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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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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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Cameras

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LEDs

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Sheet: Adaptation (v2 only)



Adaptation (v2 only)

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Sheet: BB-xM Adapter (CPU)



BB-xM Adapter (CPU)

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Sheet: BB-xM Adapter (DISP)



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.

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.

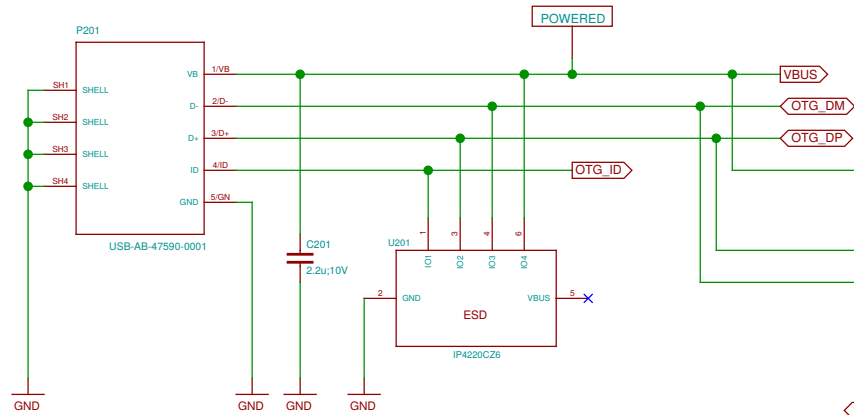
Unless indicated otherwise, all capacitors should be X5R or X6S,
or better (X7R, NP0, etc.)
If no voltage is specified, use ≥ 6.3 V.

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

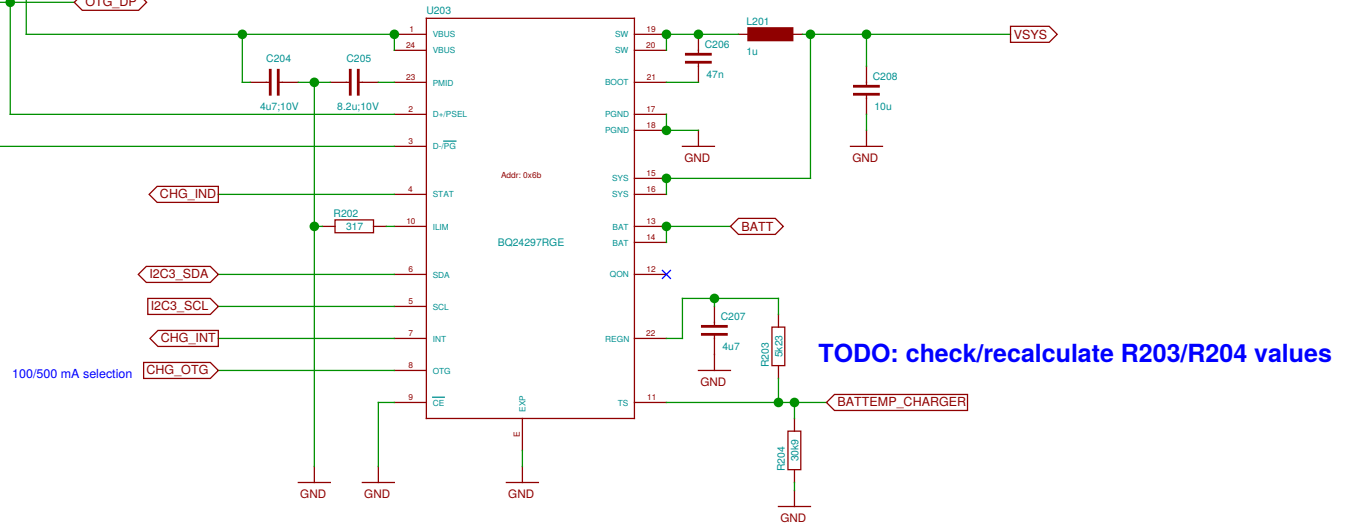
Signals that exist on both LOWER and UPPER (and maybe also BOB)
have a _U suffix on UPPER. No suffix is needed to distinguish
between LOWER and BOB because all BOB components are on
the same sheet and wires connecting them use sheet-local labels.

Sheet: /	
File: neo900.sch	
Title: Neo900	
Size: A3	Date: 2016-12-21 02:12:34
Plotted by: eeshow 221aa28 20161208-00:03Z	Rev: Id: 1/25

USB OTG connector

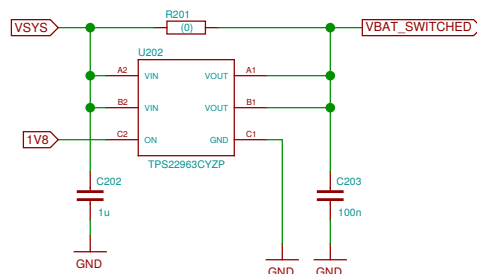


Battery charger with USB OTG

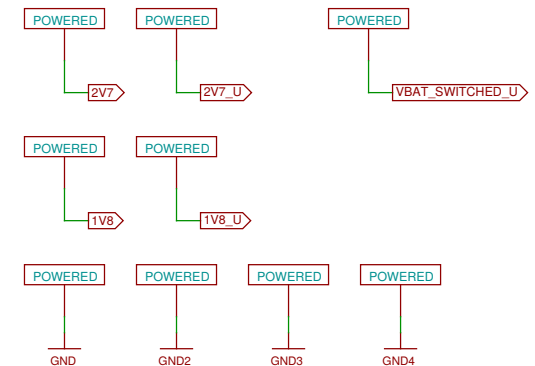


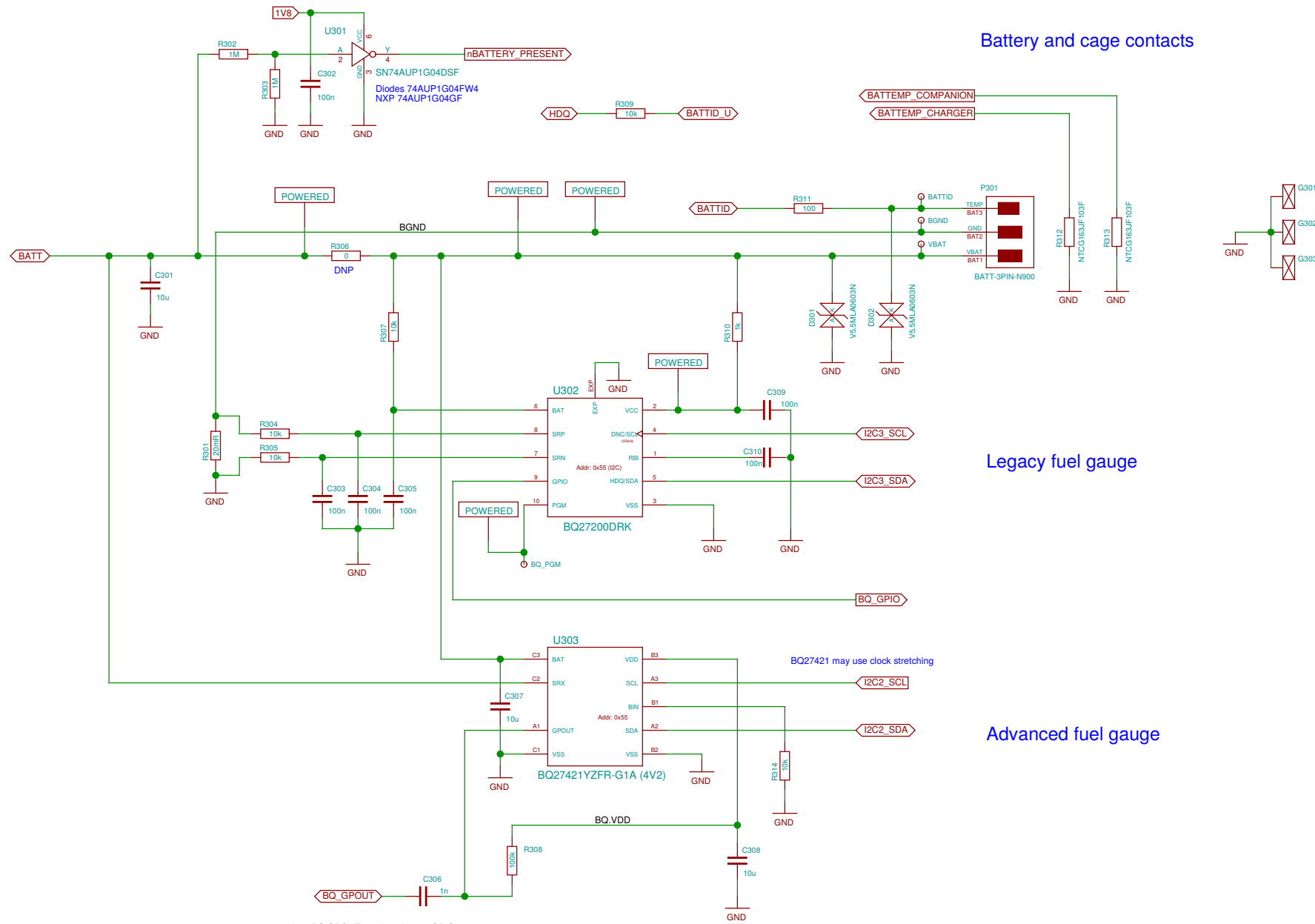
Power distribution and sequencing

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



KiCad bureaucracy

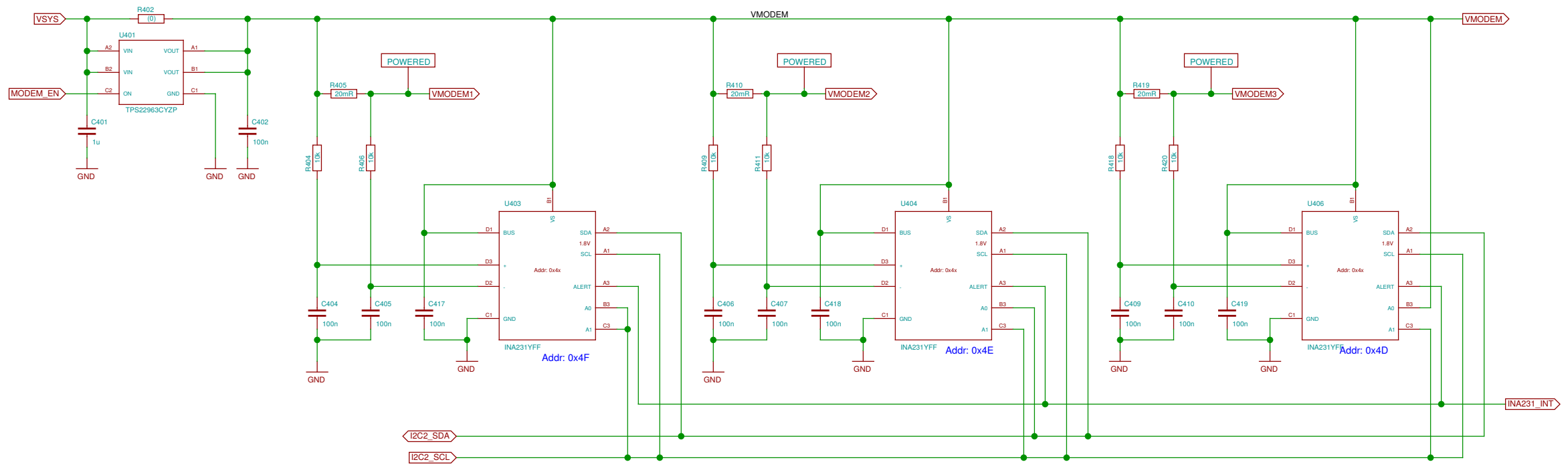




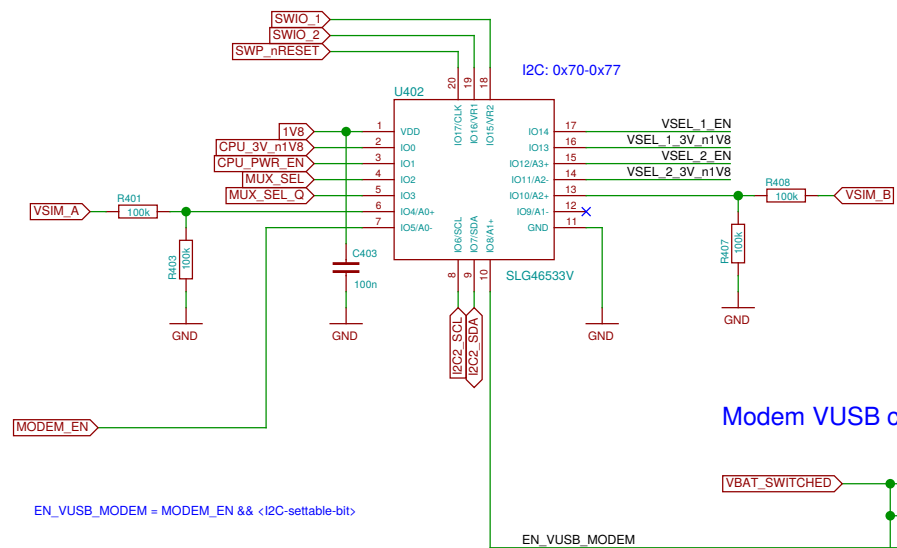
Note: BQ.GPOUT needs pull-up at GPIO.

Sheet: /Battery/ File: battery.sch	
Title: Battery	
Size: A3	Date: 2016-12-21 02:12:34
Plotted by: eeshow 221aa28 20161208-00:03Z	Rev: Id: 3/25

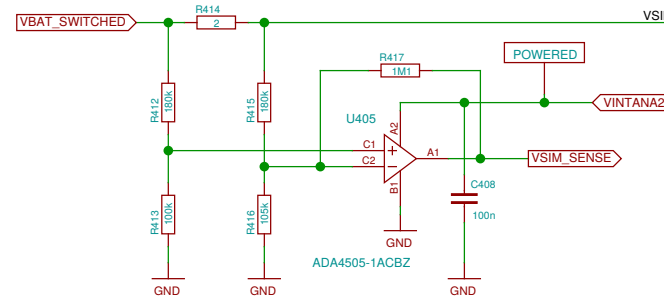
Modem current monitor



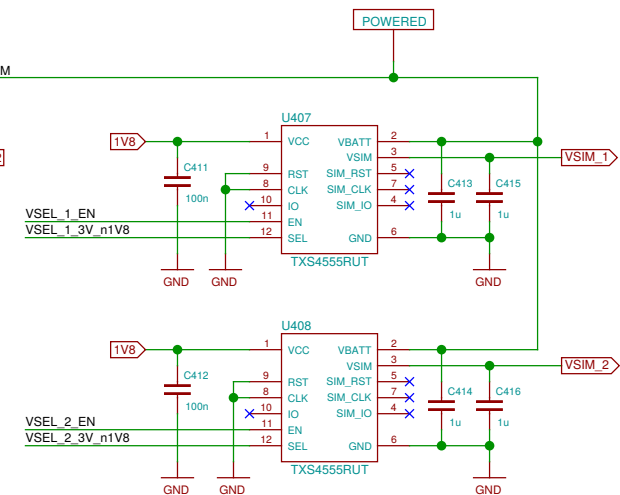
SIM power selection



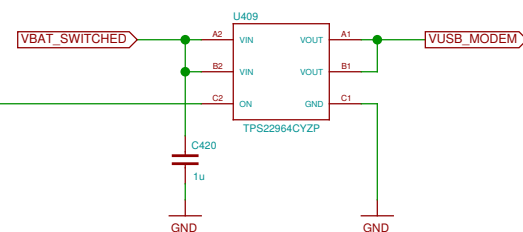
SIM current sensing



SIM power supply



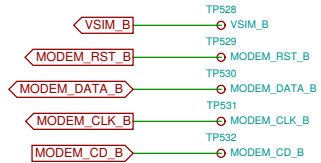
Modem VUSB control (experimental)



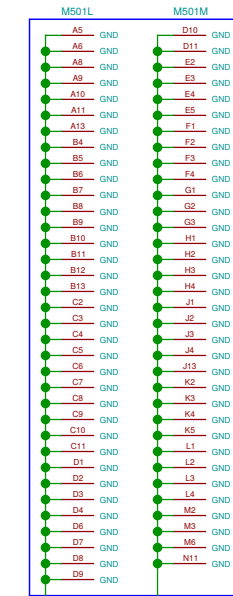
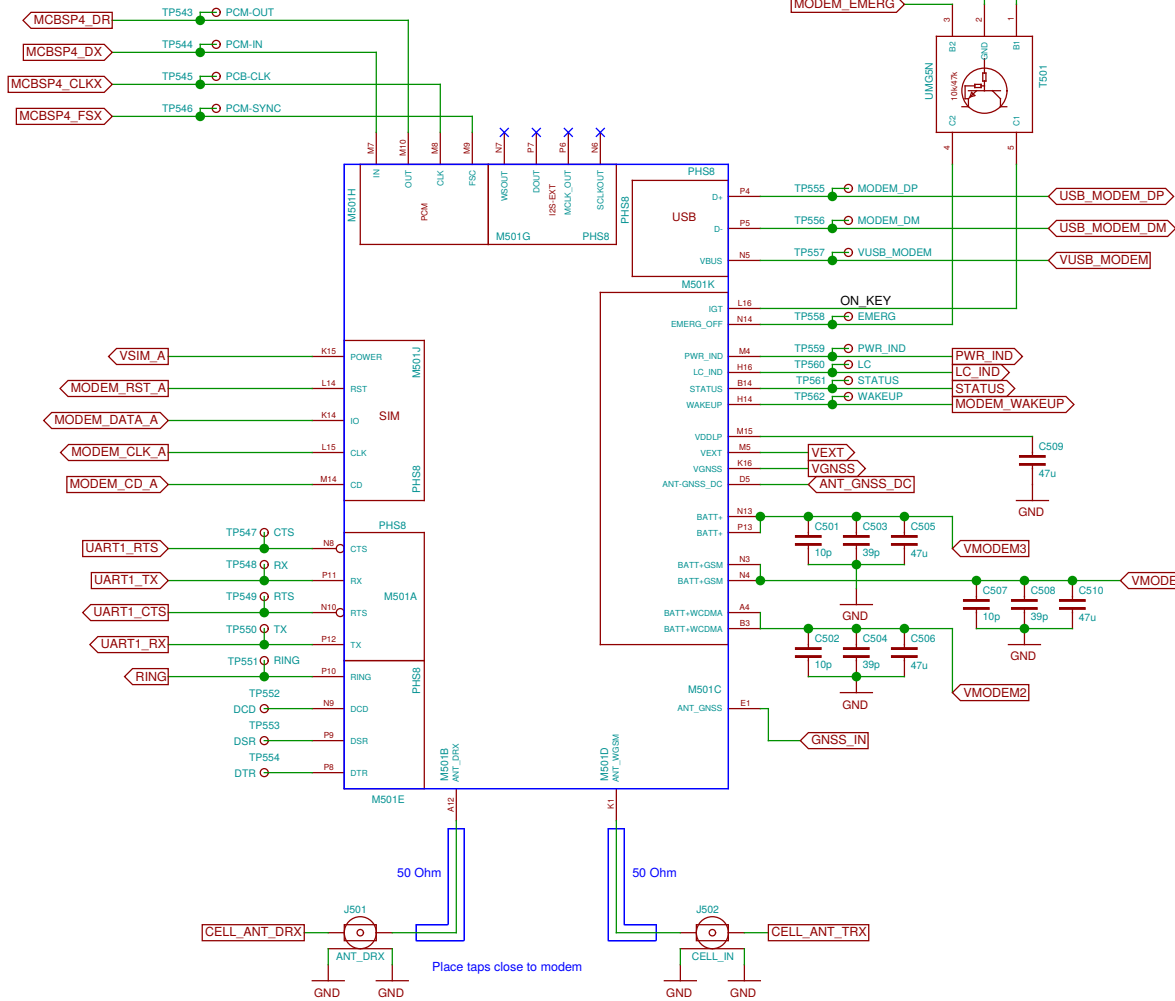
EN_VUSB_MODEM = MODEM_EN && <I2C-settable-bit>

EN_VUSB_MODEM

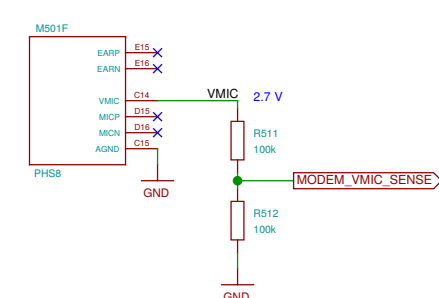
SIM B bus



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.

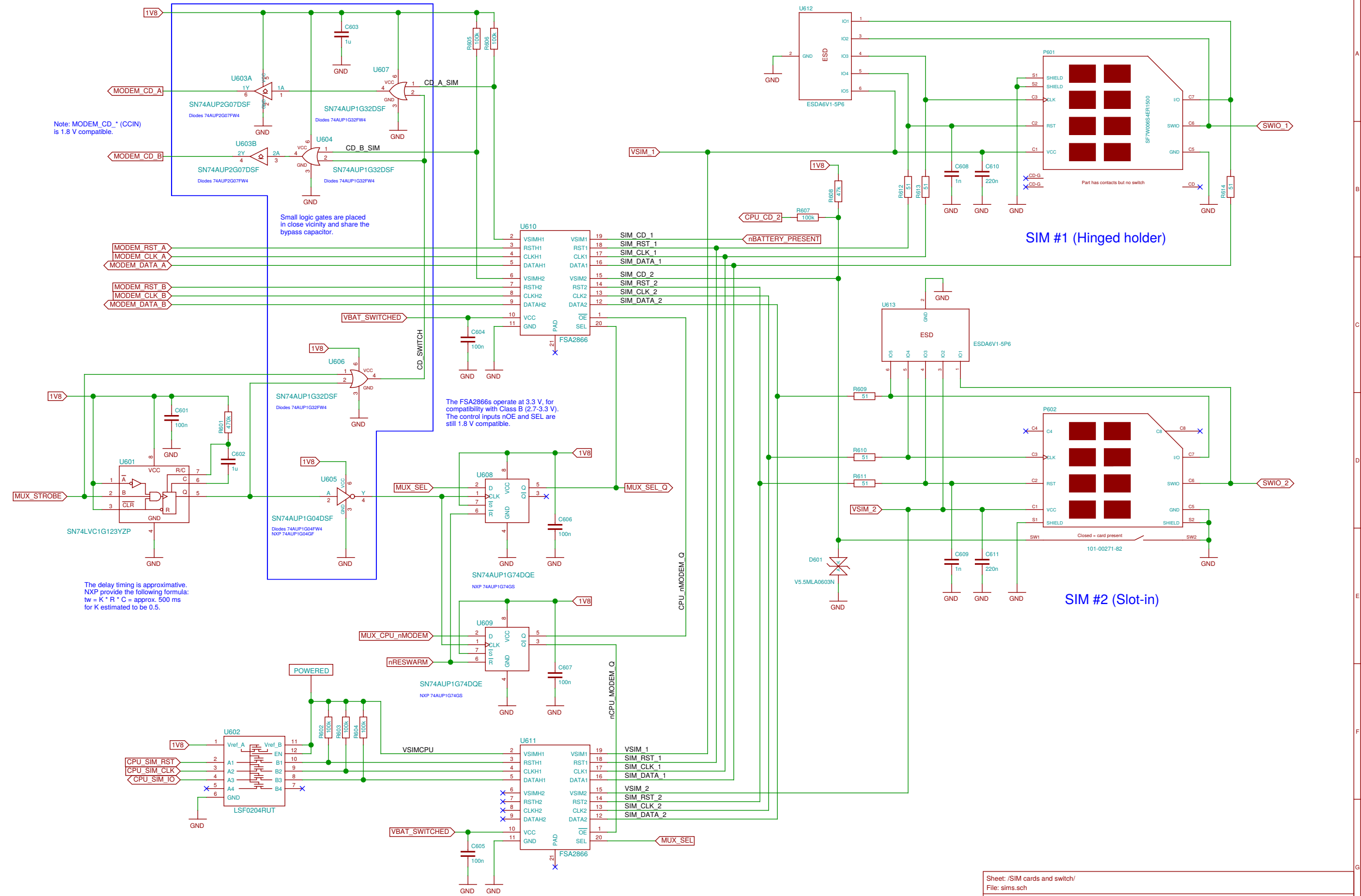
Pads that are DNU in PHS8 and PLS8.

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

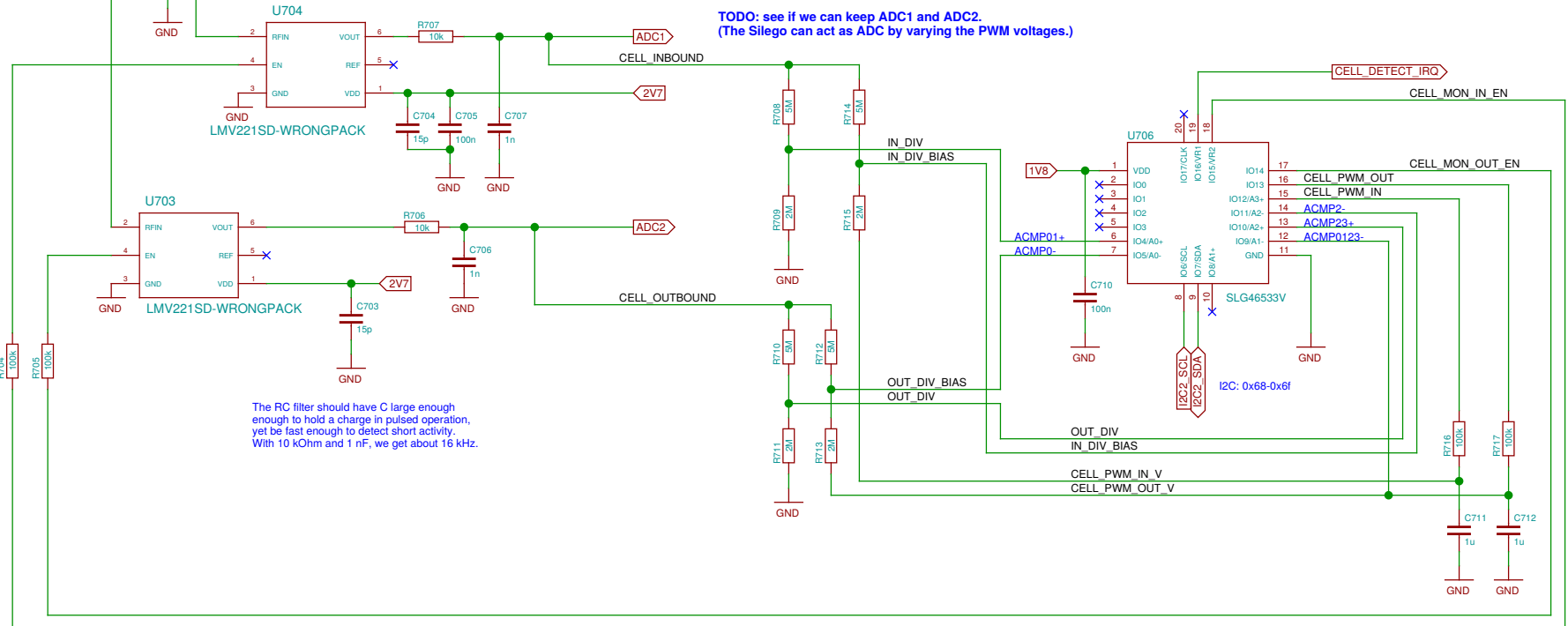
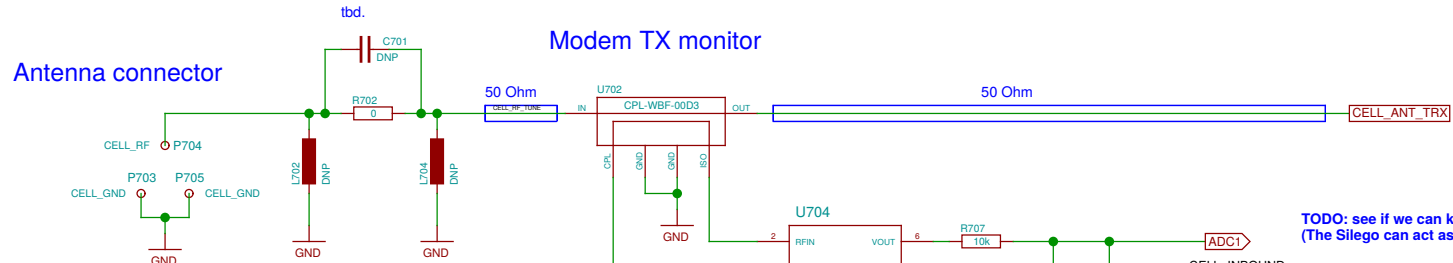
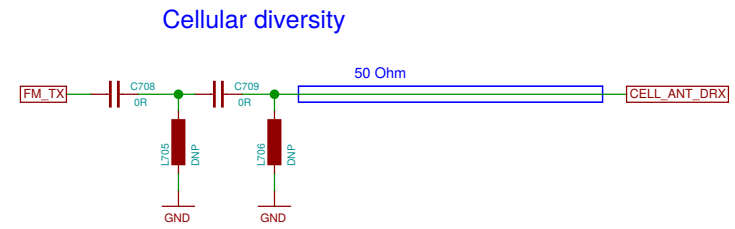
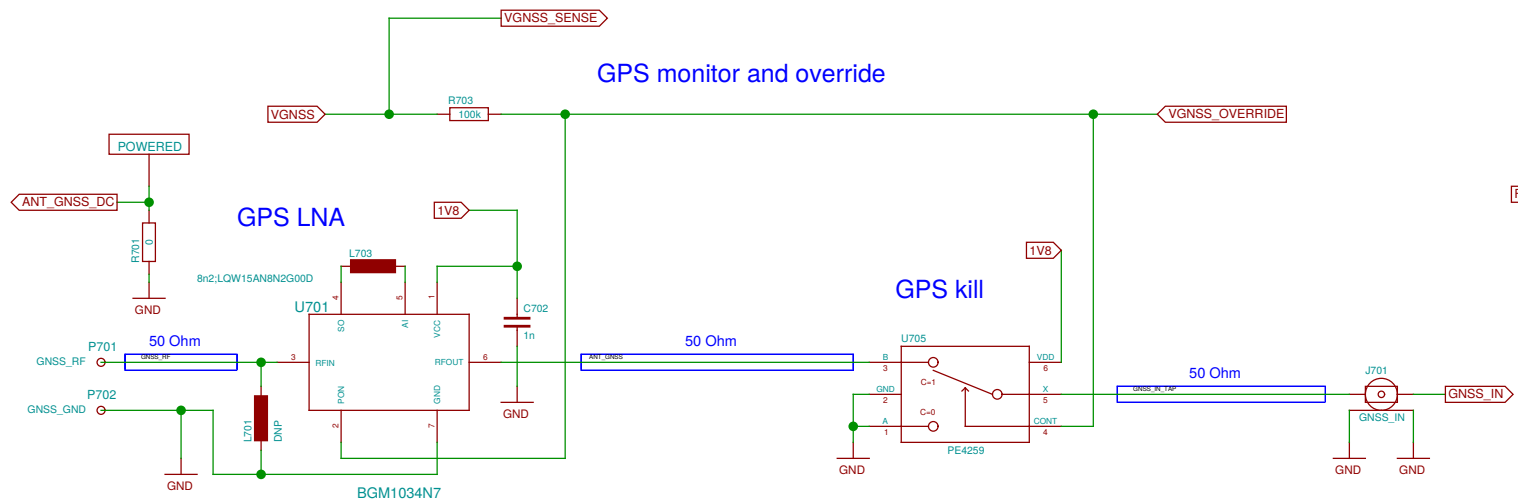
Pads RFU (GND) in PHS8 and RFU (DNU) in PLS8. The resistors indicate cuttable traces.

50 Ohm
Place taps close to modem

50 Ohm



Sheet: /SIM cards and switch/ File: sims.sch		
Title: SIM cards and switch		
Size: A3	Date: 2016-12-21 02:12:34	Rev:
Plotted by eeshow 22/1aa28 20161208-00:03Z		Id: 6/25

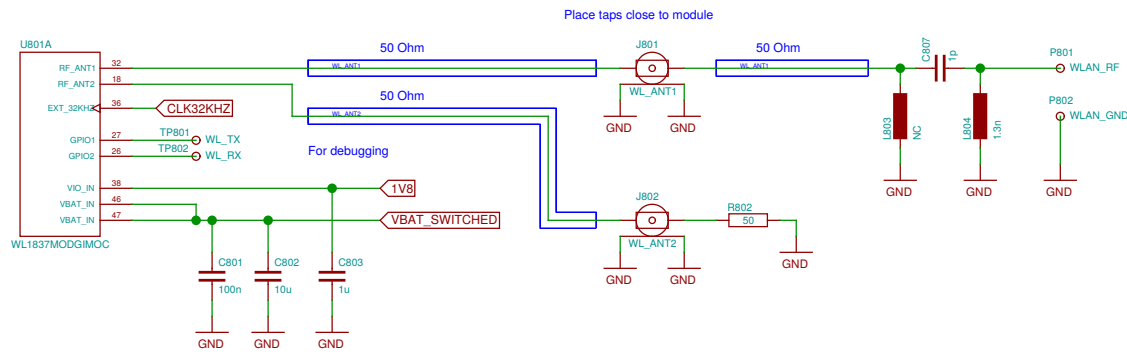


TODO: see if we can keep ADC1 and ADC2.
(The Silago can act as ADC by varying the PWM voltages.)

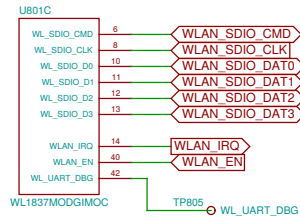
The RC filter should have C large enough
enough to hold a charge in pulsed operation,
yet be fast enough to detect short activity.
With 10 kOhm and 1 nF, we get about 16 kHz.

TODO: assign footprints for c-spring contacts

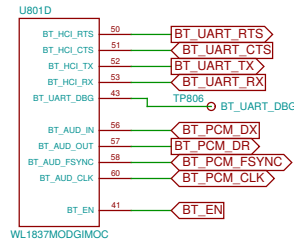
WLAN/BT antenna



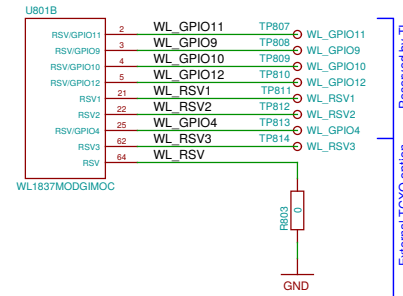
WLAN



Bluetooth

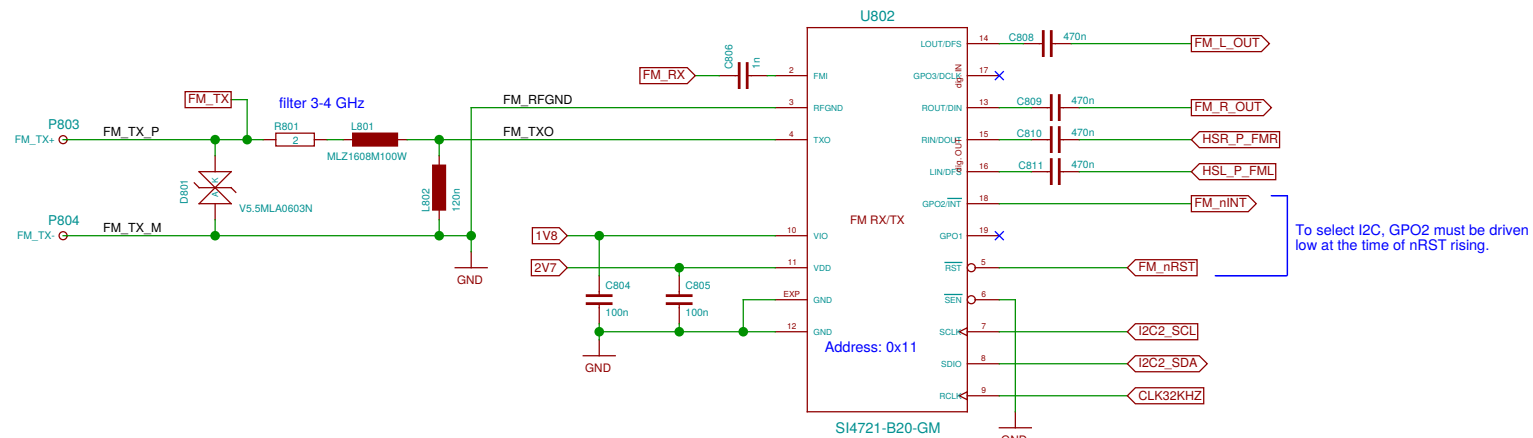


Reserved / Debugging

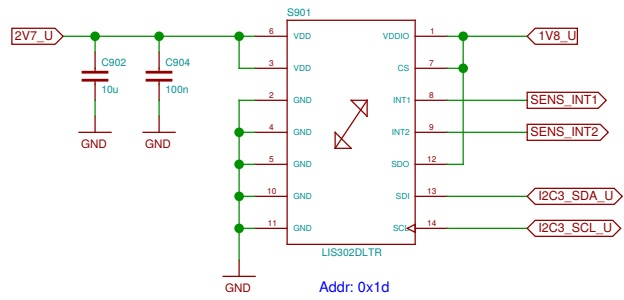


FM Radio (TX/RX)

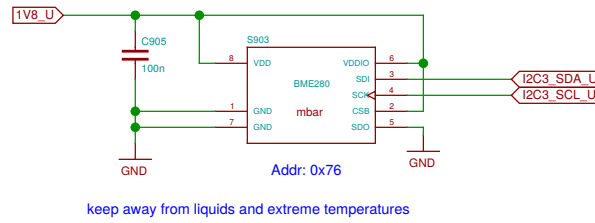
FM TX antenna



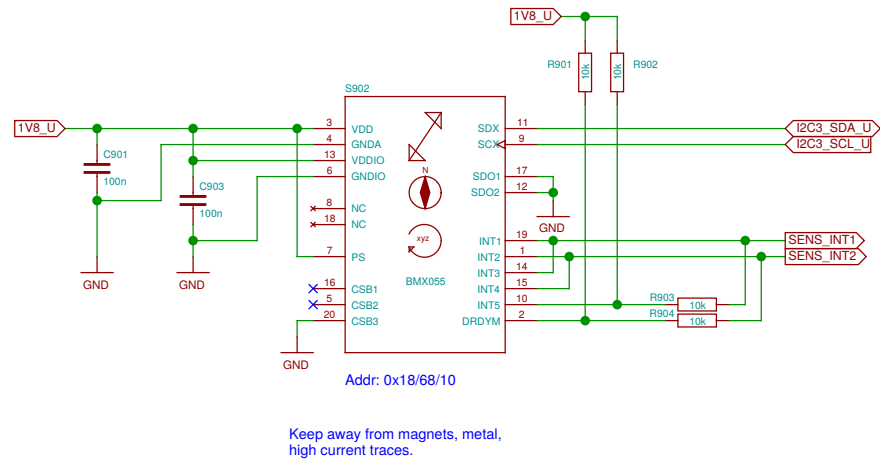
Acceleration (legacy)



Pressure, humidity

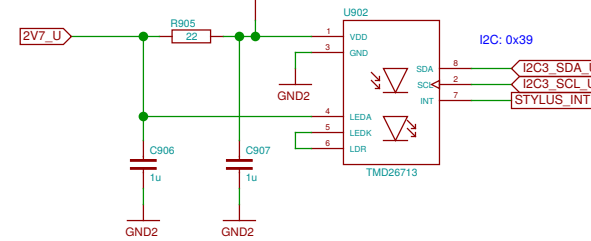


9-axis (acceleration, gyroscope, magnetometer)

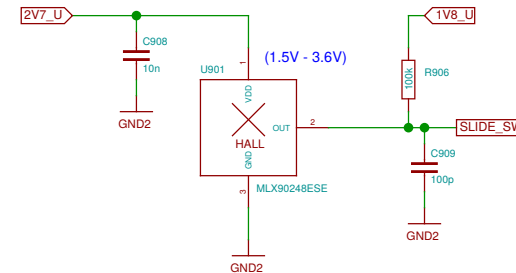


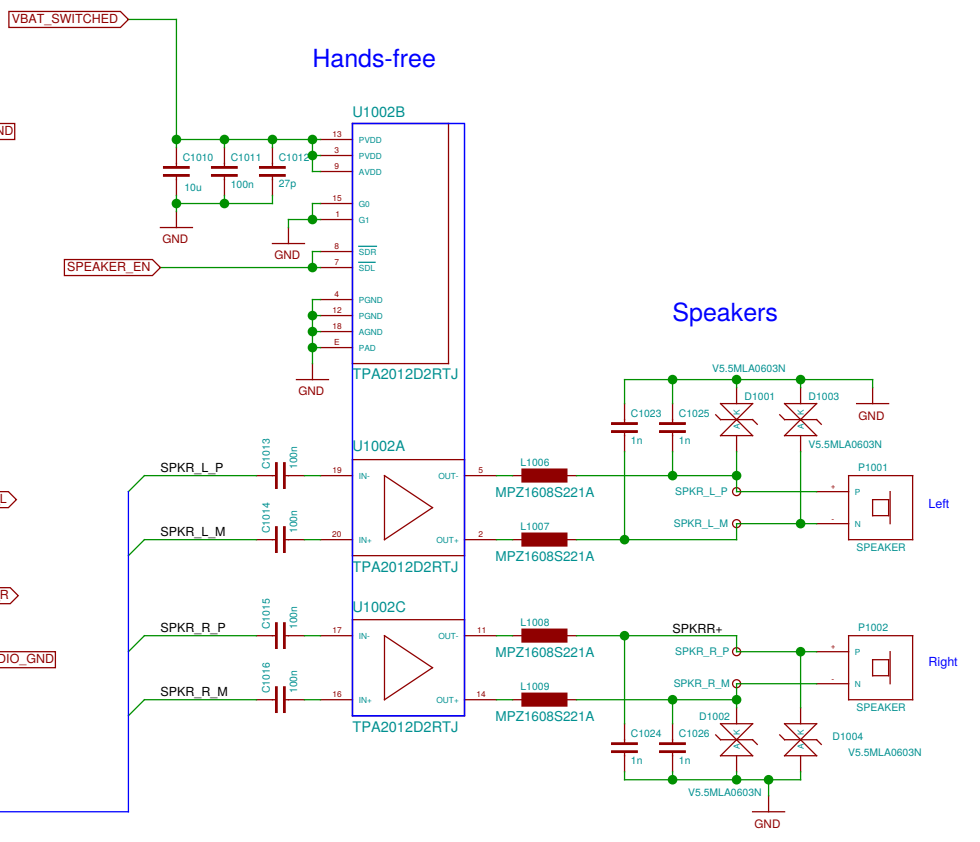
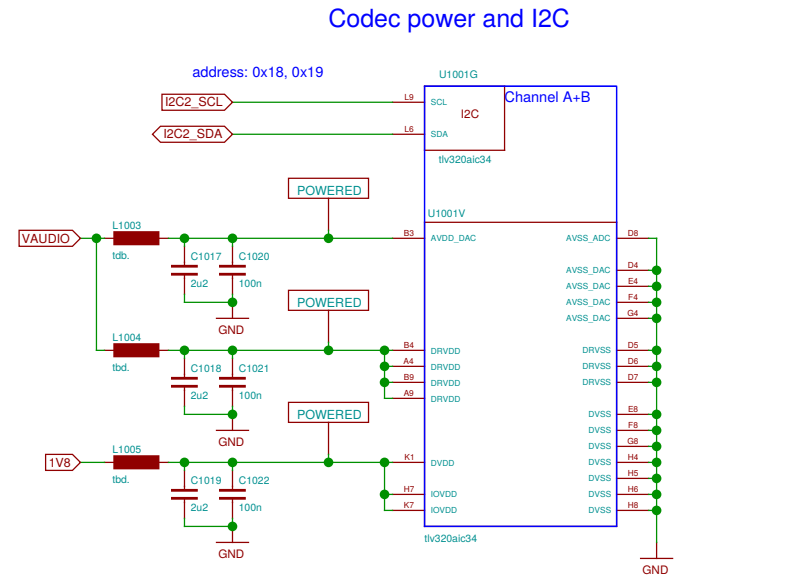
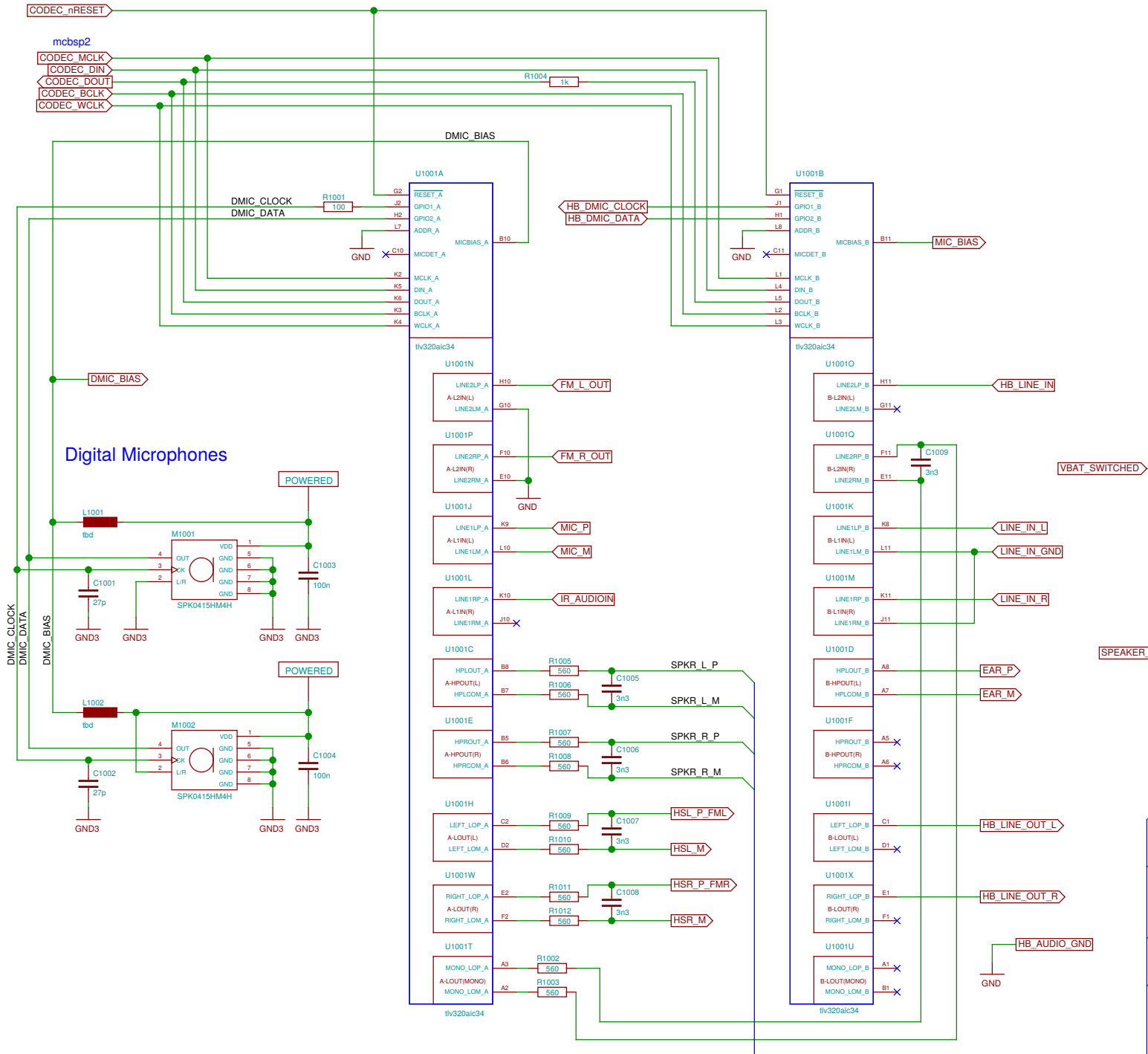
UPPER LOWER

Stylus detect

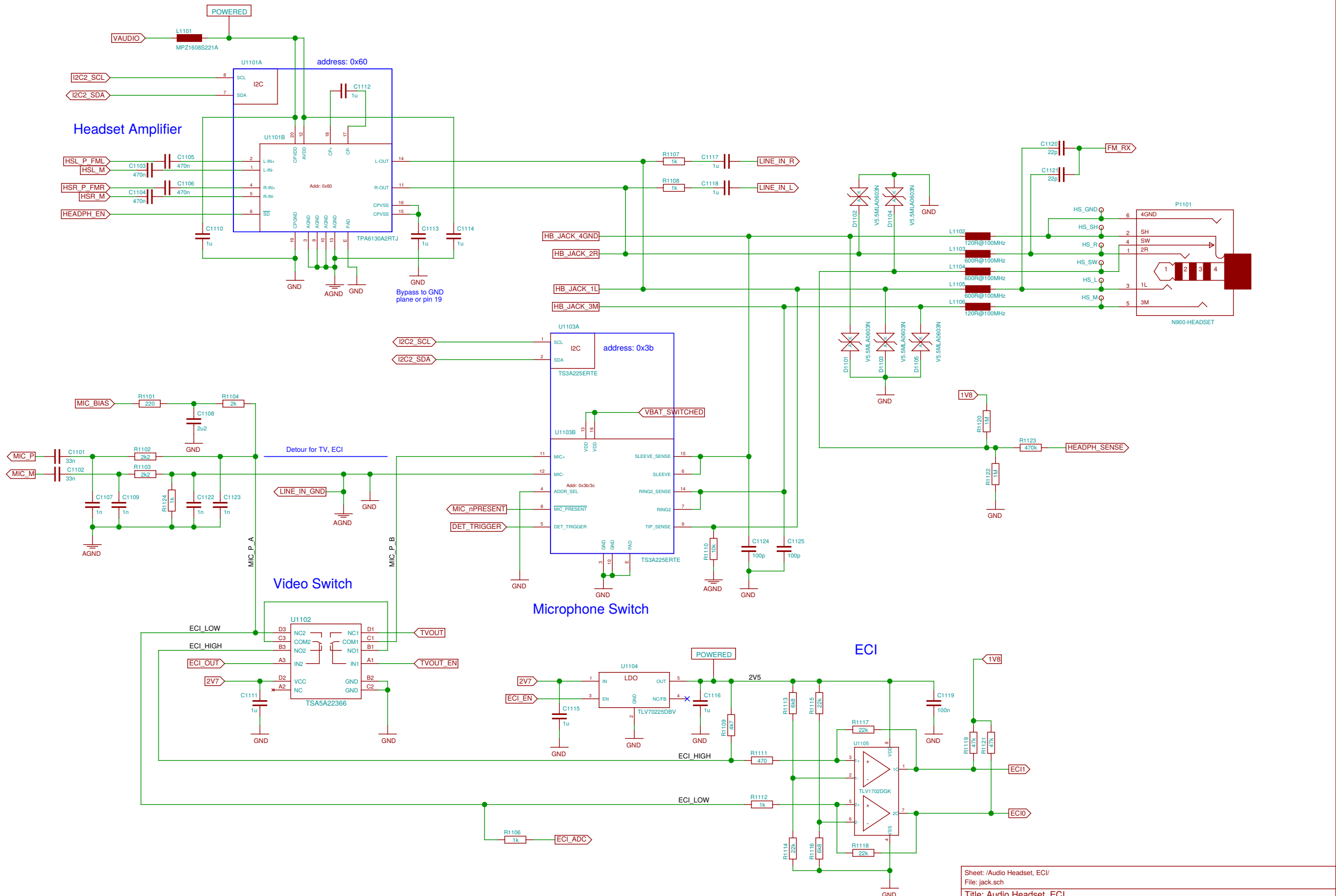


Slide sensor



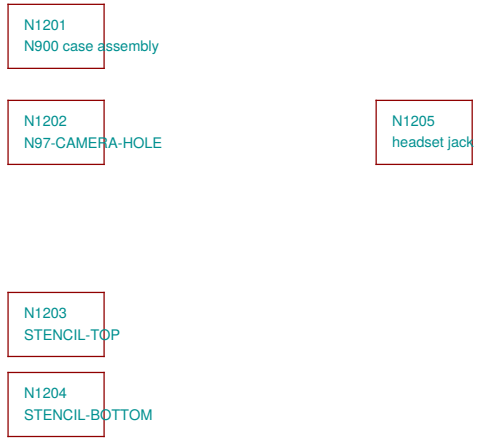


Sheet: /Audio Codec/		Date: 2016-12-21 02:17:16	
File: codec.sch		Rev:	
Title: Audio Codec		Id: 10/25	
Size: A3	Date: 2016-12-21 02:17:16	Rev:	
Plotted by eeshow 221aa28 20161208-00:03Z			

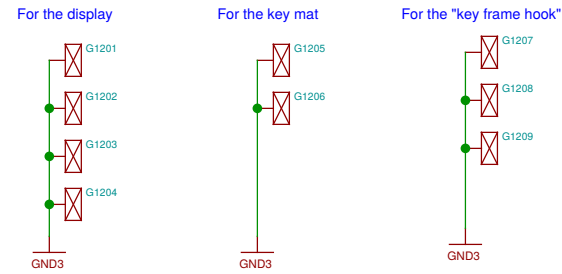


Sheet: /Audio Headset, ECI/		Date: 2016-12-21 02:12:34	
File: jack.sch		Rev: 1	
Title: Audio Headset, ECI		Plotted by eeshow 221aa28 20161208-00:03Z	
Size: A3		Id: 11/25	

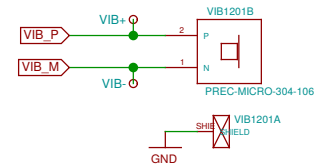
No-Solder Components



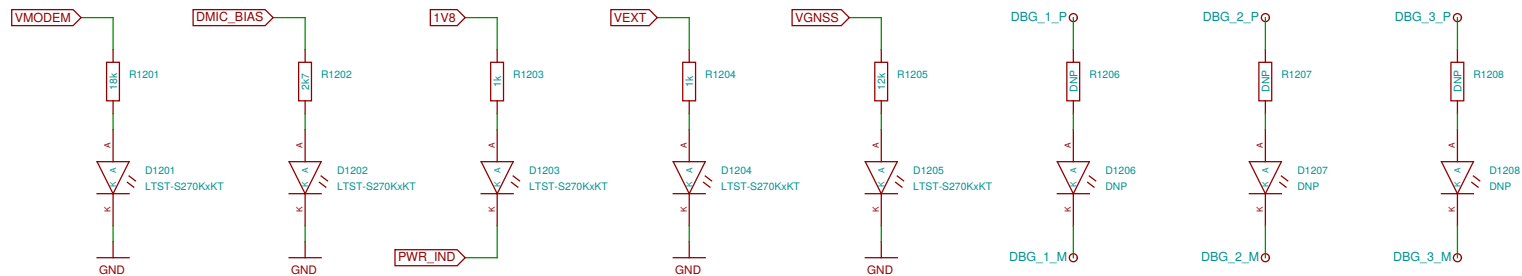
Shield Contacts on UPPER



Vibramotor



Hardware debugging LEDs



VMODEM is based on
VSYS >= 3.5 V

DMIC_BIAS >= 2 V

Open drain,
pulled to 1.8 V

VEXT = 1.8 V

VGNSS = 3.05 V

For ad hoc assignment during testing.

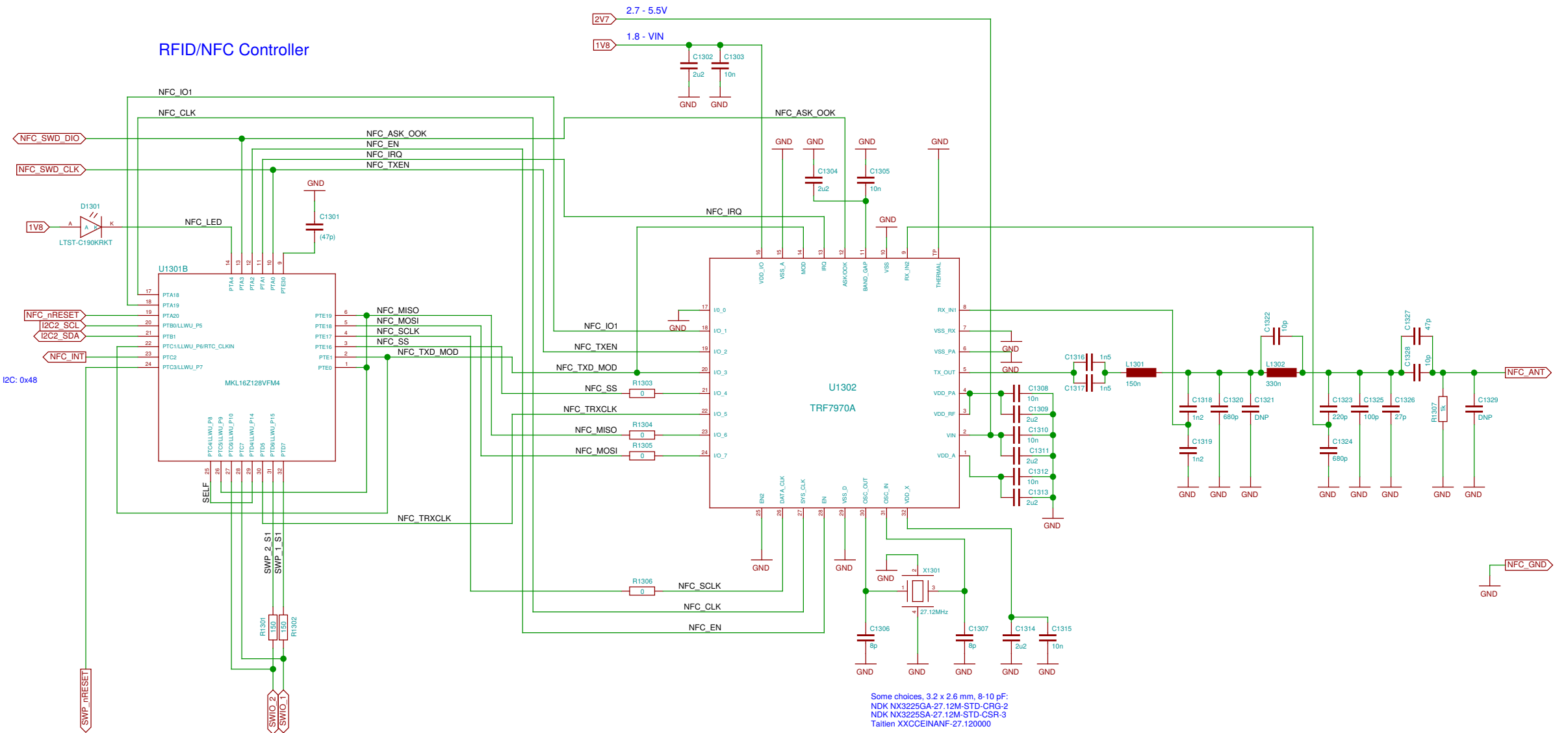
LTST-S270KxKT colors (e.g., KRKT = red) to be selected later.

The debugging LEDs should be placed on the front edge of S2
(top of LOWER), centered around the space bar.

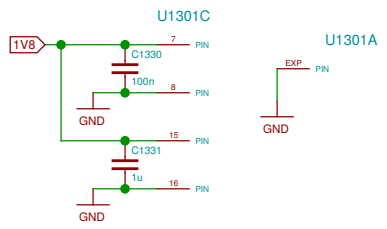
Sheet: Misc/ File: misc.sch	
Title: Misc	
Size: A3	Date: 2016-12-21 02:11:31
Plotted by: eeshow 221aa28 20161208-00:03Z	Rev: Id: 12/25

RFID/NFC Transceiver

RFID/NFC Controller

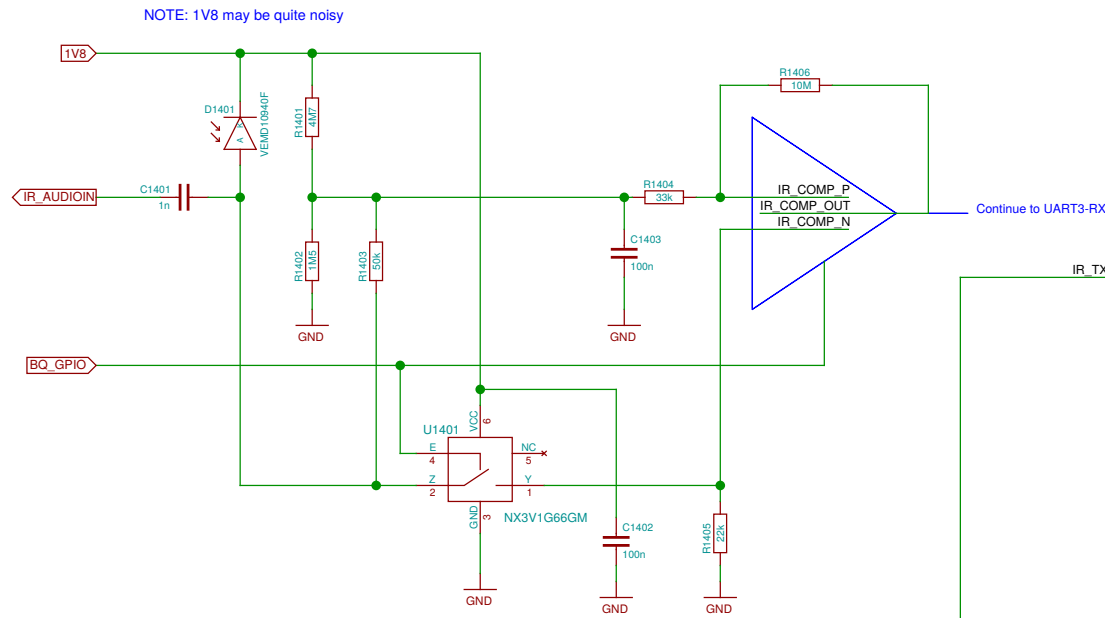


Some choices, 3.2 x 2.6 mm, 8-10 pF:
 NDK NX3225GA-27.12M-STD-CRG-2
 NDK NX3225SA-27.12M-STD-CSR-3
 Tallien XXCCEINANF-27.120000

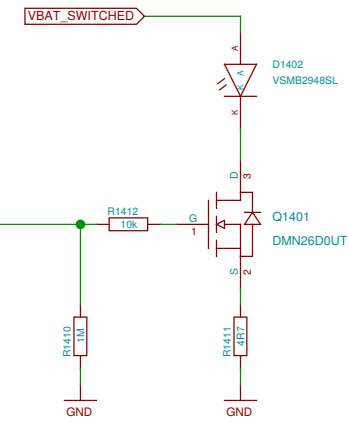


Sheet: /RFID/NFC/		File: nfc.sch	
Title: RFID/NFC			
Size: A3	Date: 2016-12-21 02:12:34	Rev:	
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 13/25	

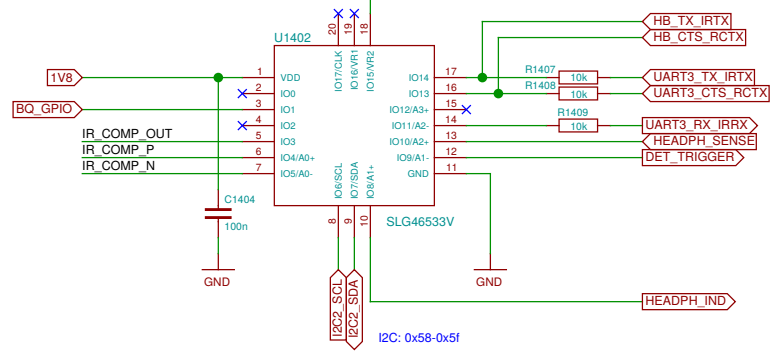
IR receiver



IR transmitter



IR send/receive logic

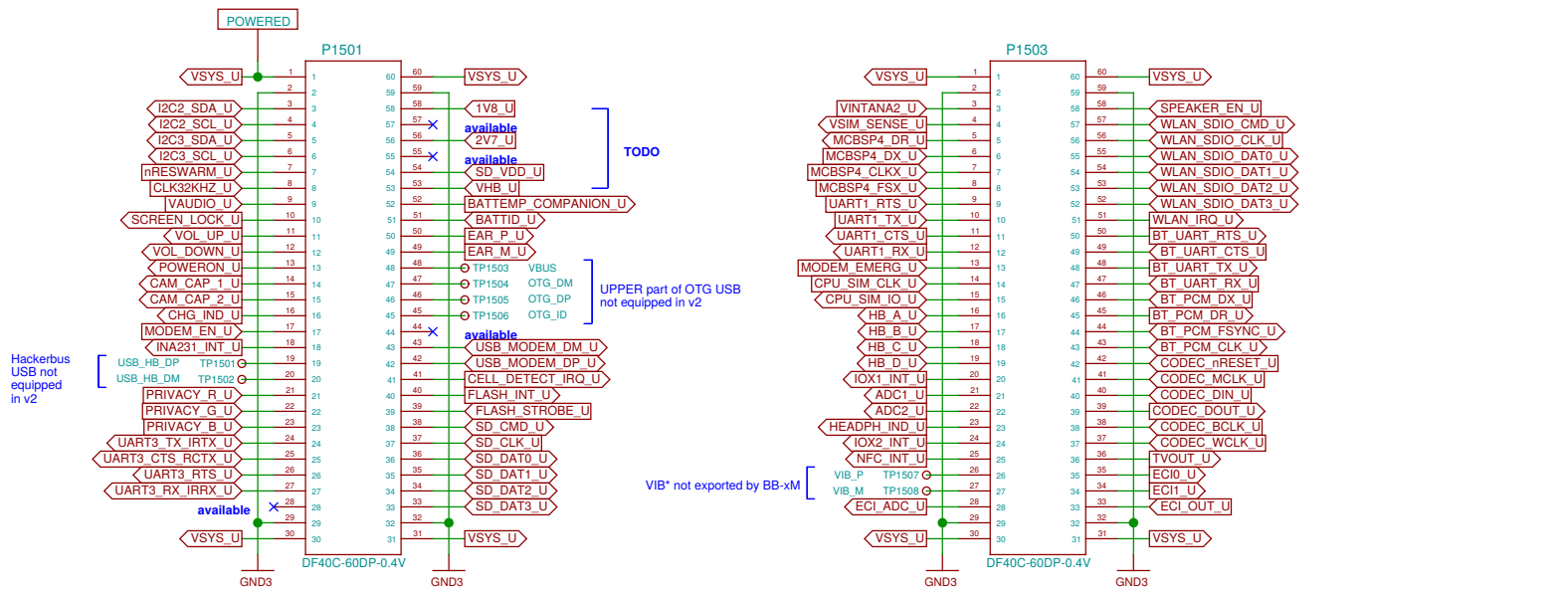


TODO: update D1401 footprint

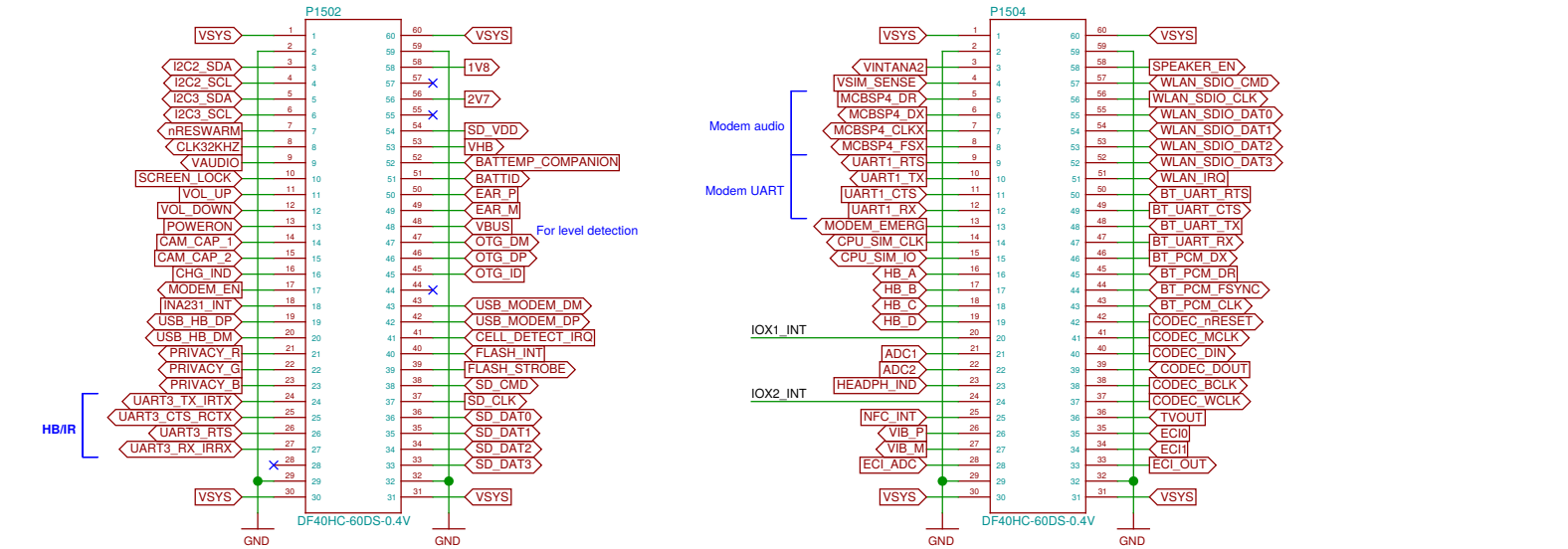
Sheet: /Infrared/		File: ir.sch	
Title: Infrared			
Size: A3	Date: 2016-12-21 02:12:34	Rev:	
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 14/25	

This is just the collection of signals we have.

Assignment can still change, e.g., to improve layout.

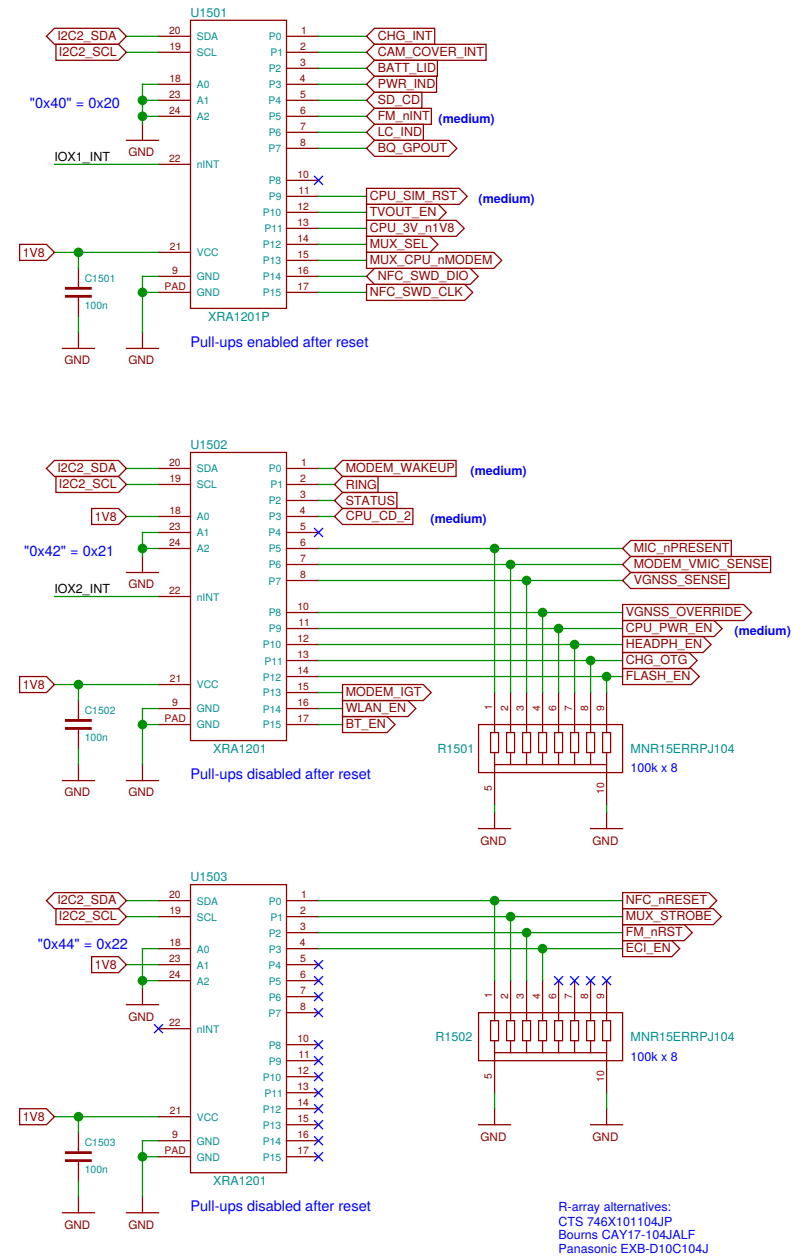


UPPER
LOWER



Current rating per contact: 0.3 A

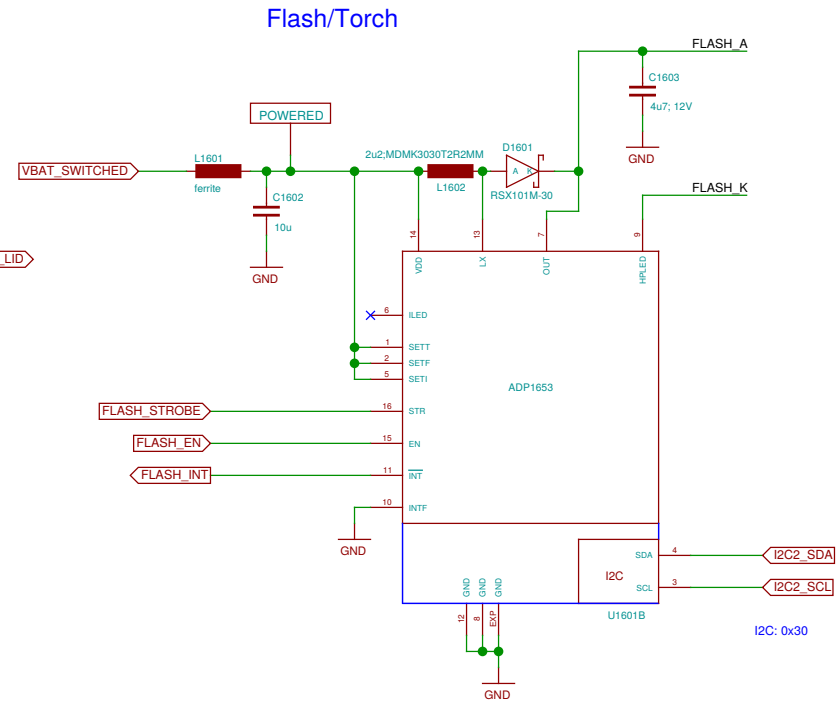
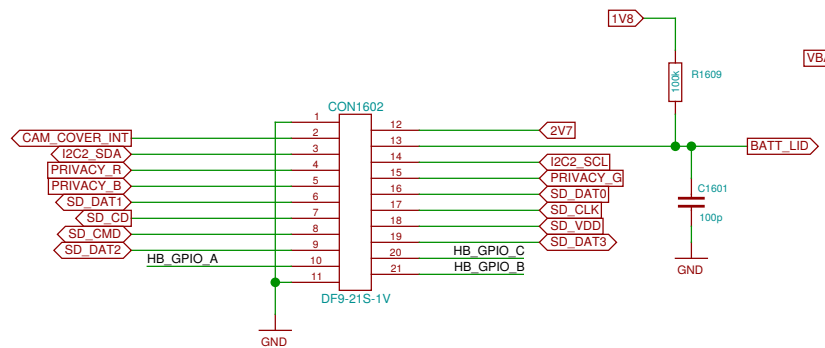
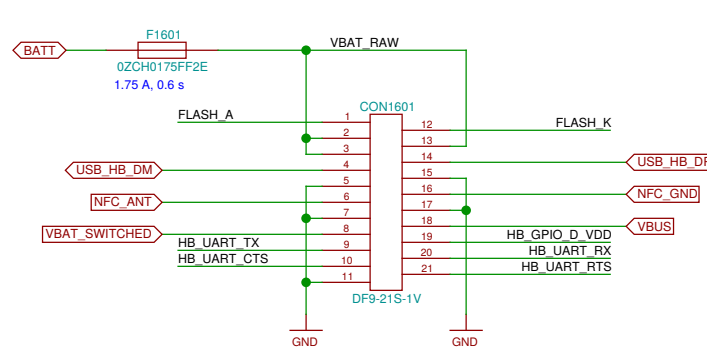
IO expanders (on LOWER)



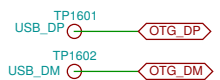
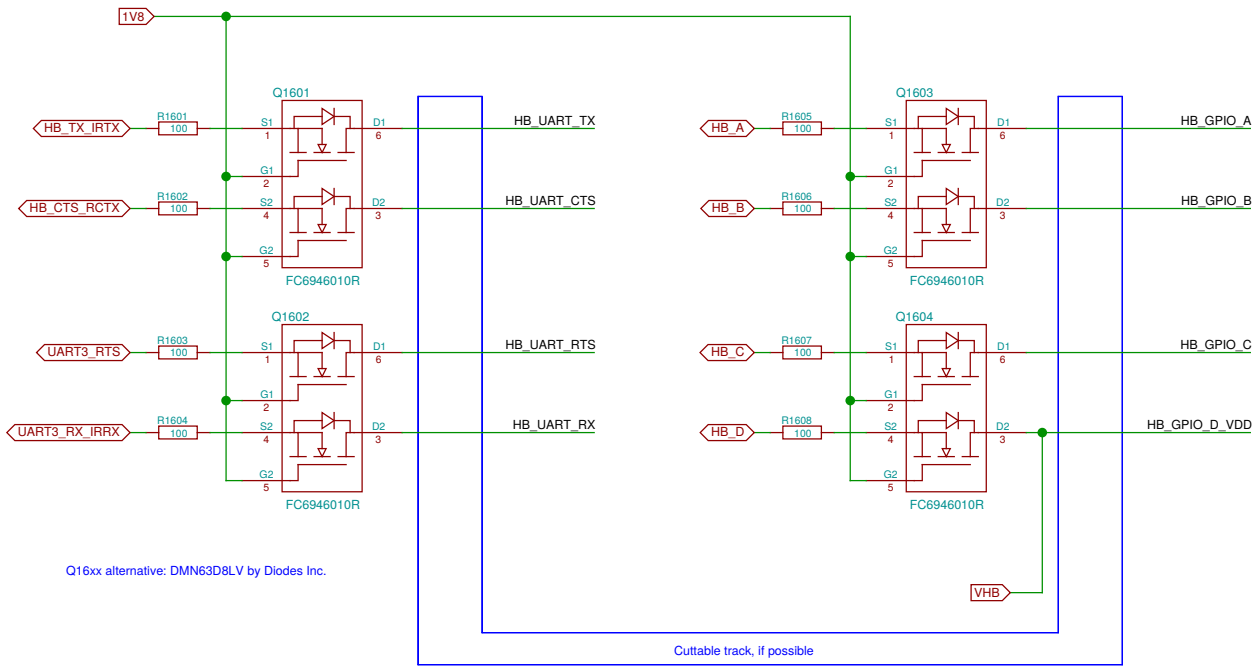
Sheet: /B2B LOWER-UPPER/		File: b2b.sch	
Title: B2B LOWER-UPPER			
Size: A3	Date: 2016-12-21 02:12:34	Rev:	
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 15/25	

LOWER-BOB Interconnect (LOWER side)

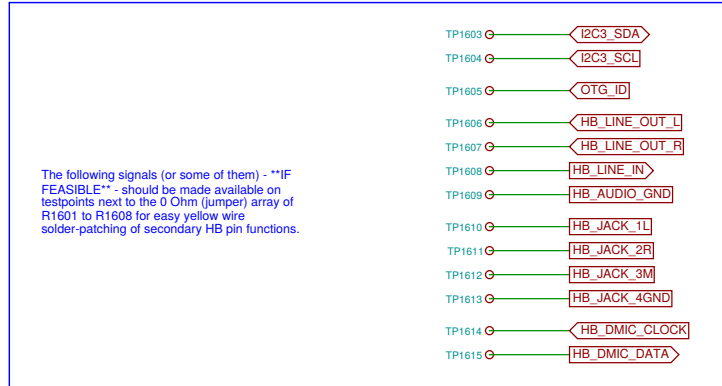
Defined in the Hackerbus specification, <http://neo900.org/stuff/papers/hb.pdf>



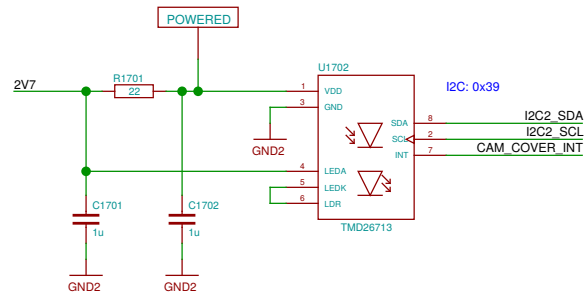
Level shifters for Hackerbus GPIO and UART



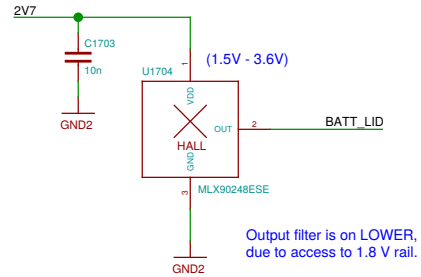
Patch field



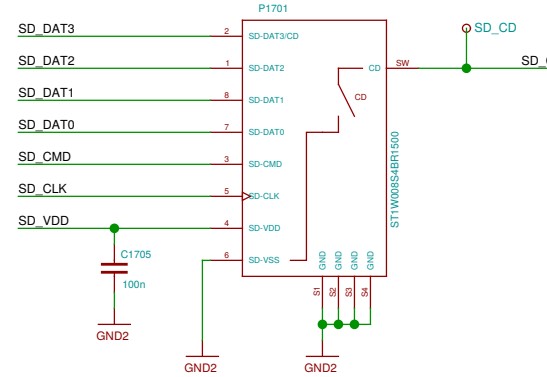
Camera Cover detect



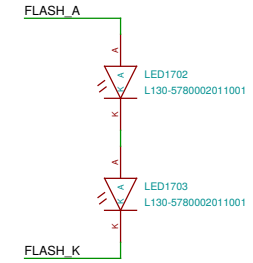
Battery Cover detect



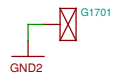
Memory card holder



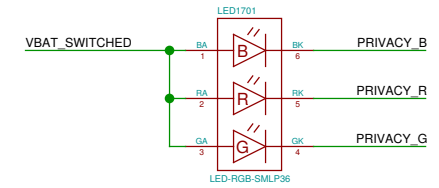
Camera flash



Camera lens plate

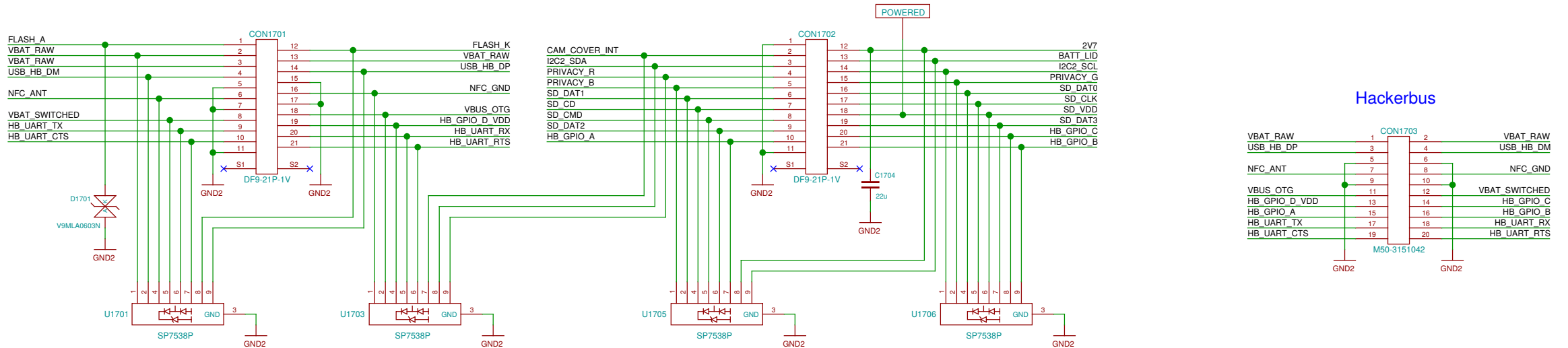


Privacy LED



LOWER-BOB Interconnect (BOB side)

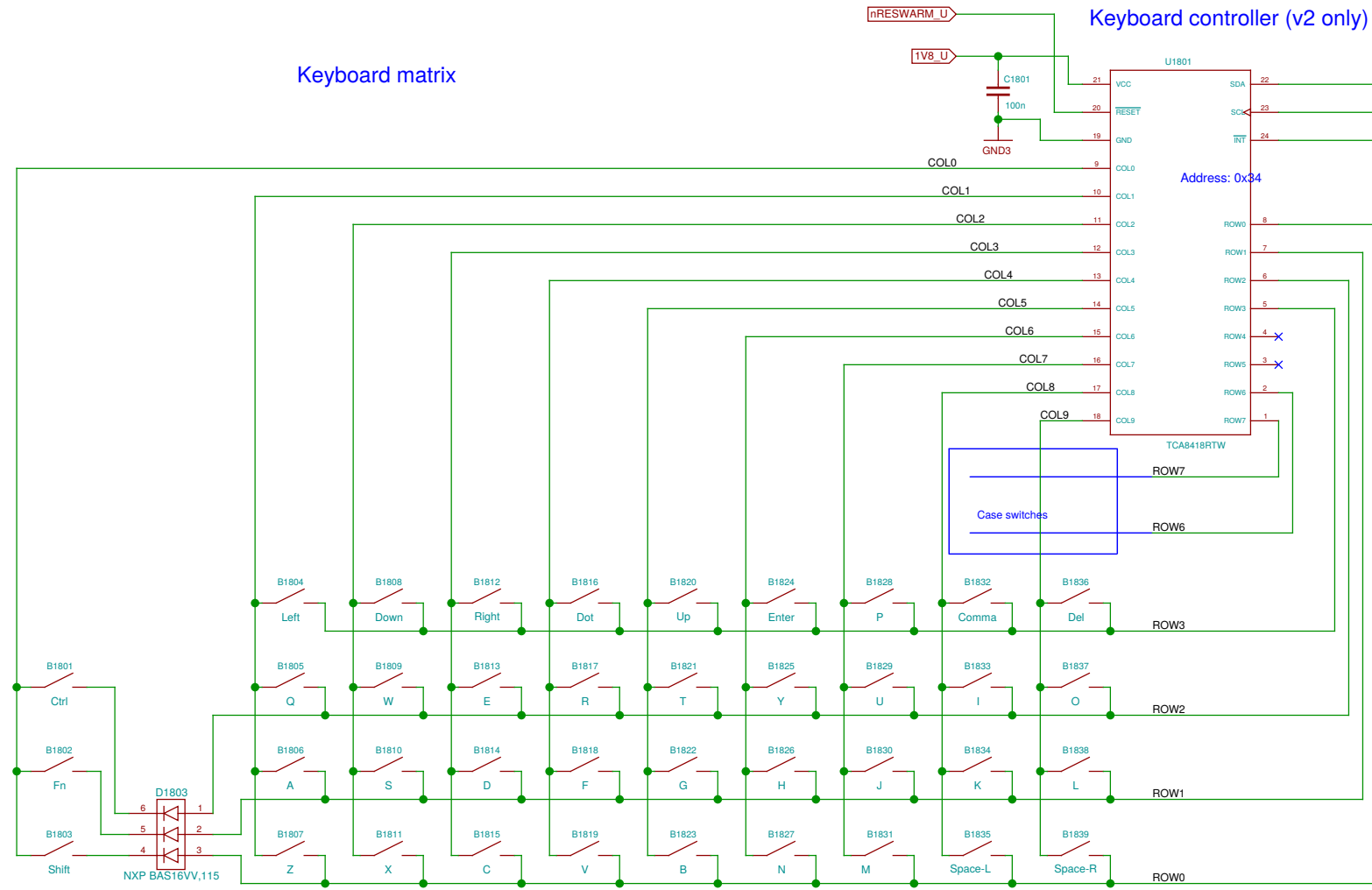
Defined in the Hackerbus specification, <http://neo900.org/stuff/papers/hb.pdf>



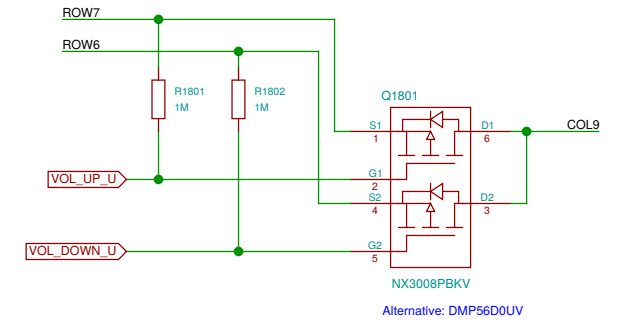
ESD pin assignment is only indicative.
Actual assignment to be defined by layout.

Sheet: /uSD Breakout Board/ File: bob.sch		
Title: uSD Breakout Board		
Size: A3	Date: 2016-12-21 02:12:34	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 17/25

Keyboard matrix

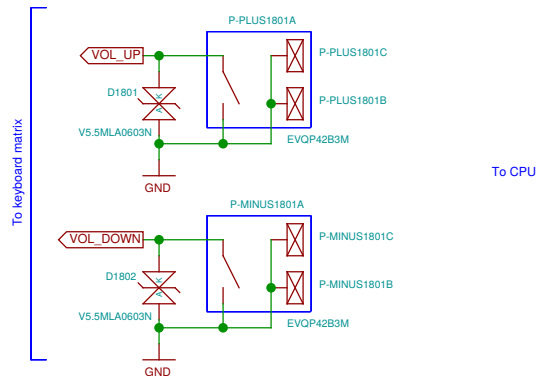


Alternative: Diodes Inc. BAS16VV-7
Warning: Diodes Inc. have cathodes on pin 1 side, NXP anodes !

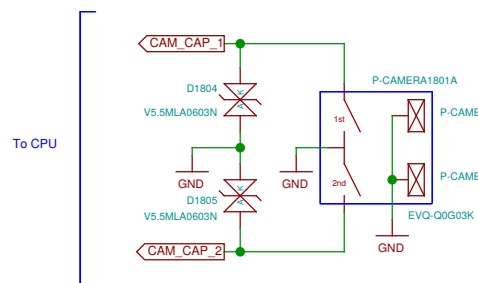


UPPER
LOWER

Volume

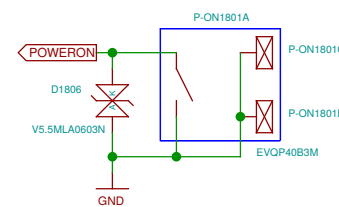


Camera trigger

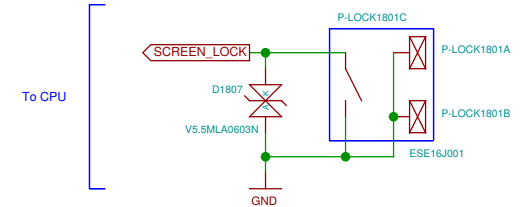


To companion chip

On-off



Lock switch

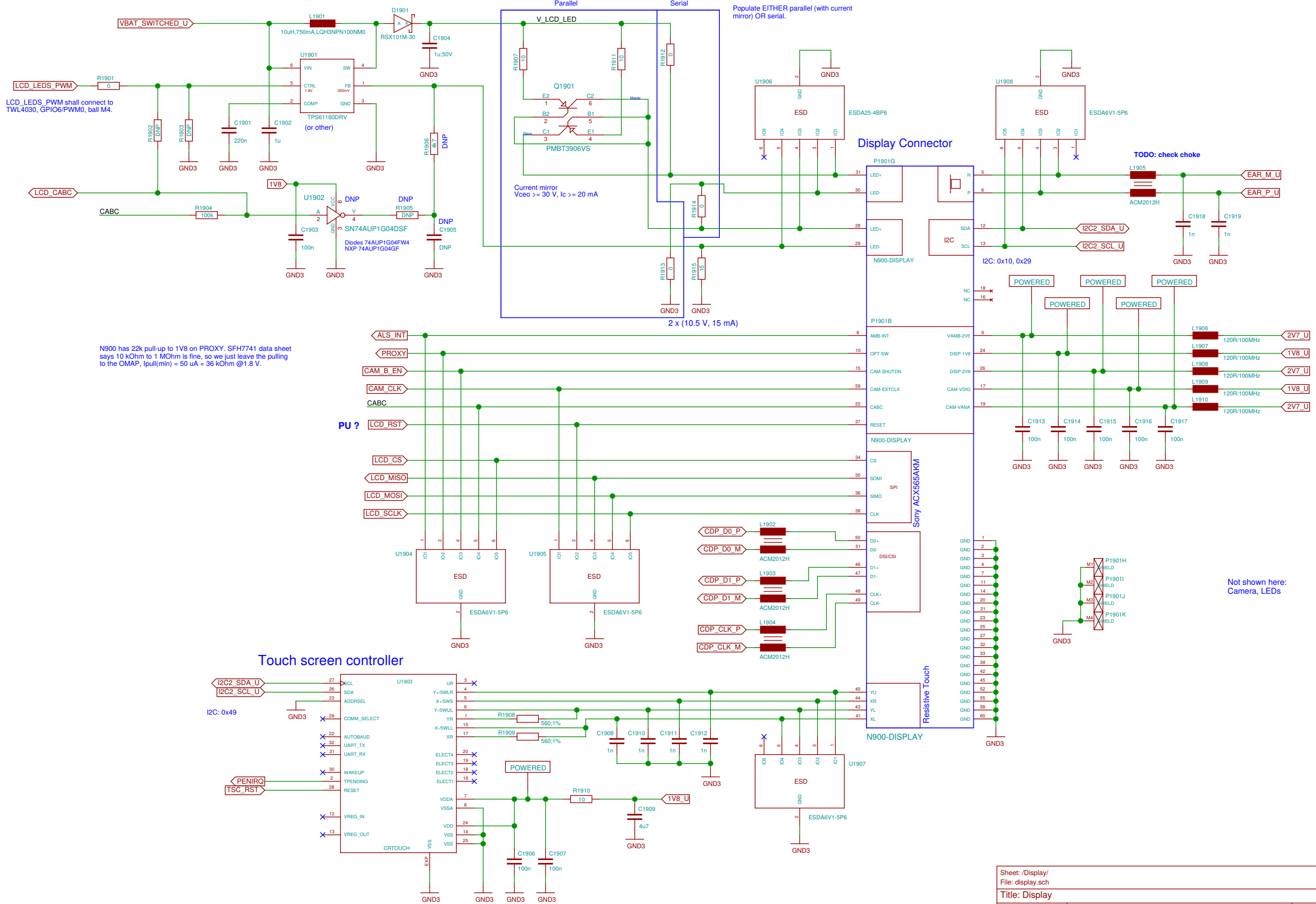


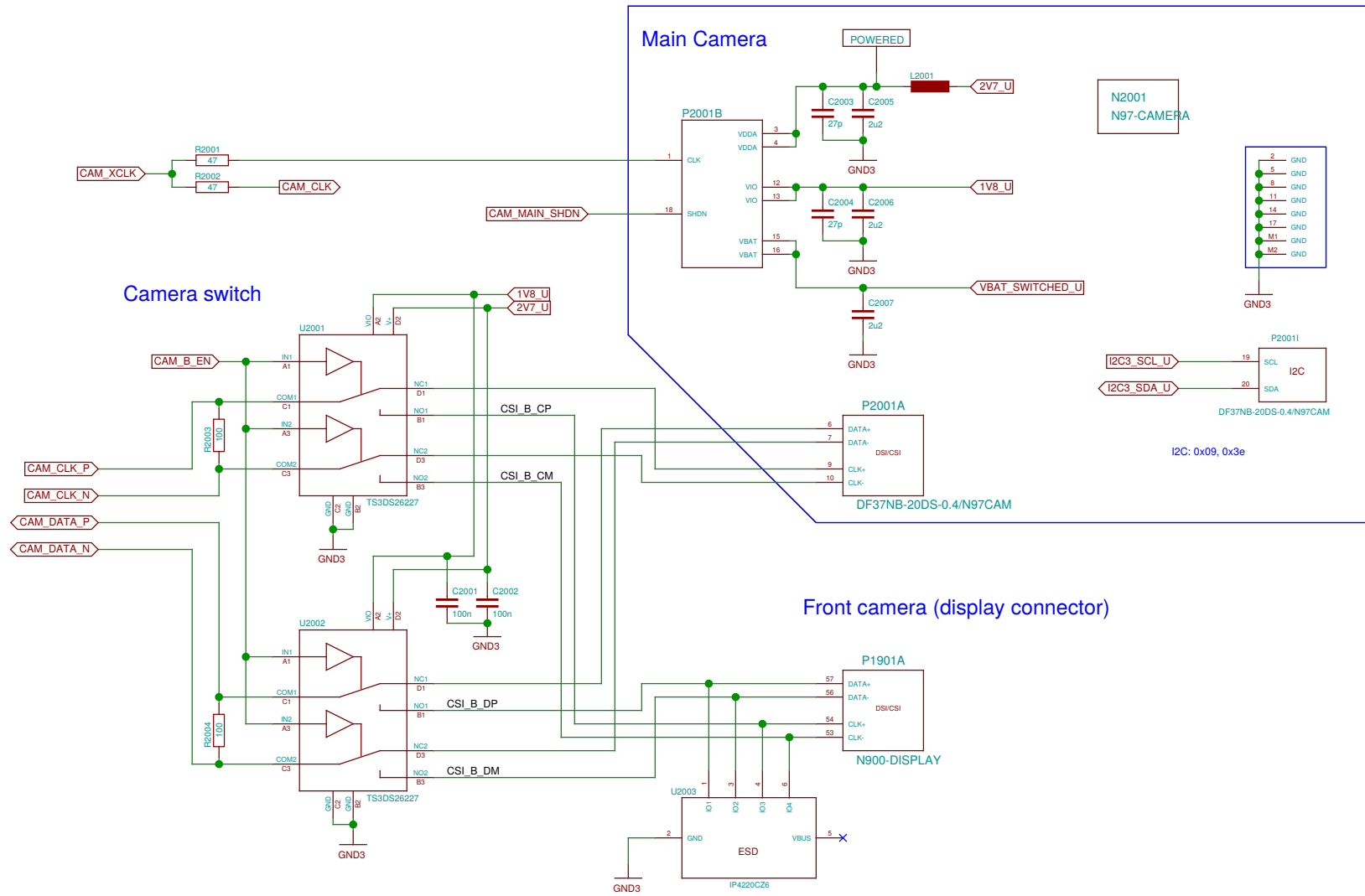
Sheet: /Keypad and buttons/
File: keys.sch

Title: Keypad and buttons

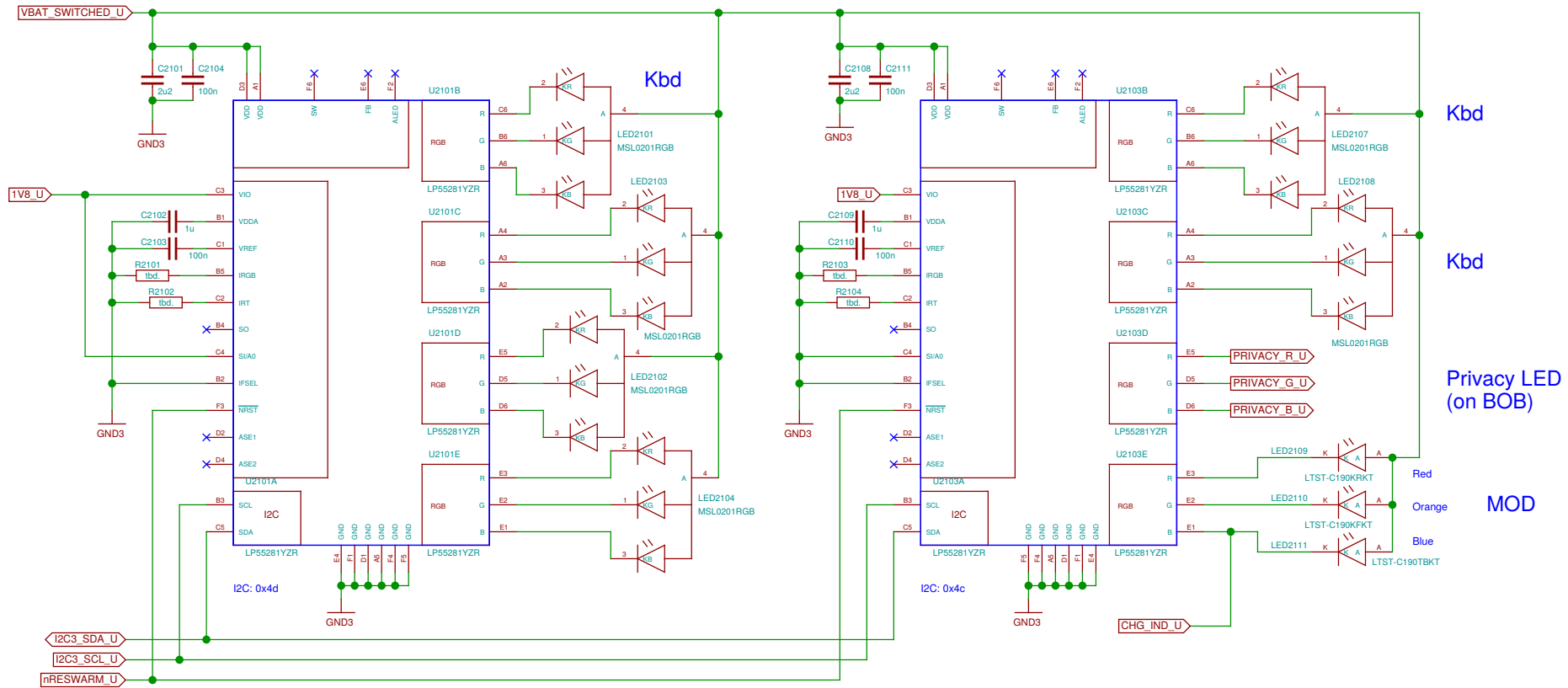
Size: A3 Date: 2016-12-21 02:12:34

Rev: Id: 18/25

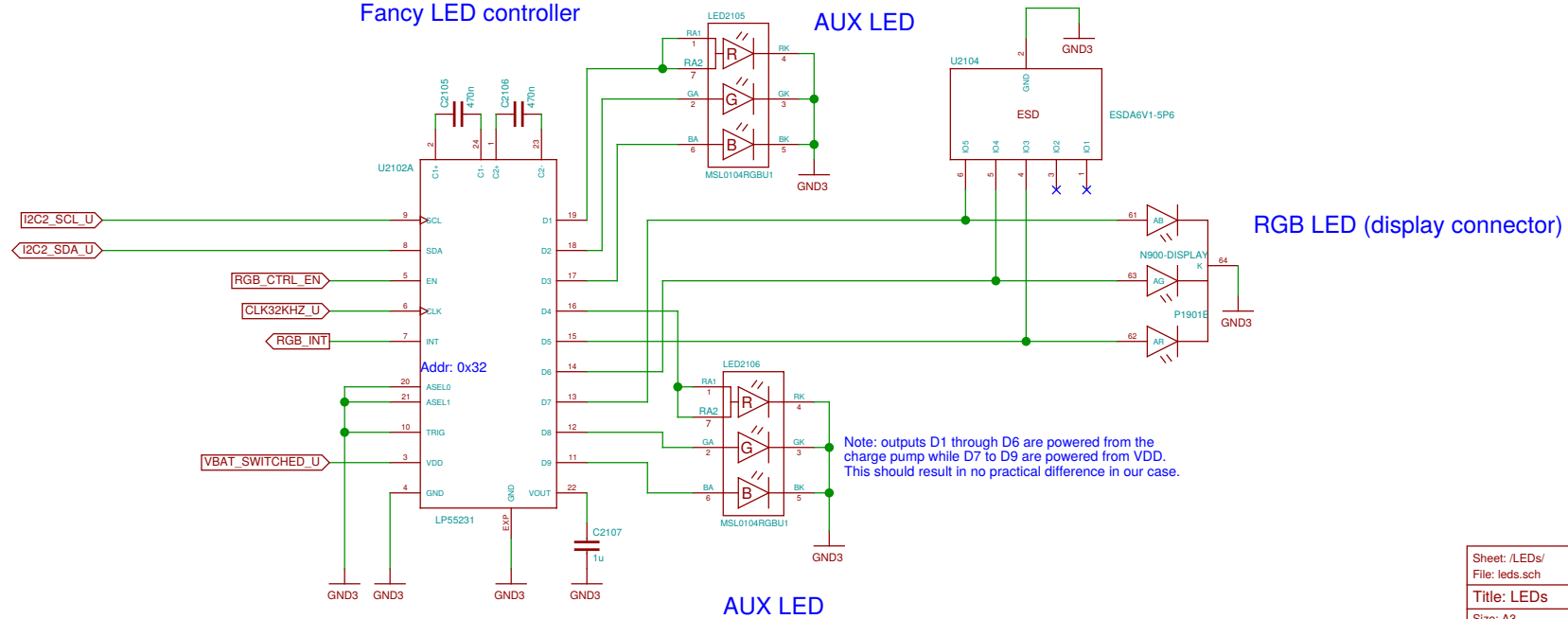




Basic LED controllers

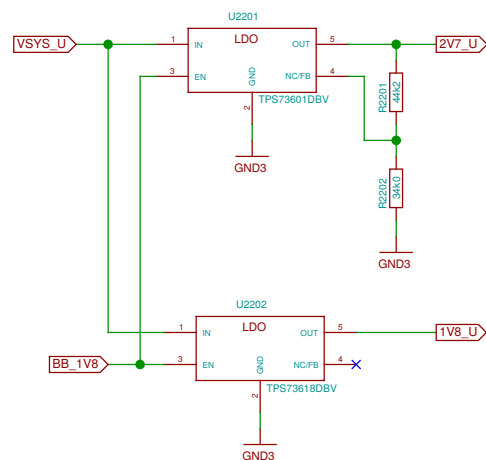


Fancy LED controller



Sheet: /LEDs/		Date: 2016-12-21 02:12:34	
File: leds.sch		Rev:	
Title: LEDs		Id: 21/25	
Size: A3	Plotted by: eeshow 221aa28 20161208-00:03Z		

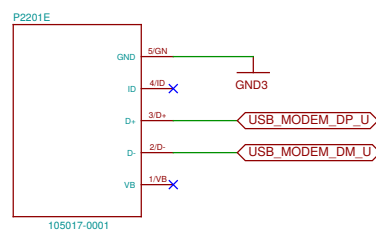
simple capless 400mA LDO for TPS65950 substitute
(only for prototype)



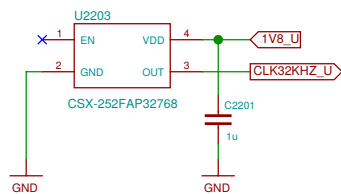
TODO: use REGEN ?

Modem USB

connect to BB
by some Micro-USB cable

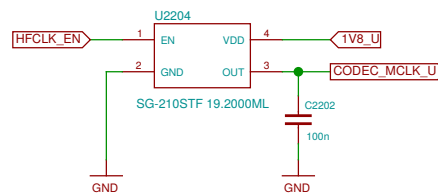


32 kHz clock



Alternative: OYKTGLJANF-0.032768

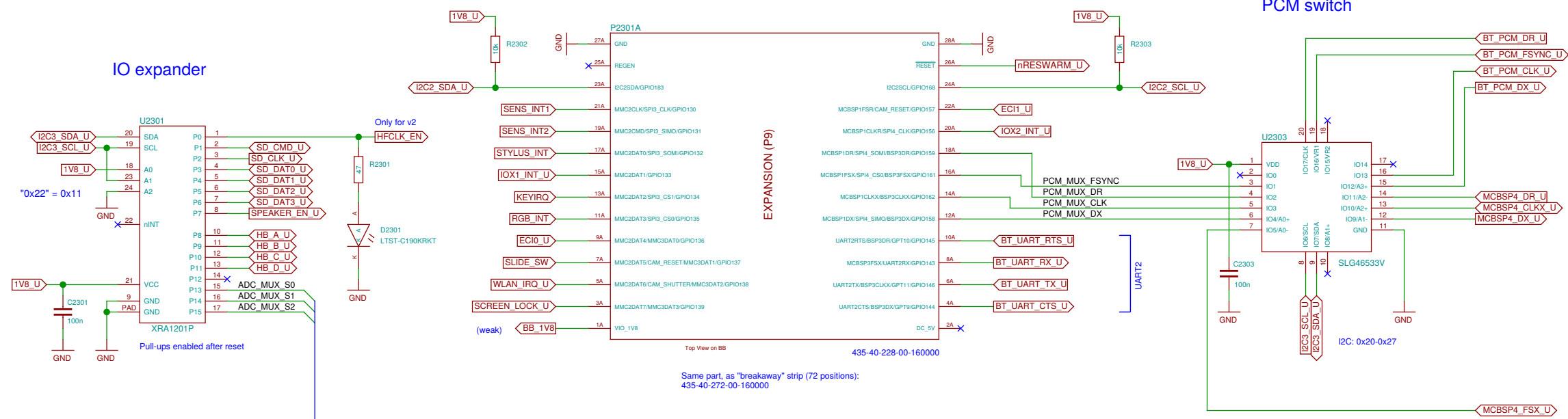
19.2 MHz clock



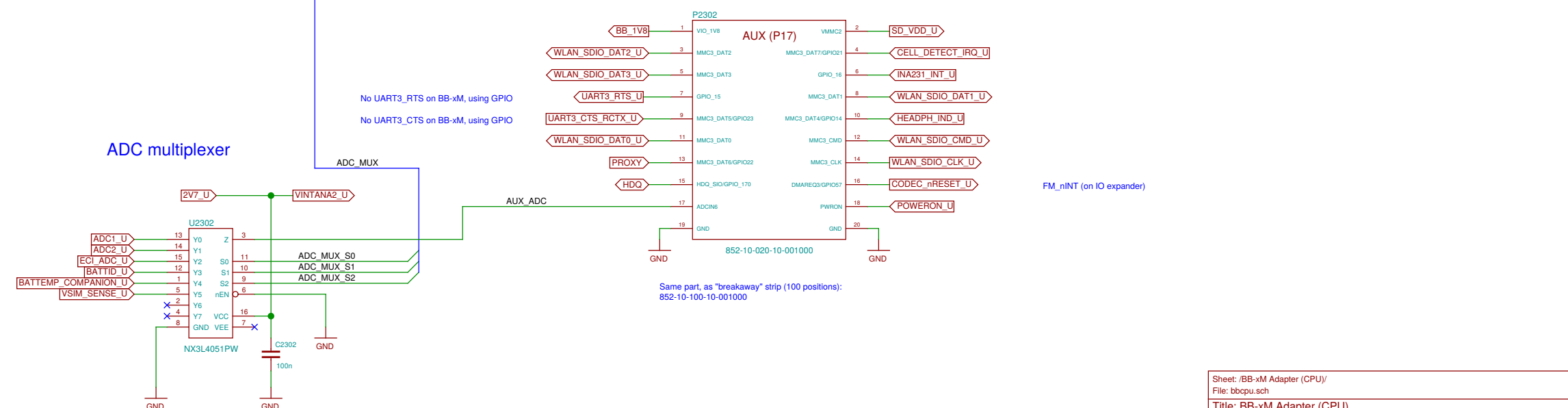
Alternative: KC2520B19.2000C1GE00

Sheet: /Adaptation (v2 only)/		
File: v2.sch		
Title: Adaptation (v2 only)		
Size: A3	Date: 2016-12-21 02:12:34	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 22/25

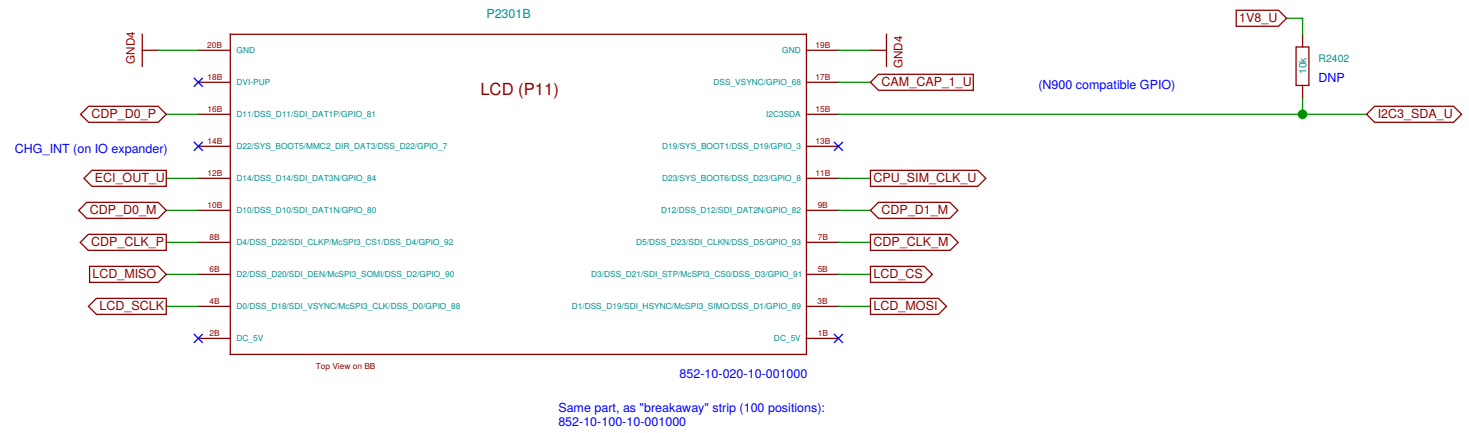
BB-xM Main Expansion Header (P9, 7.24)



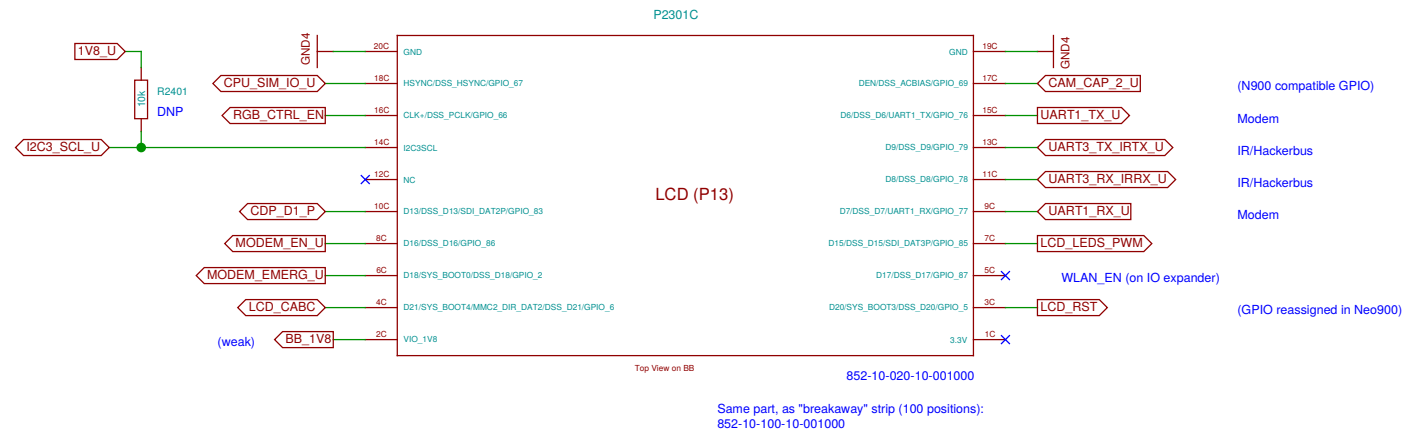
Auxiliary Expansion Header (P17, 7.26)



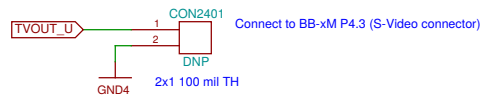
P11 (7.25)



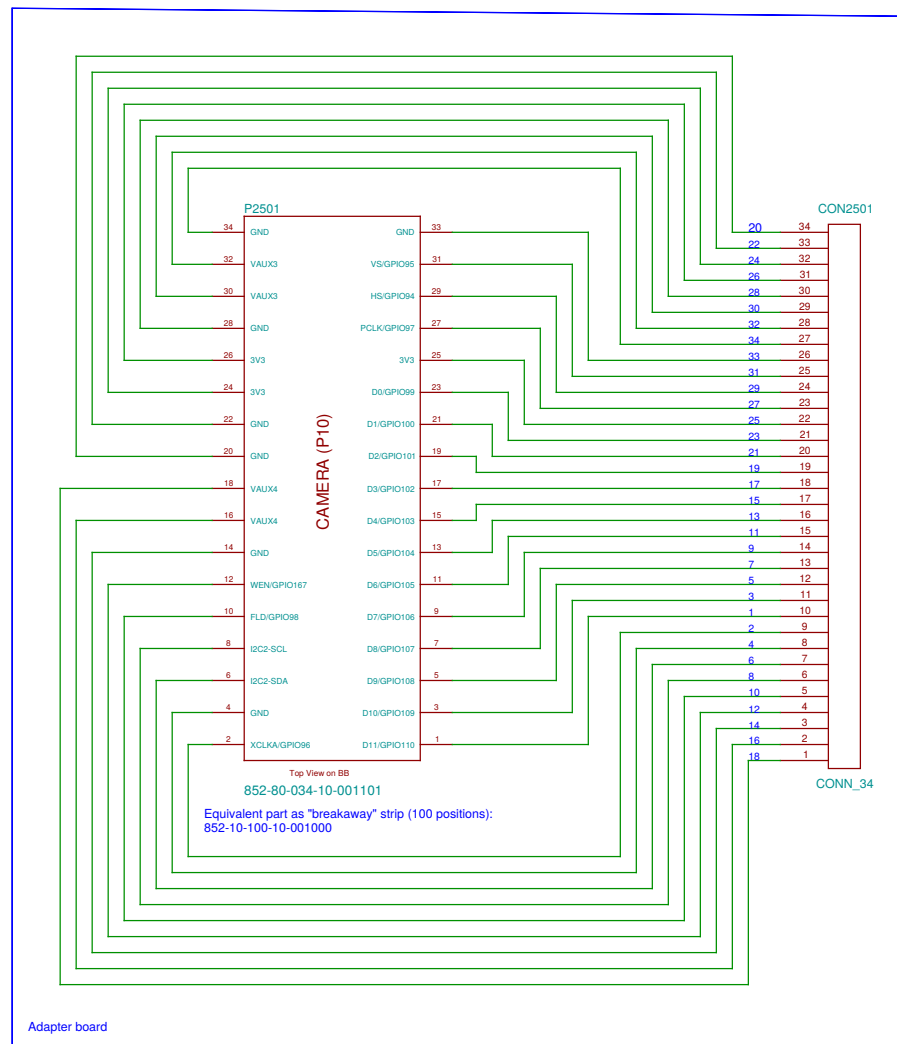
P13 (7.25)



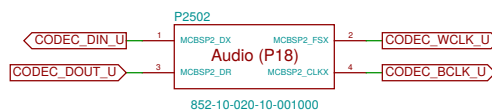
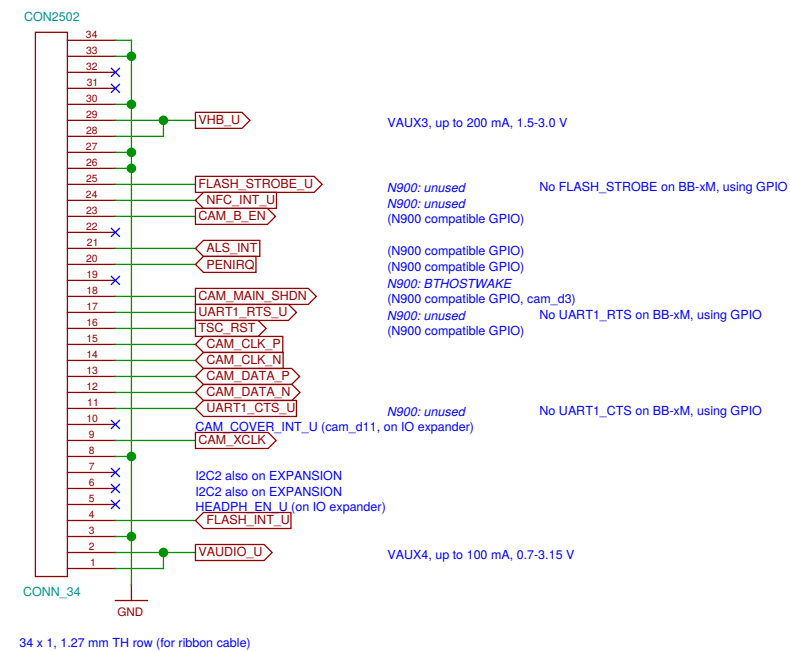
P4 (7.19)



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: 2016-12-21 02:12:34
Plotted by eeshow 221aa28 20161208-00:03Z

Rev: Id: 25/25