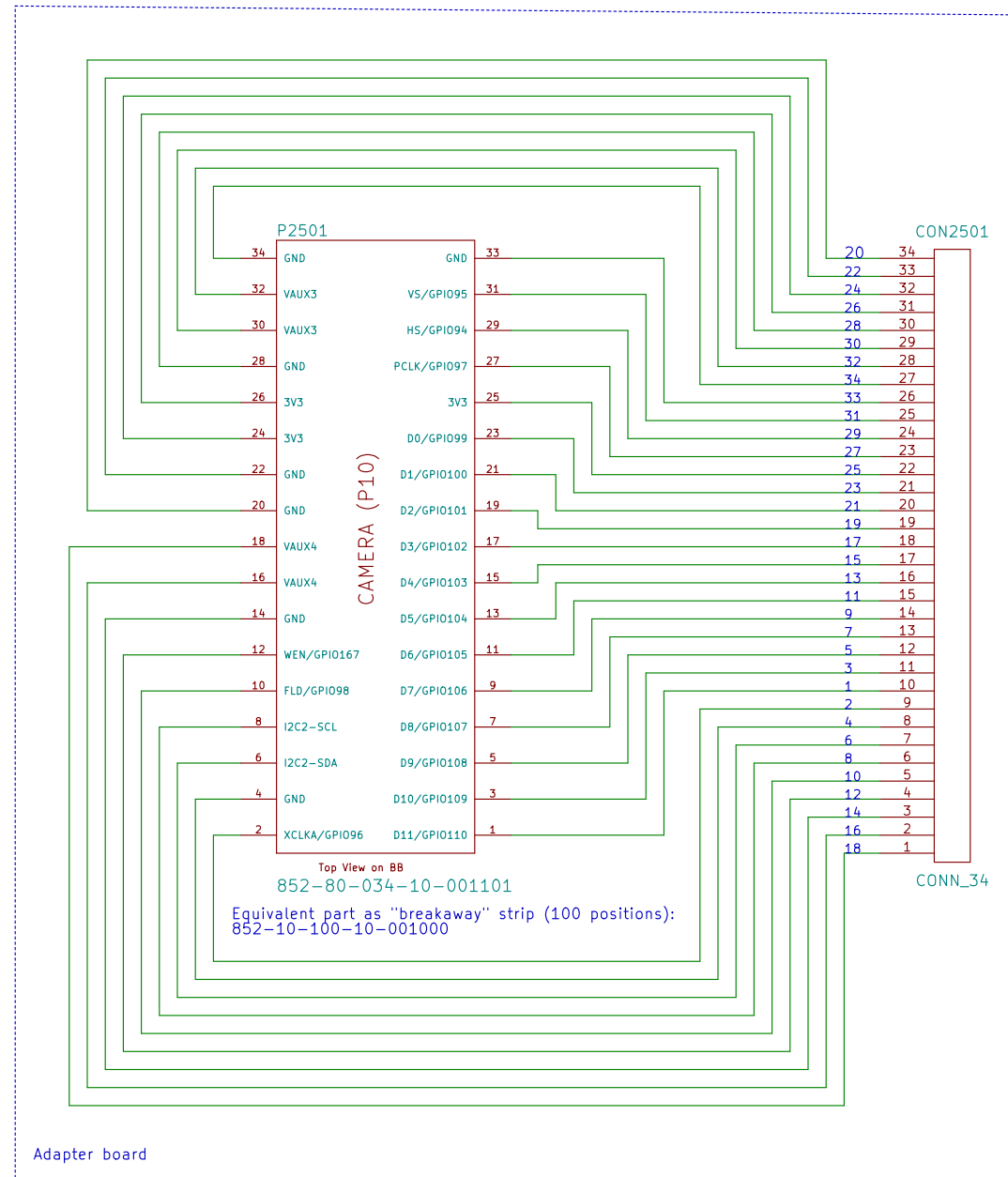
P13 (7.25)



P4 (7.19)



Processor Camera Port Interface (P10, 7.20.3)



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.