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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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Audio Codec

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Audio Headset, ECI

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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

File: leds.sch

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V

Sheet: Adaptation (v2 only)



Adaptation (v2 only)

File: v2.sch

Sheet: BB-xM Adapter (CPU)



BB-xM Adapter (CPU)

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Sheet: BB-xM Adapter (DISP)



BB-xM Adapter (DISP)

File: bbdisp.sch

Sheet: BB-xM Adapter (CAM)



BB-xM Adapter (CAM)

File: bbcam.sch

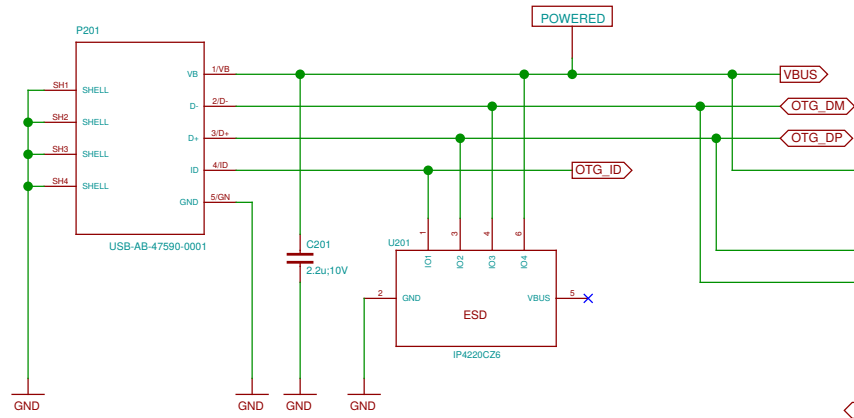
Circuits that exist in the v2 prototype only
and that will not be part of the final design.

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

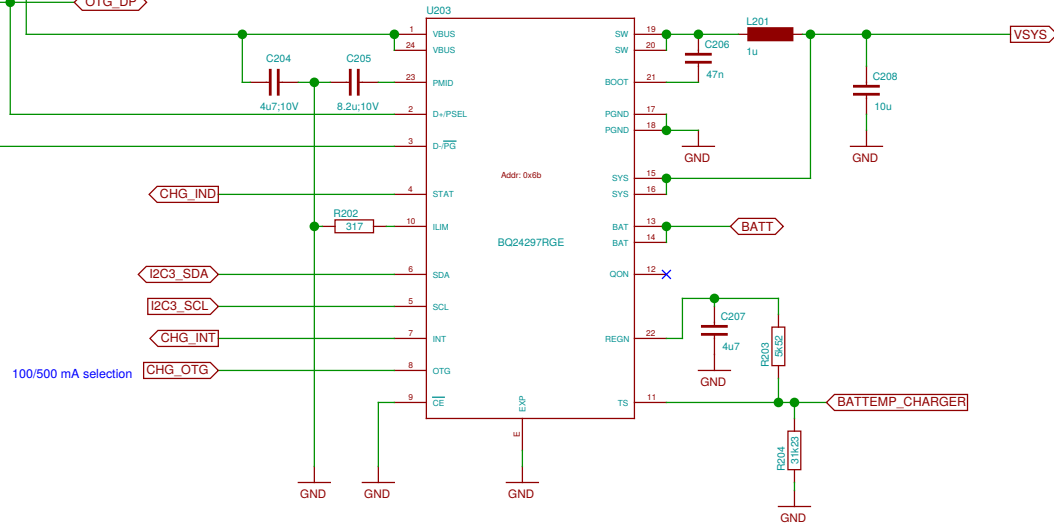
Signals that exist on both LOWER and UPPER (and maybe also BOB)
have a _U suffix on UPPER. No suffix is needed to distinguish
between LOWER and BOB because all BOB components are on
the same sheet and wires connecting them use sheet-local labels.

Sheet: /	
File: neo900.sch	
Title: Neo900	
Size: A3	Date: 2016-11-18 15:49:26
Plotted by: eeshow a9b66dd+ 20161113-21:01Z	Rev: Id: 1/25

USB OTG connector

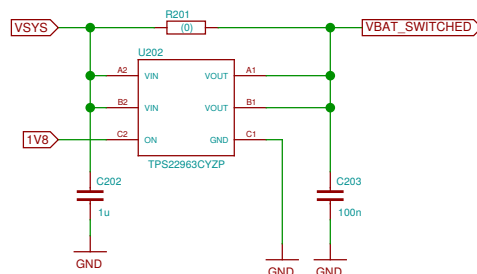


Battery charger with USB OTG

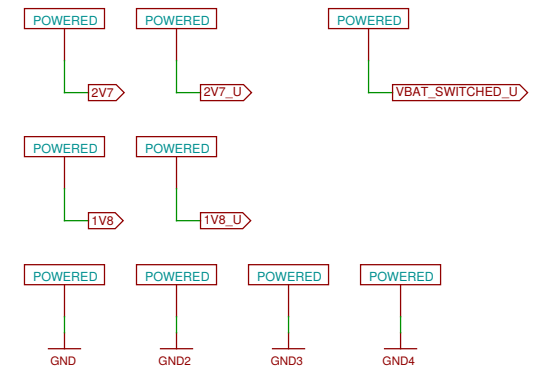


Power distribution and sequencing

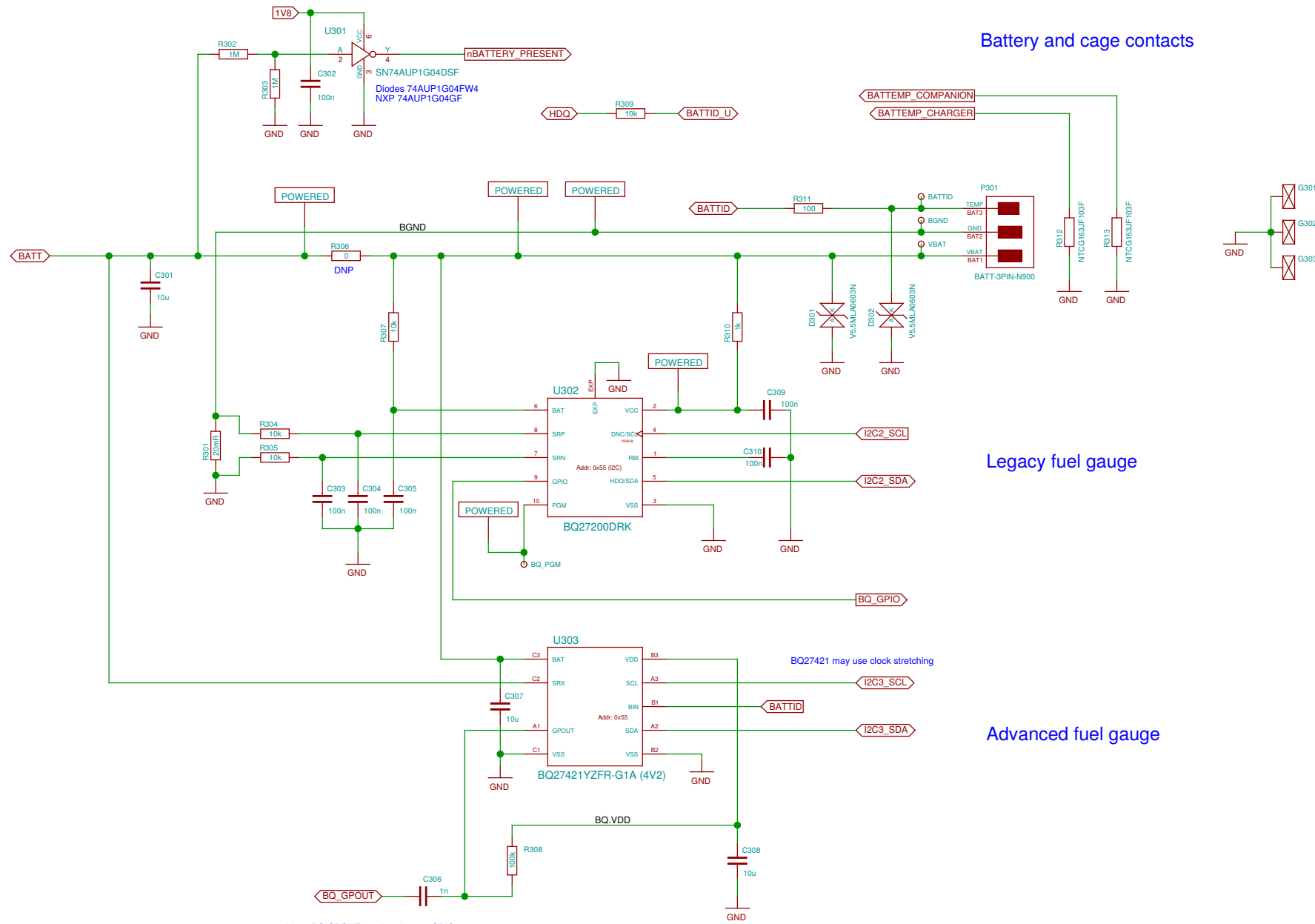
Most high-current consumers are on VBAT_SWITCHED.
1V8 signals that the regulators on UPPER are operational.



KiCad bureaucracy



Sheet: /Charger/OTG/		File: charger.sch	
Title: Charger/OTG			
Size: A3	Date: 2016-11-18 15:49:26	Rev:	
Plotted by eeshow a9b66dd+ 20161113-21:01Z			Id: 2/25



Battery and cage contacts

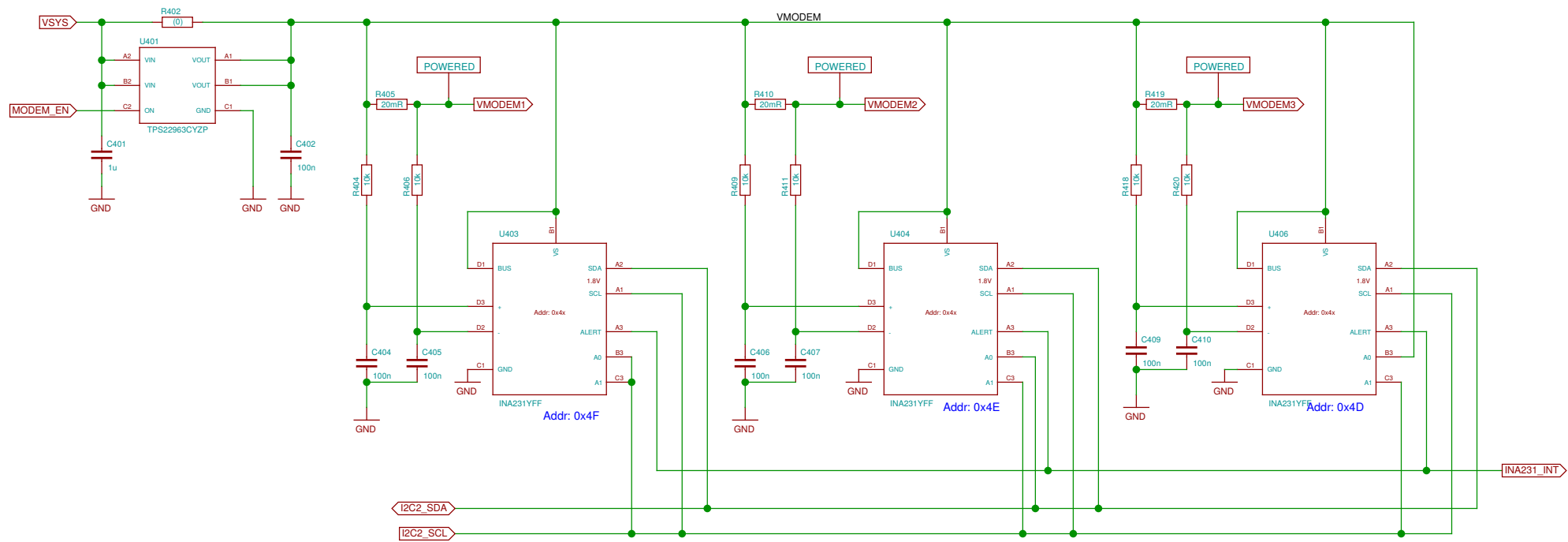
Legacy fuel gauge

Advanced fuel gauge

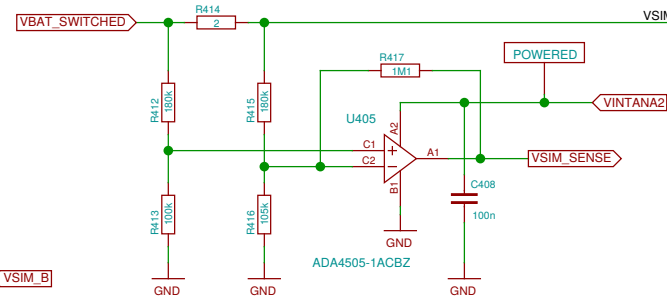
Note: BQ.GPOUT needs pull-up at GPIO.

Sheet: /Battery/		Date: 2016-11-18 04:02:08	
File: battery.sch		Rev: 3/25	
Title: Battery			
Size: A3	Plotted by eeshow a9b66dd+ 20161113-21:01Z		Id: 3/25

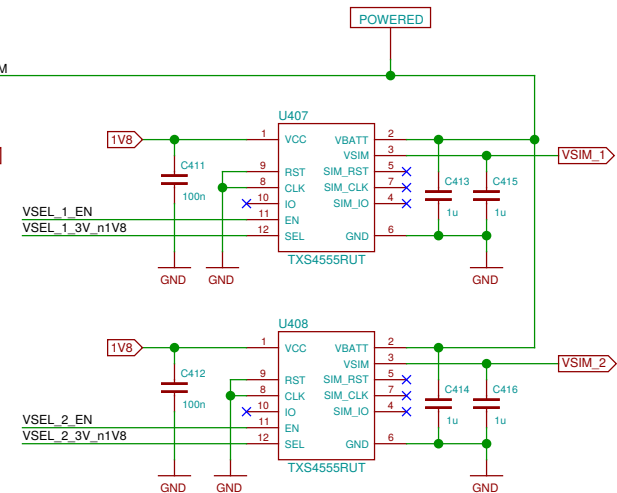
Modem current monitor



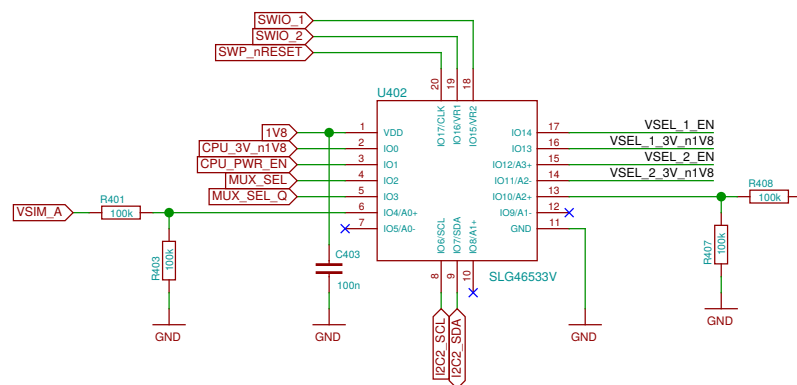
SIM current sensing



SIM power supply

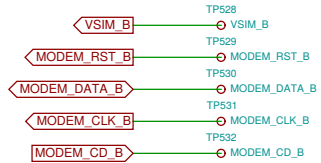


SIM power selection

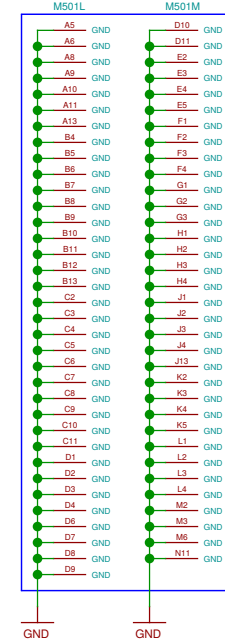
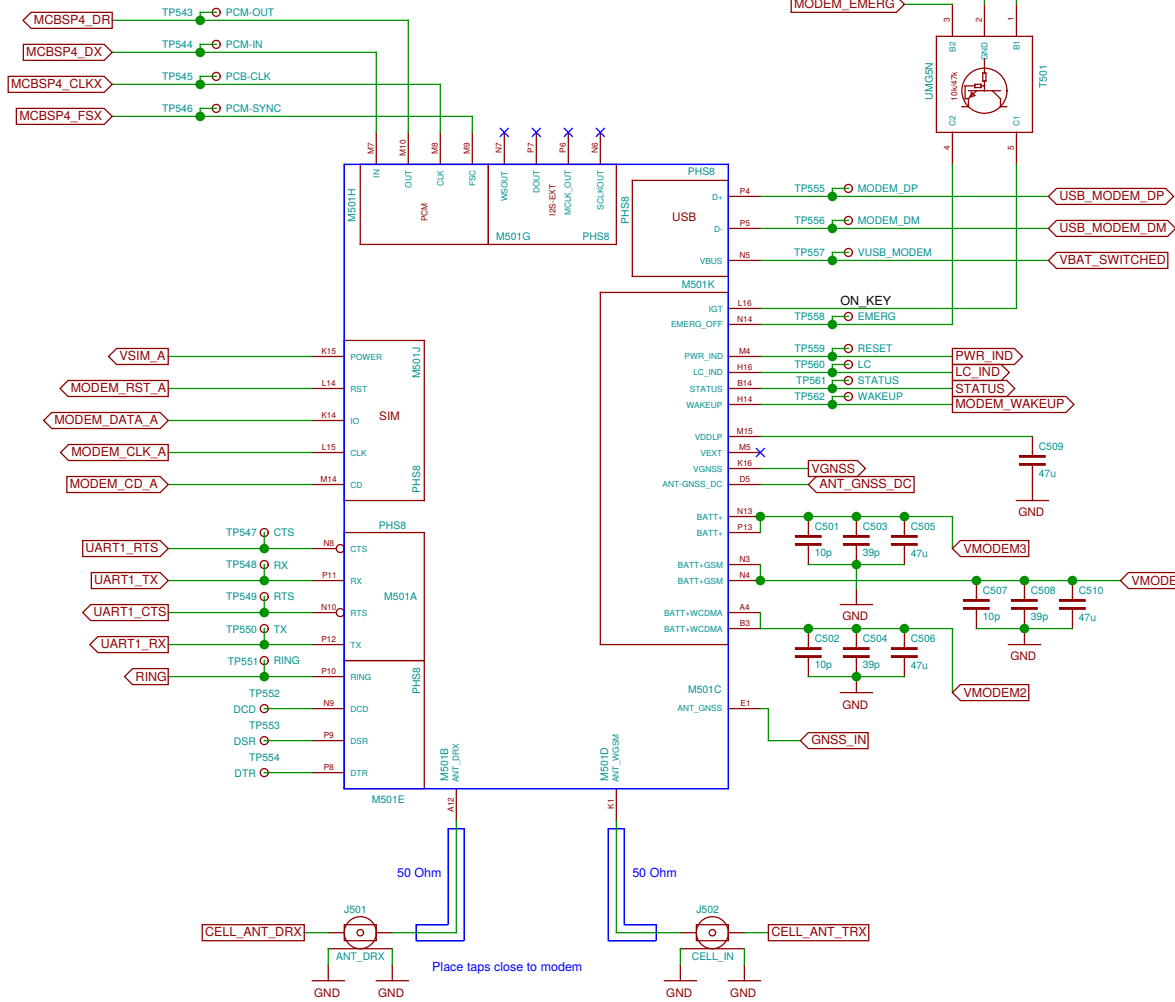


TODO: update SLG design for changed pins

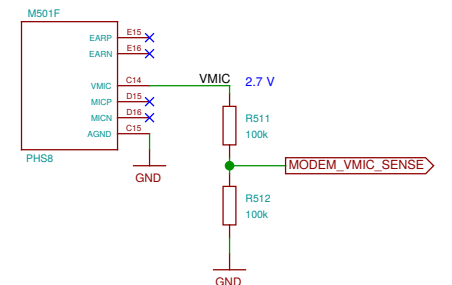
SIM B bus



Modem (module)



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.

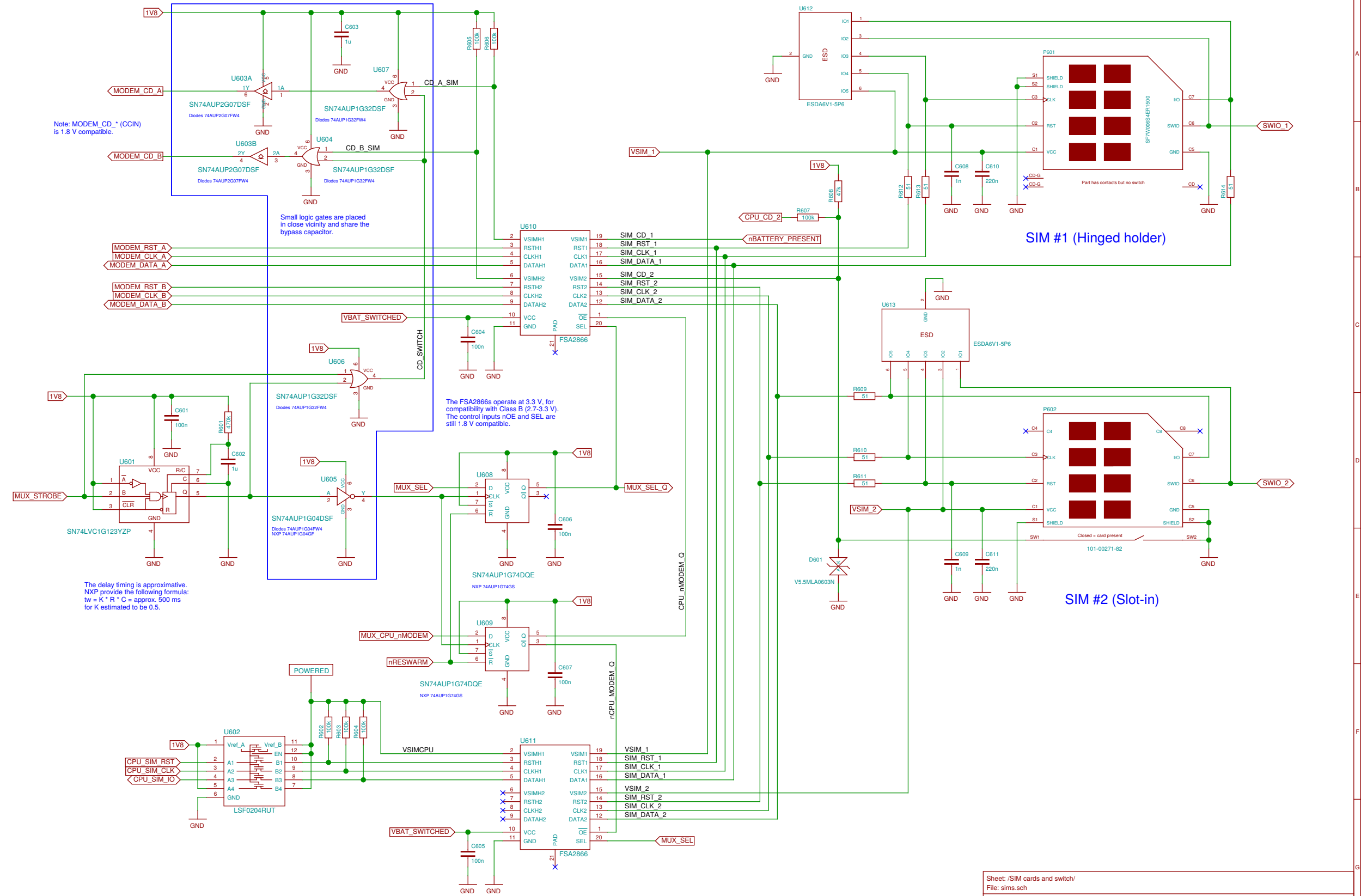
Pads that are DNU in PHS8 and PLS8.

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

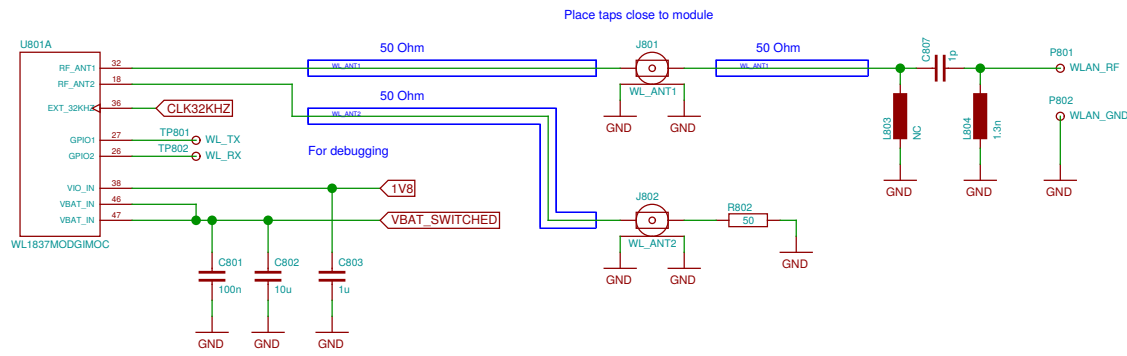
50 Ohm



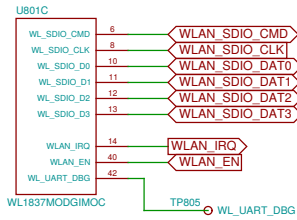
Sheet: /SIM cards and switch/ File: sims.sch		
Title: SIM cards and switch		
Size: A3	Date: 2016-11-18 15:48:54	Rev:
Plotted by eeshow a9b66dd+ 20161113-21:01Z		Id: 6/25

TODO: assign footprints for c-spring contacts

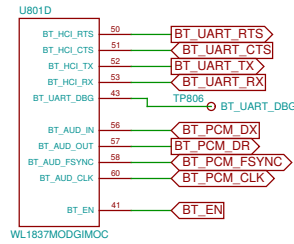
WLAN/BT antenna



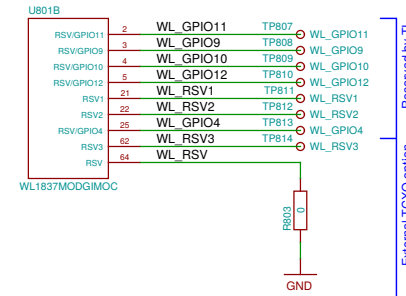
WLAN



Bluetooth

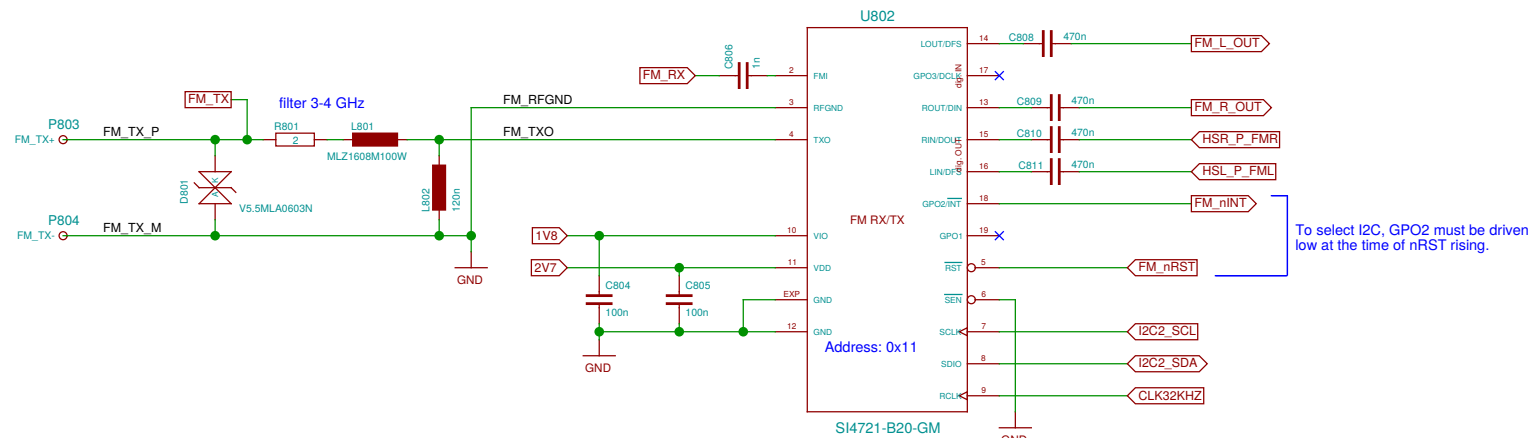


Reserved / Debugging

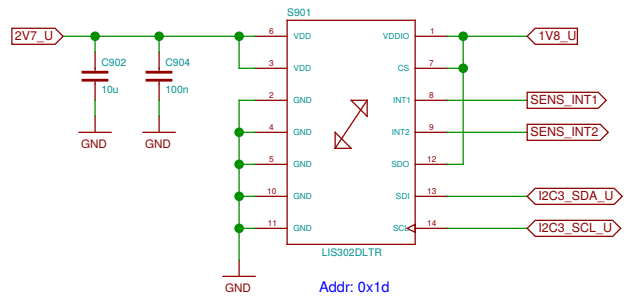


FM Radio (TX/RX)

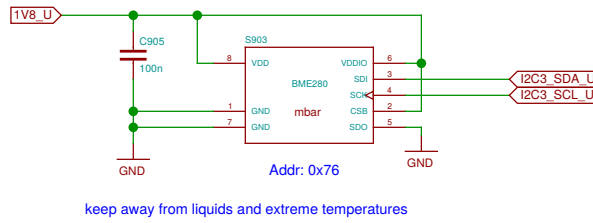
FM TX antenna



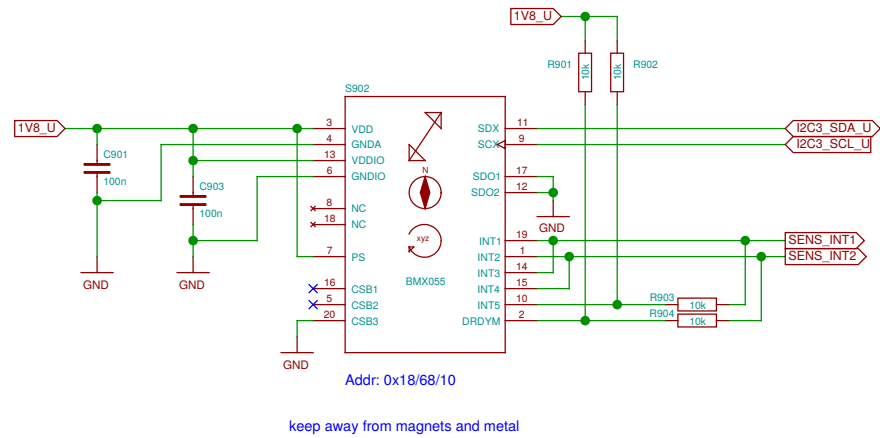
Acceleration (legacy)



Pressure, humidity

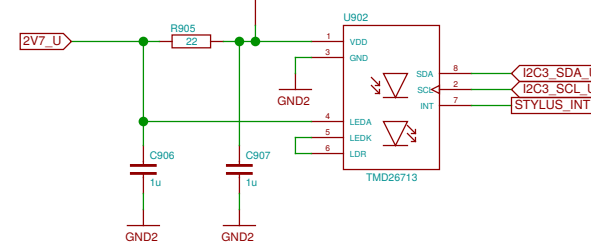


9-axis (acceleration, gyroscope, magnetometer)

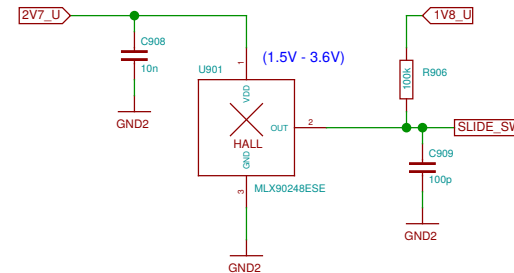


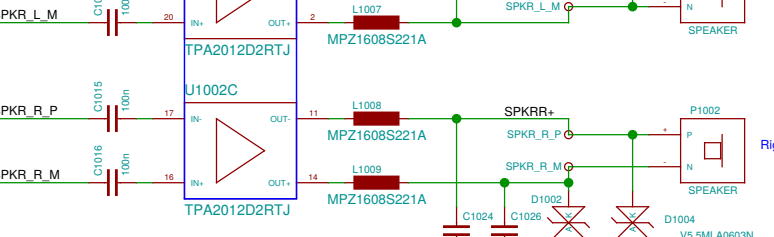
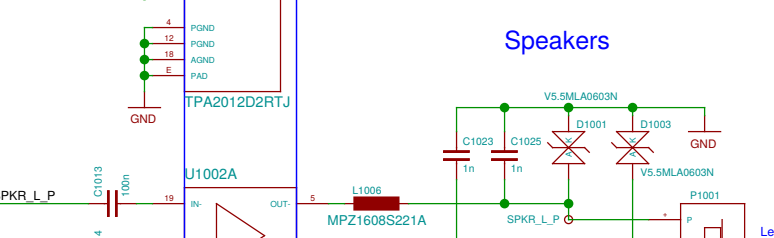
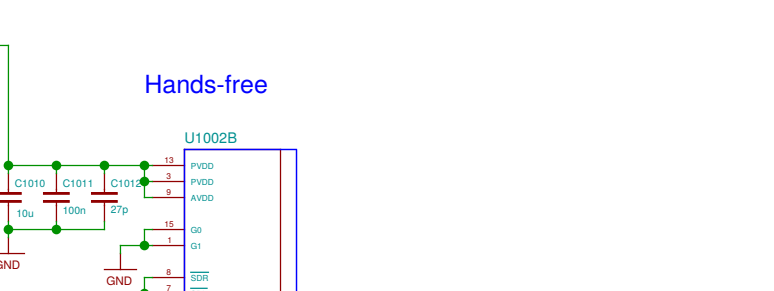
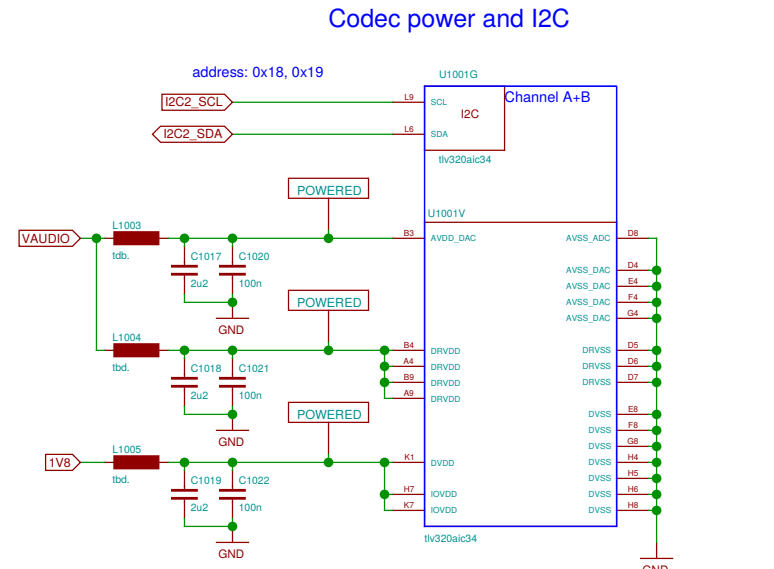
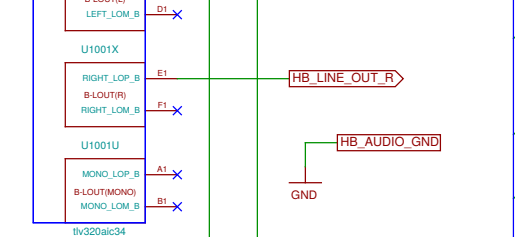
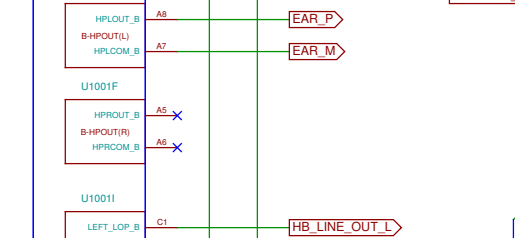
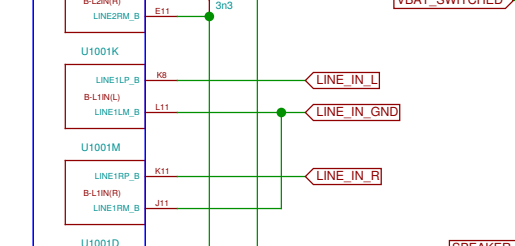
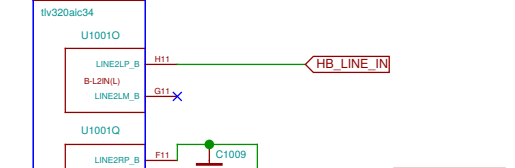
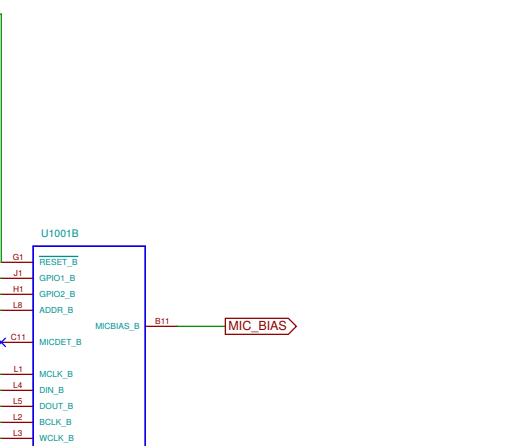
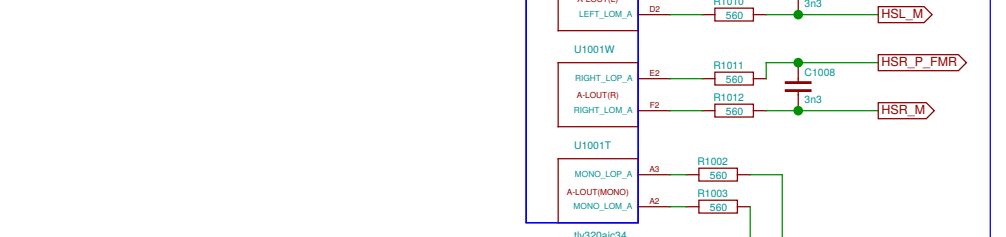
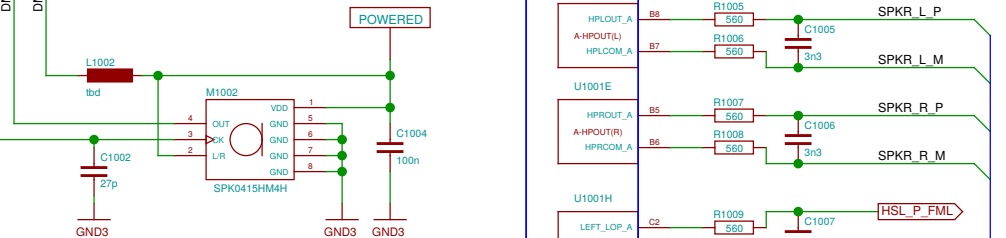
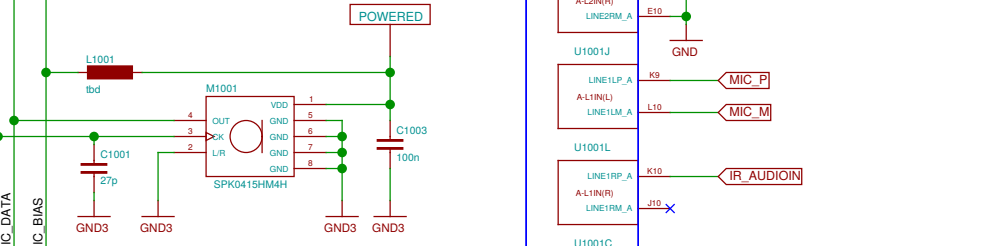
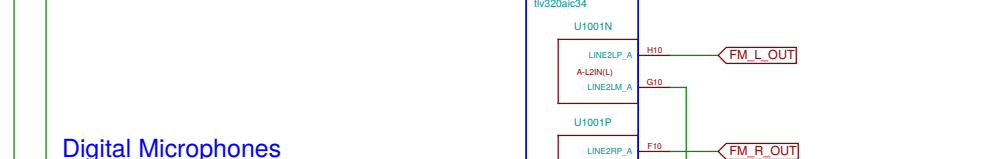
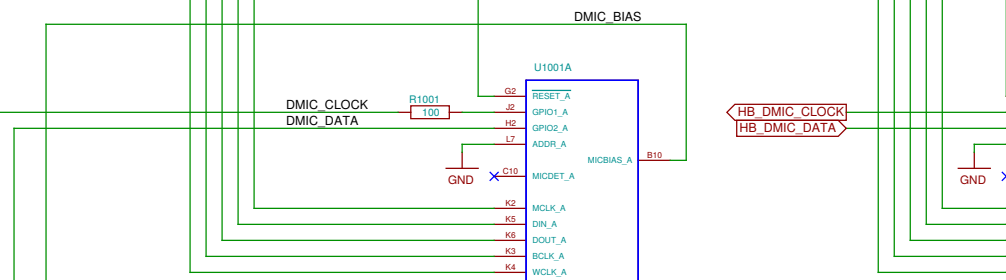
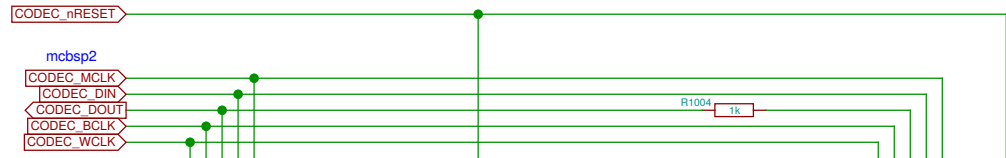
UPPER LOWER

Stylus detect

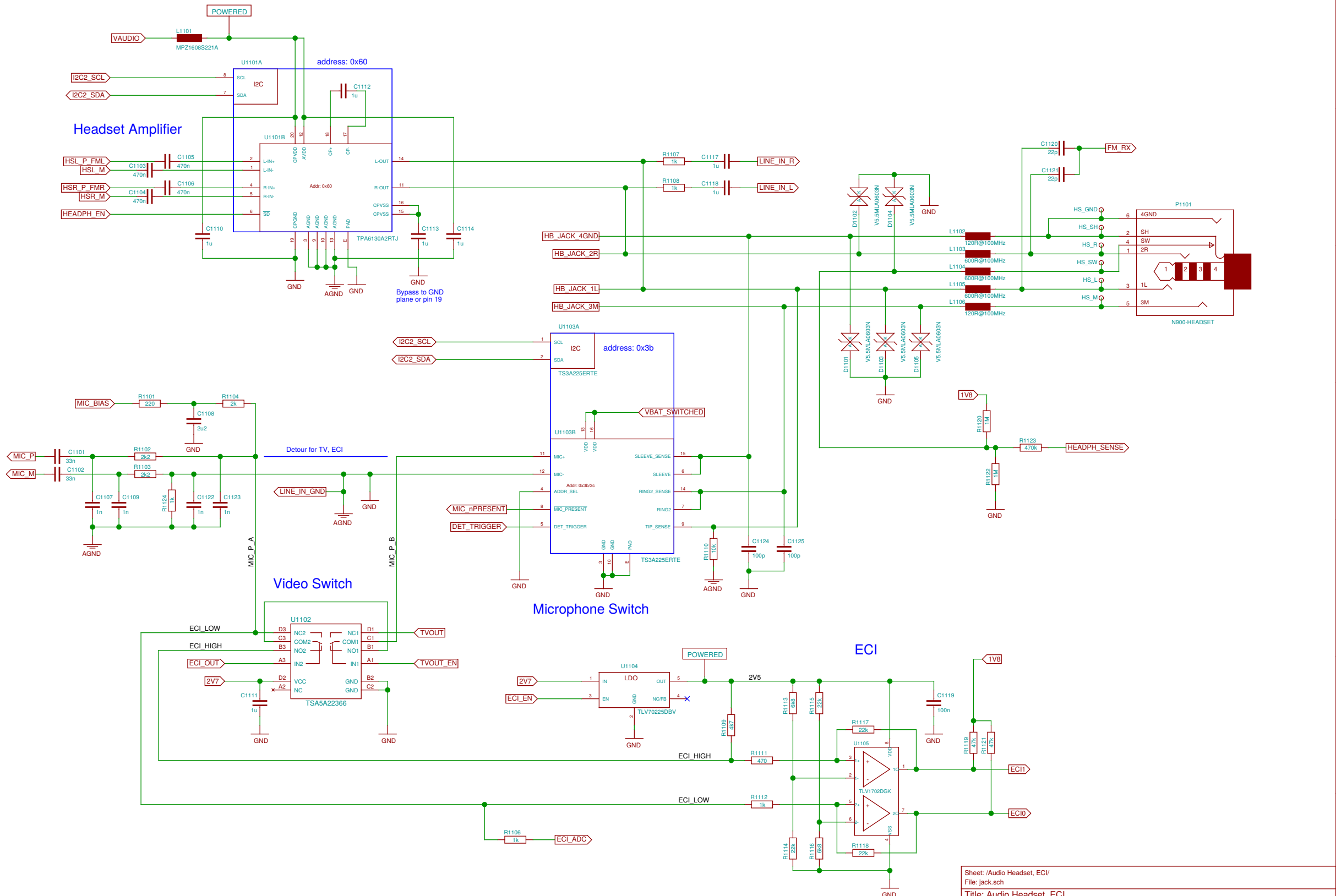


Slide sensor



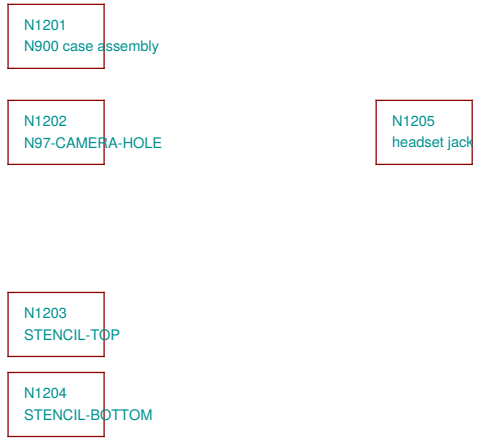


Sheet: /Audio Codec/		File: codec.sch	
Title: Audio Codec			
Size: A3	Date: 2016-11-18 15:49:26	Rev:	
Plotted by eeshow a9b66dd+ 20161113-21:01Z		Id: 10/25	

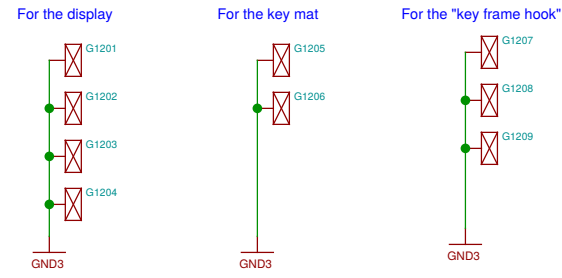


Sheet: /Audio Headset, ECI/		File: jack.sch	
Title: Audio Headset, ECI			
Size: A3	Date: 2016-11-18 15:49:26	Rev:	
Plotted by: eeshow a9b66dd+		20161113-21:01Z	
Id: 11/25			

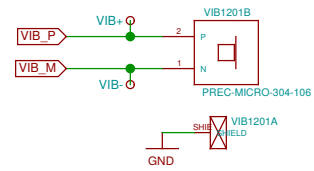
No-Solder Components



Shield Contacts on UPPER

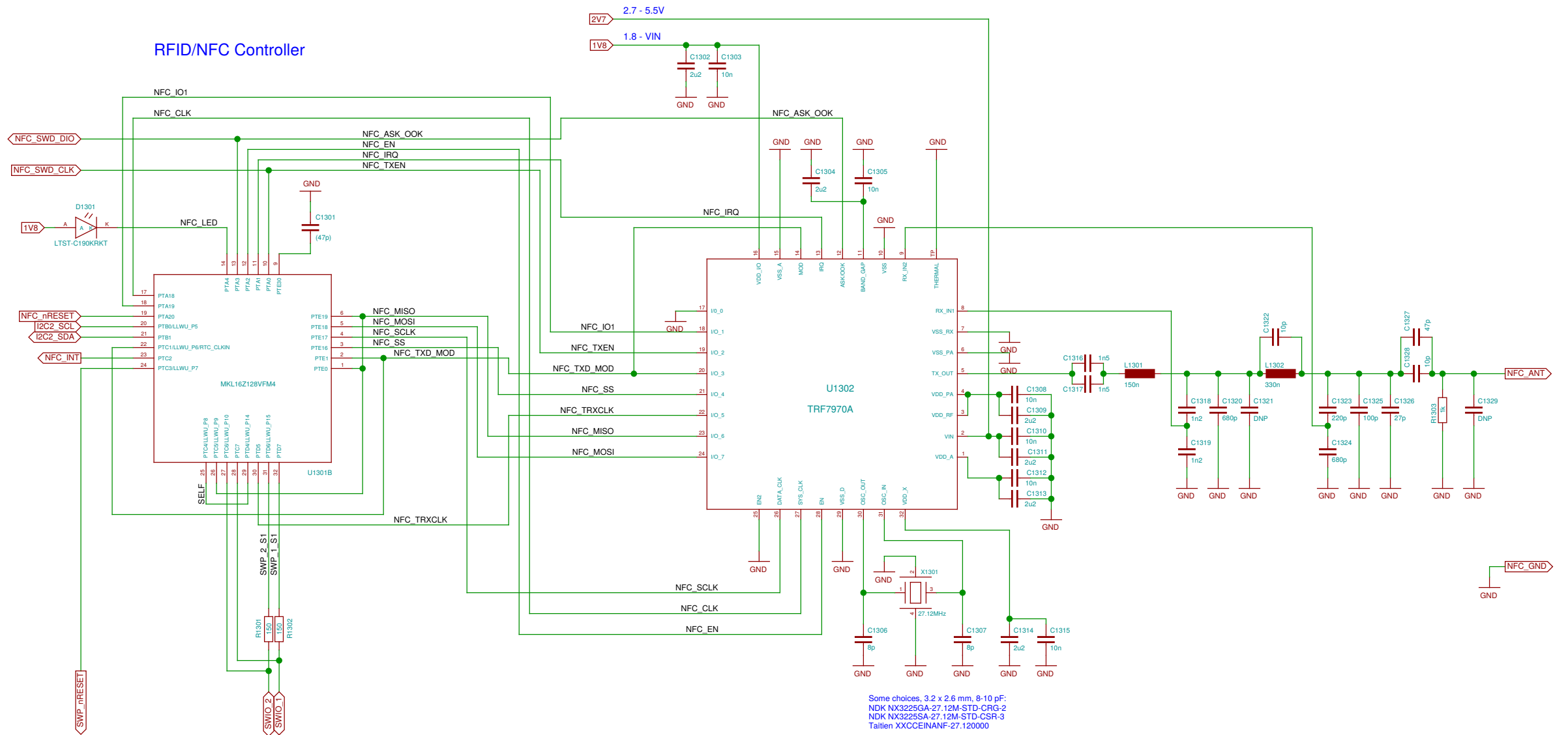


Vibramotor



Sheet: /Misc/		
File: misc.sch		
Title: Misc		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow a9b66dd+ 20161113-21:01Z		Id: 12/25

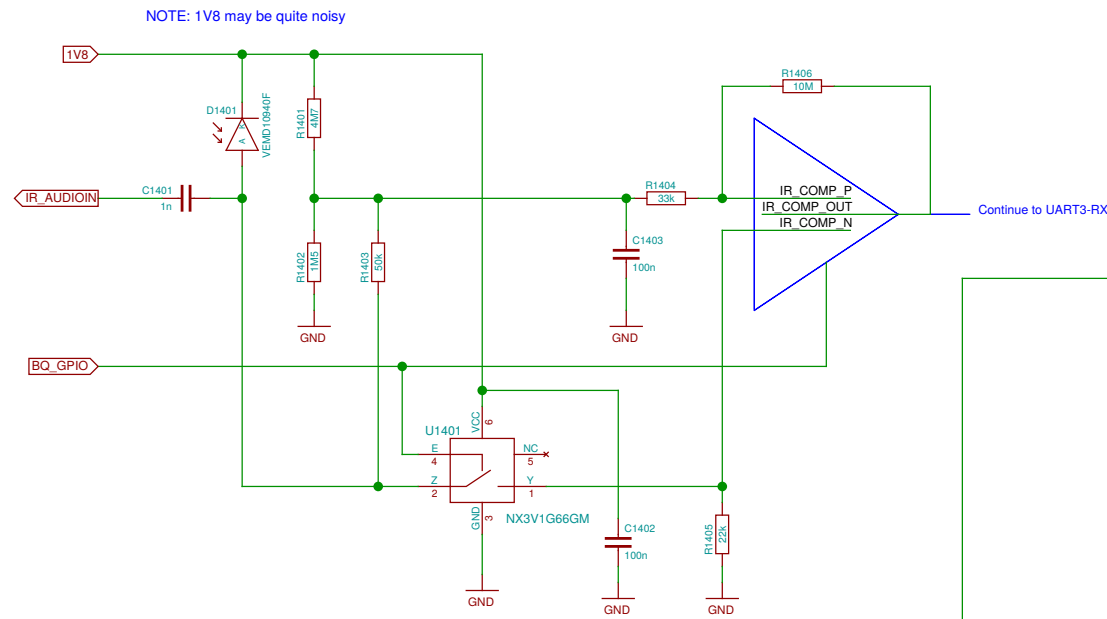
RFID/NFC Transceiver



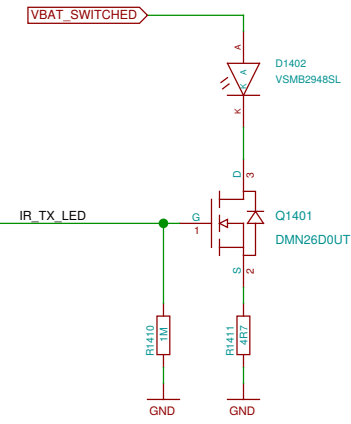
Some choices, 3.2 x 2.6 mm, 8-10 pF:
 NDK NX3225GA-27.12M-STD-CRG-2
 NDK NX3225SA-27.12M-STD-CSR-3
 Taillien XXCCEINANF-27.120000

Sheet: /RFID/NFC/		File: nfc.sch	
Title: RFID/NFC			
Size: A3	Date: 2016-11-18 15:49:26	Rev:	
Plotted by eeshow a9b66dd+ 20161113-21:01Z		Id: 13/25	

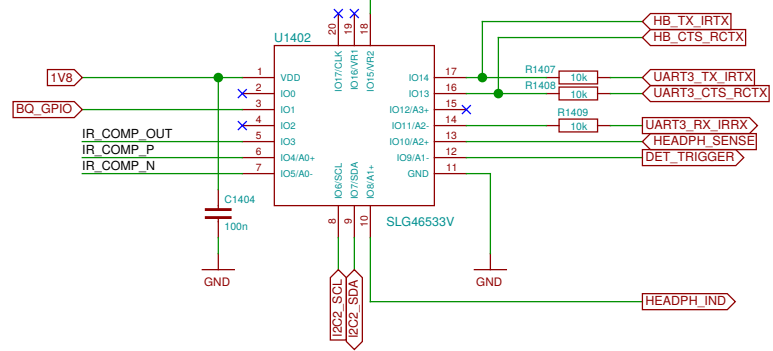
IR receiver



IR transmitter



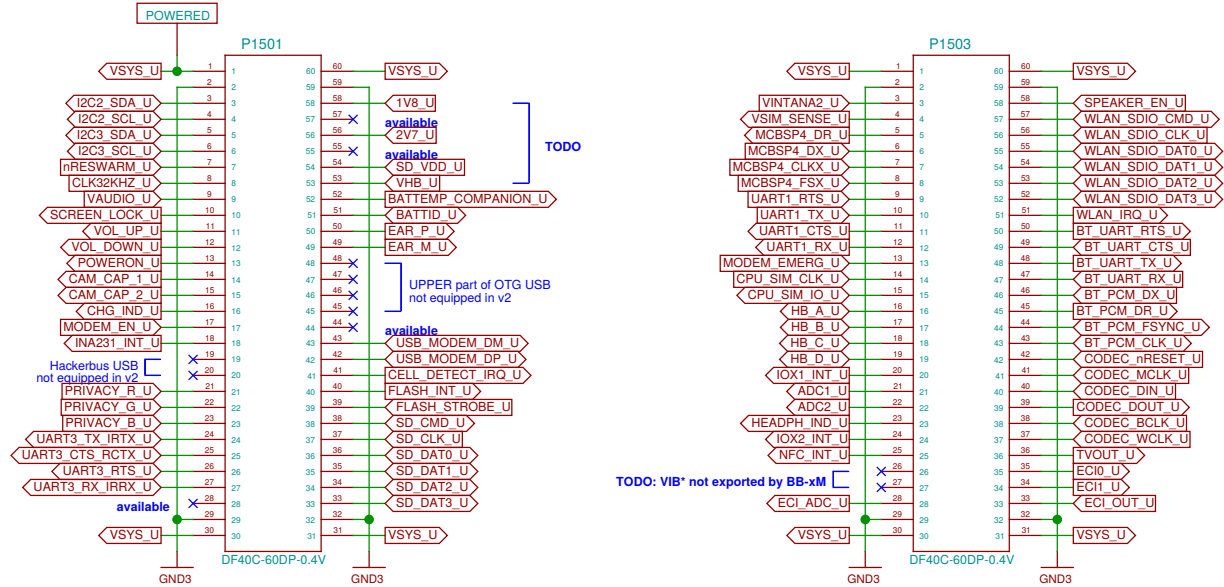
IR send/receive logic



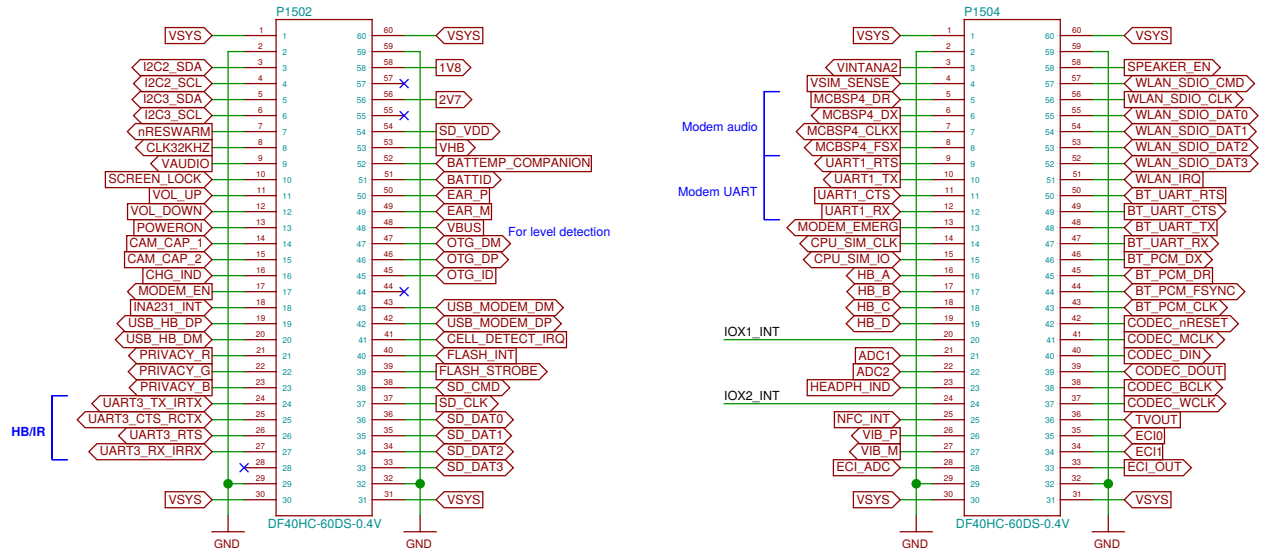
TODO: update D1401 footprint

Sheet: /Infrared/		File: ir.sch	
Title: Infrared			
Size: A3	Date: 2016-11-18 15:48:54	Rev:	
Plotted by eeshow a9b66dd+ 20161113-21:01Z		Id: 14/25	

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

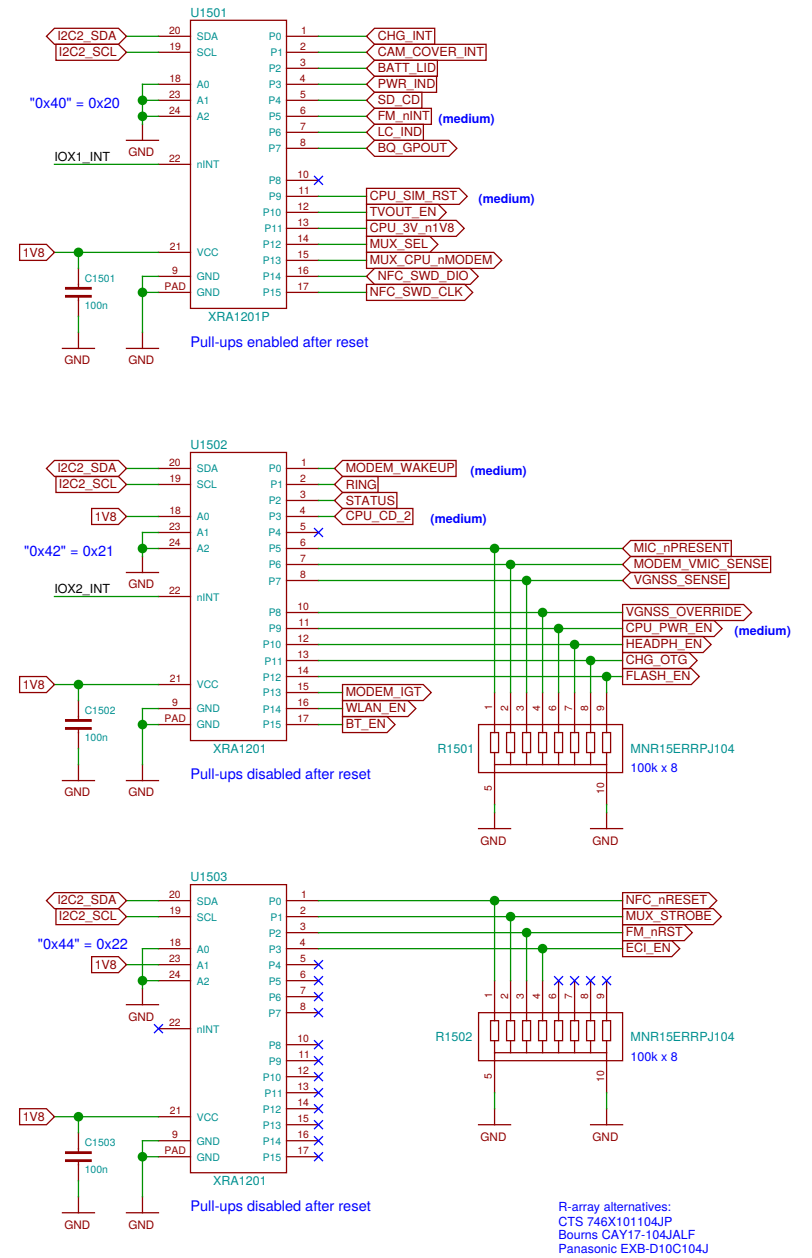


UPPER
LOWER



Current rating per contact: 0.3 A

IO expanders (on LOWER)

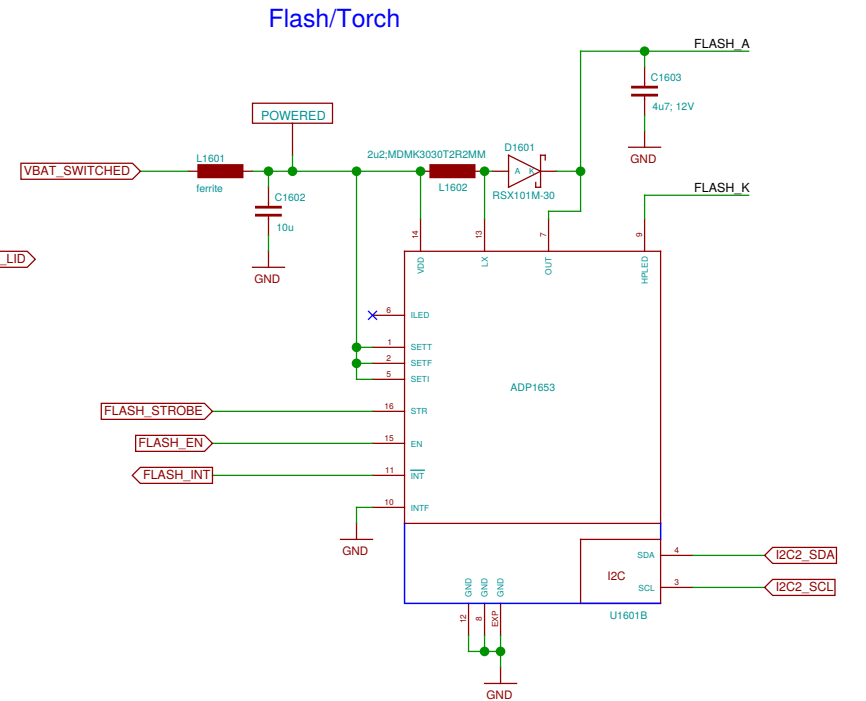
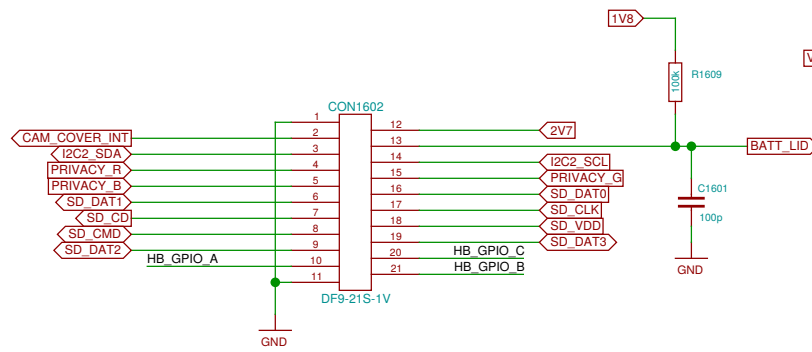
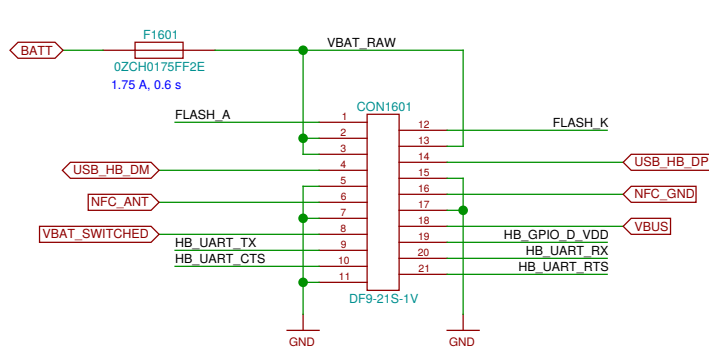


R-array alternatives:
CTS 746X101104JP
Bourns CAY17-104JALF
Panasonic EXB-D10C104J

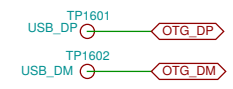
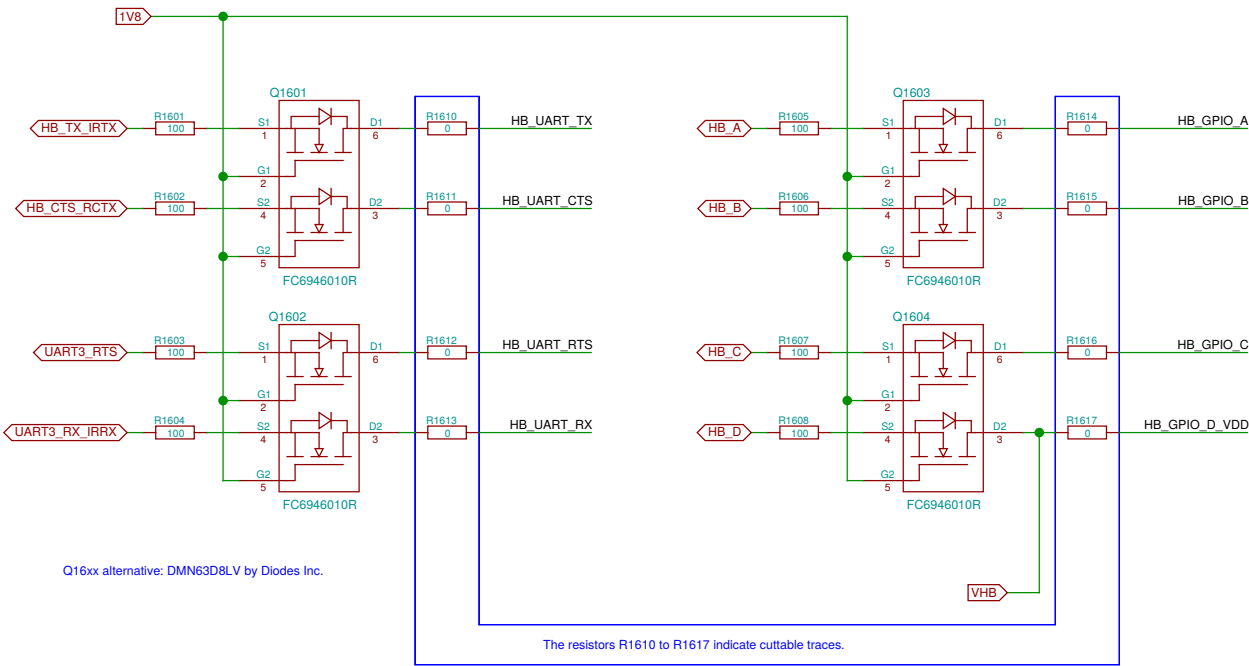
Sheet: /B2B LOWER-UPPER/ File: b2b.sch		Date: 2016-11-18 15:48:54	
Title: B2B LOWER-UPPER		Rev: 15/25	
Size: A3	Plotted by: eeshow a9b66dd+ 20161113-21:01Z	Id: 15/25	

LOWER-BOB Interconnect (LOWER side)

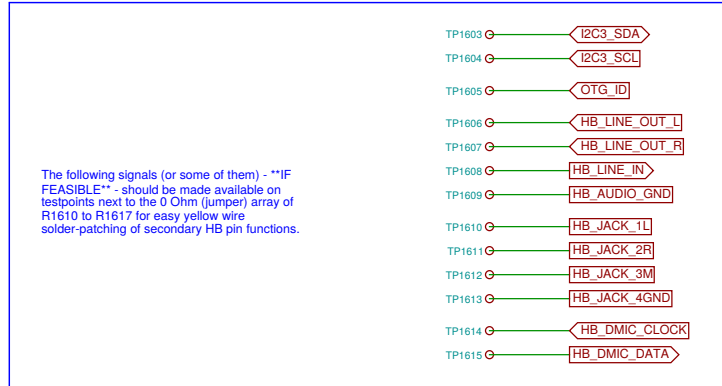
Defined in the Hackerbus specification, <http://neo900.org/stuff/papers/hb.pdf>



Level shifters for Hackerbus GPIO and UART

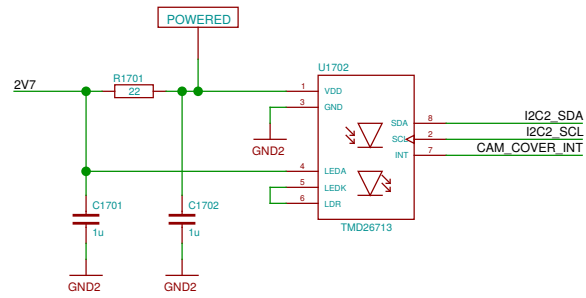


Patch field

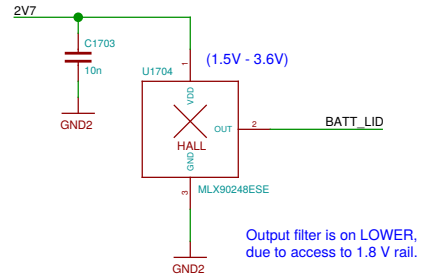


The following signals (or some of them) - **IF FEASIBLE** - should be made available on testpoints next to the 0 Ohm (jumper) array of R1610 to R1617 for easy yellow wire solder-patching of secondary HB pin functions.

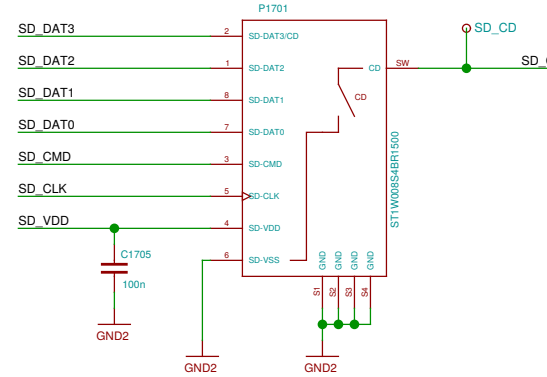
Camera Cover detect



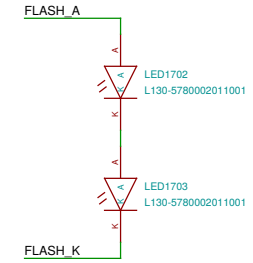
Battery Cover detect



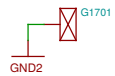
Memory card holder



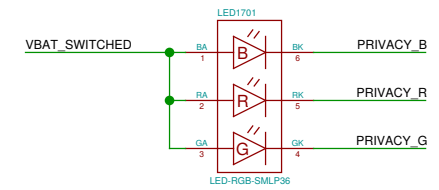
Camera flash



Camera lens plate

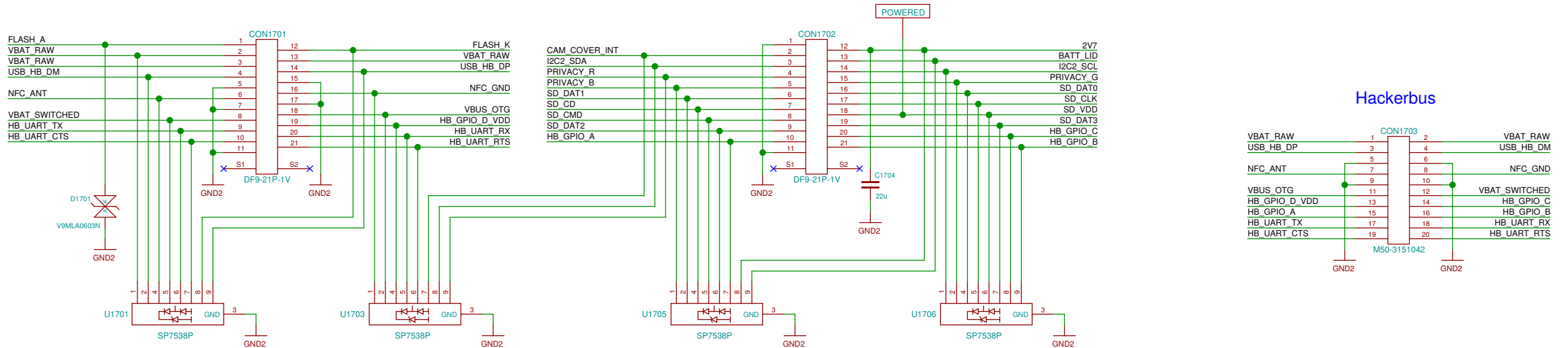


Privacy LED



LOWER-BOB Interconnect (BOB side)

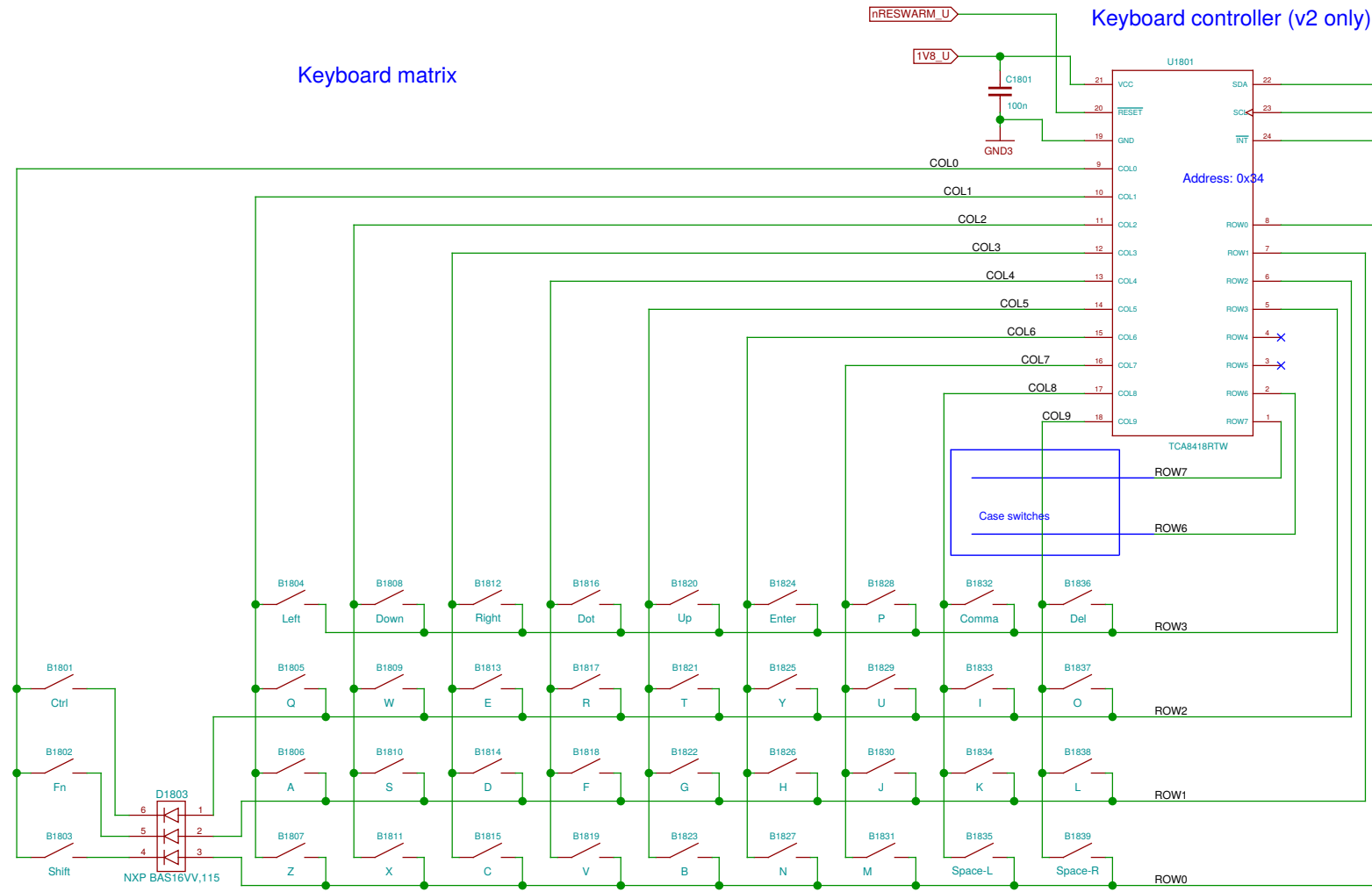
Defined in the Hackbus specification, <http://neo900.org/stuff/papers/hb.pdf>



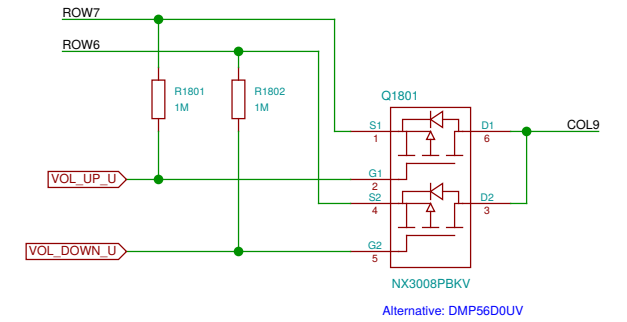
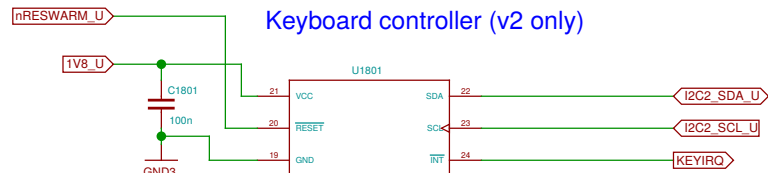
**ESD pin assignment is only indicative.
Actual assignment to be defined by layout.**

Sheet: /uSD Breakout Board/ File: bob.sch		
Title: uSD Breakout Board		
Size: A3	Date: 2016-11-20 14:27:47	Rev:
Plotted by eeshow a9b65dd+ 20161113-21:01Z		Id: 17/25

Keyboard matrix



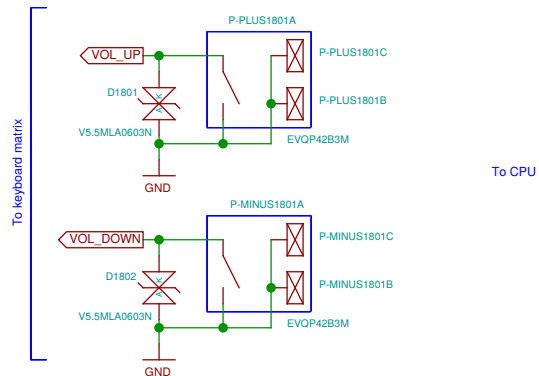
Keyboard controller (v2 only)



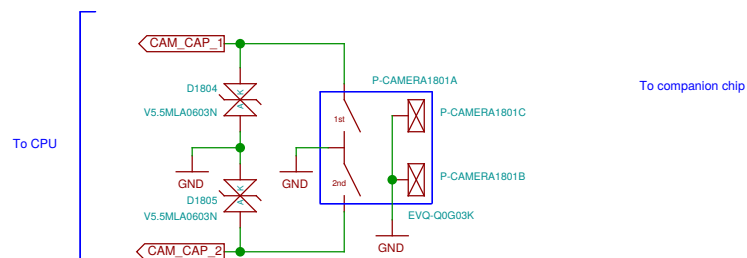
Alternative: Diodes Inc. BAS16VV-7
Warning: Diodes Inc. have cathodes on pin 1 side, NXP anodes !

UPPER
LOWER

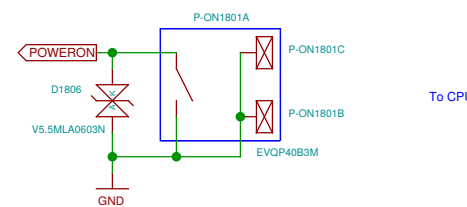
Volume



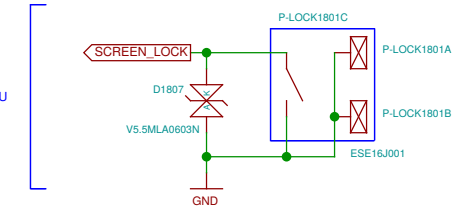
Camera trigger



On-off



Lock switch

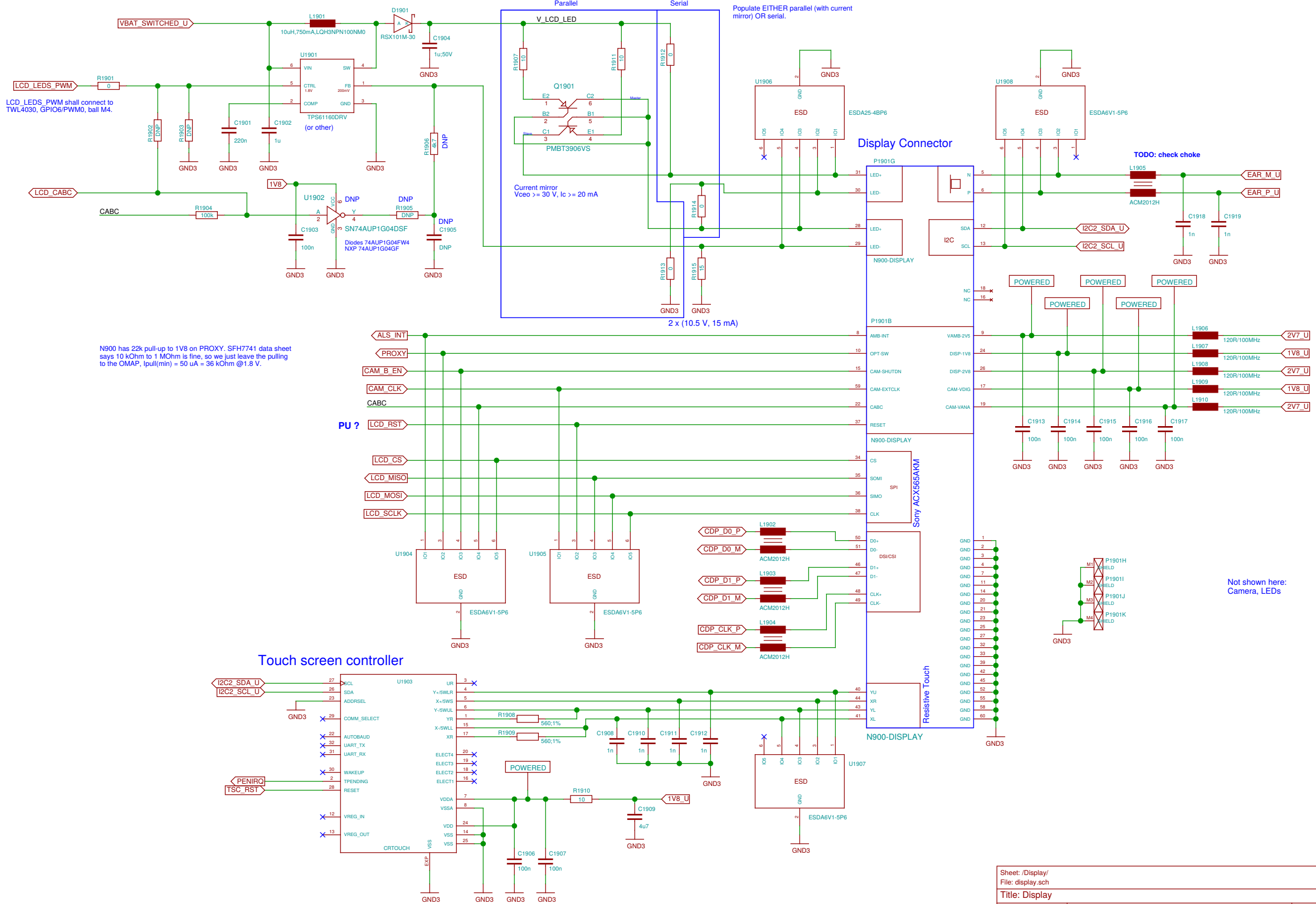


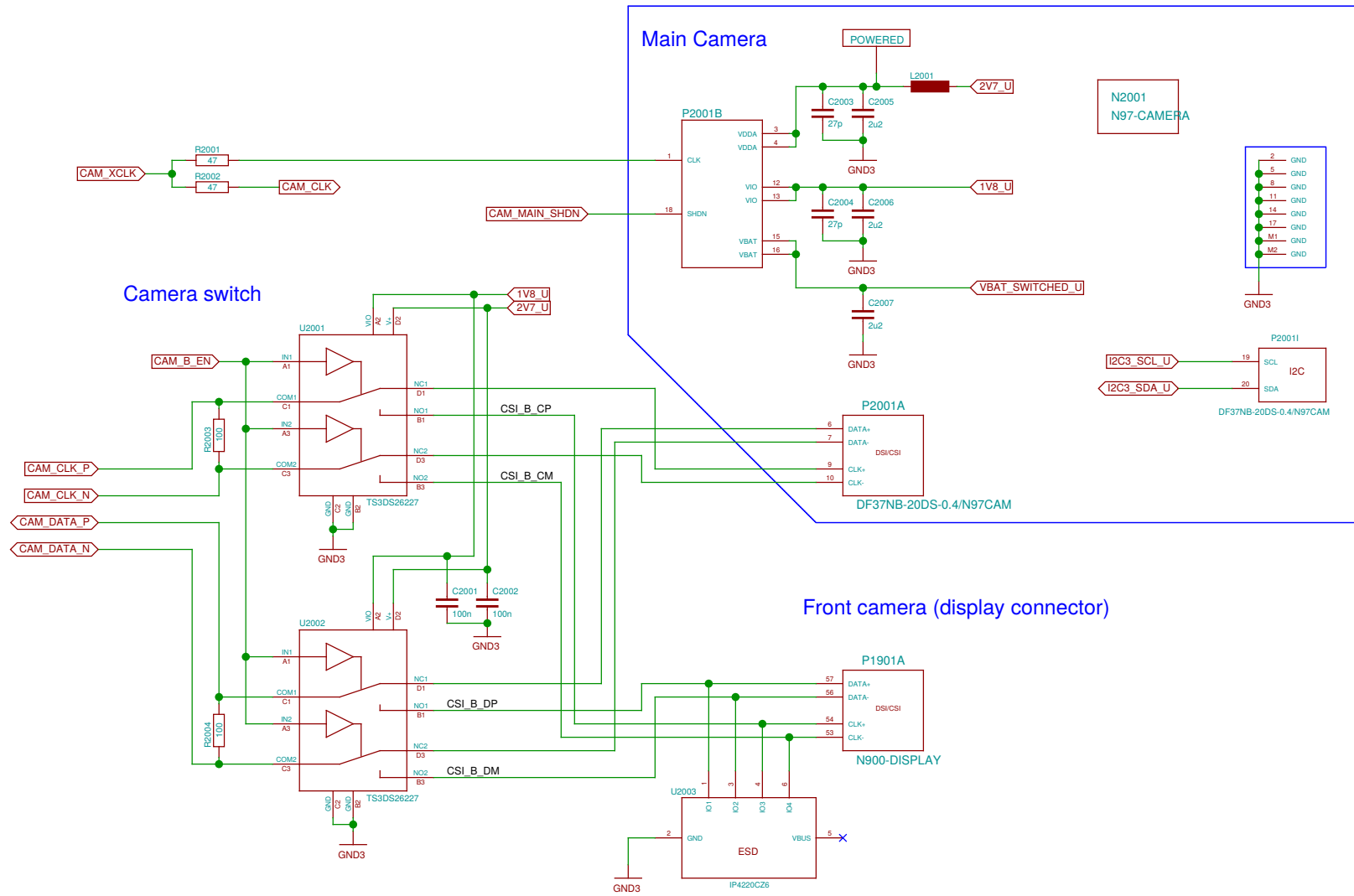
Sheet: /Keypad and buttons/
File: keys.sch

Title: Keypad and buttons

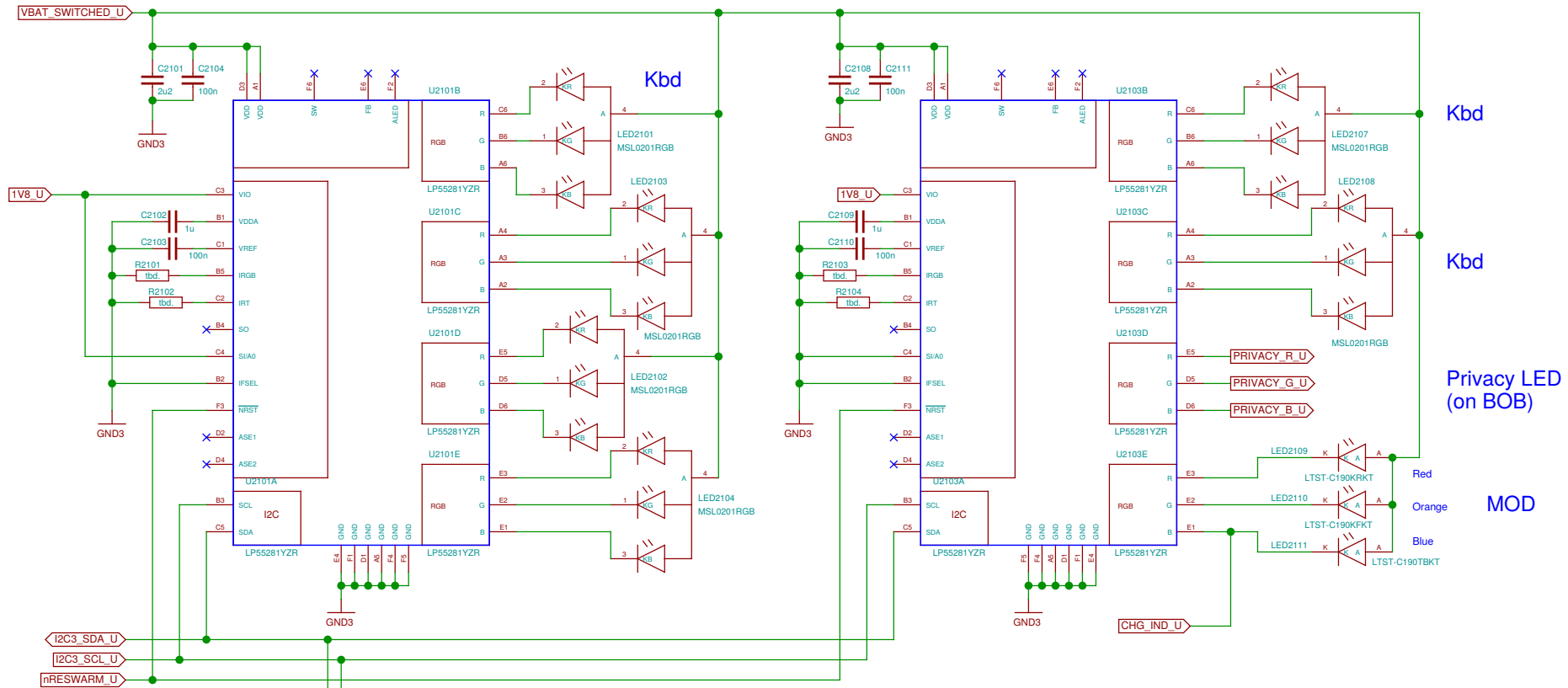
Size: A3 Date: 2016-11-18 15:48:54

Rev: Id: 18/25

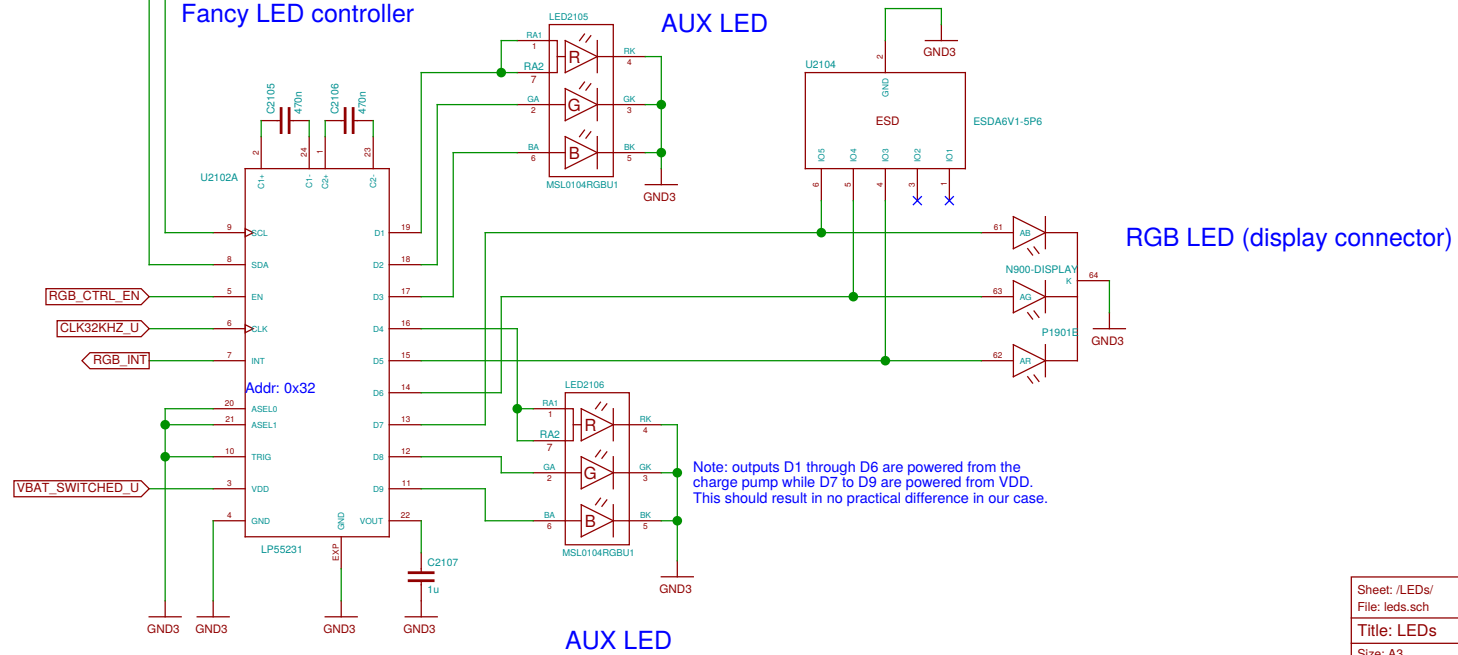




Basic LED controllers



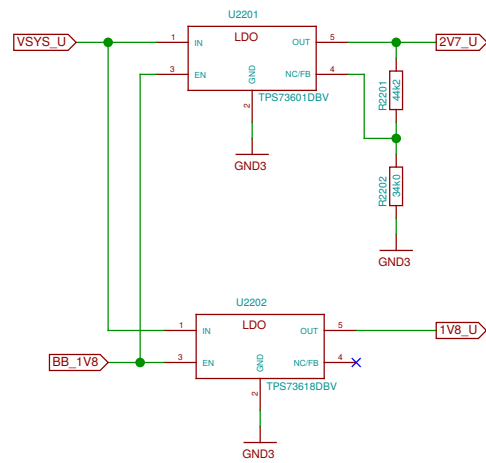
Fancy LED controller



Note: outputs D1 through D6 are powered from the charge pump while D7 to D9 are powered from VDD. This should result in no practical difference in our case.

Sheet: /LEDs/		Date: 2016-11-18 15:48:54	
File: leds.sch		Rev: 2	
Title: LEDs		Id: 21/25	
Size: A3	Plotted by: eeshow a9b66dd+ 20161113-21:01Z		

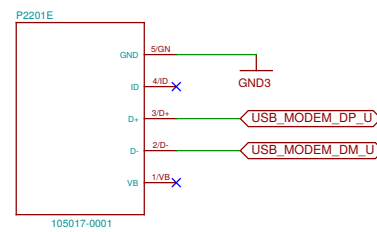
simple capless 400mA LDO for TPS65950 substitute
(only for prototype)



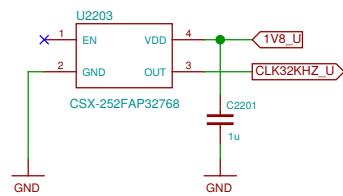
TODO: use REGEN ?

Modem USB

connect to BB
by some Micro-USB cable

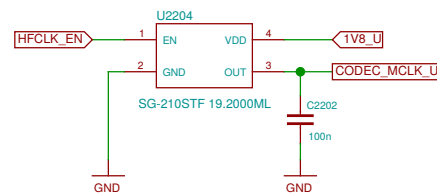


32 kHz clock



Alternative: OYKTGLJANF-0.032768

19.2 MHz clock

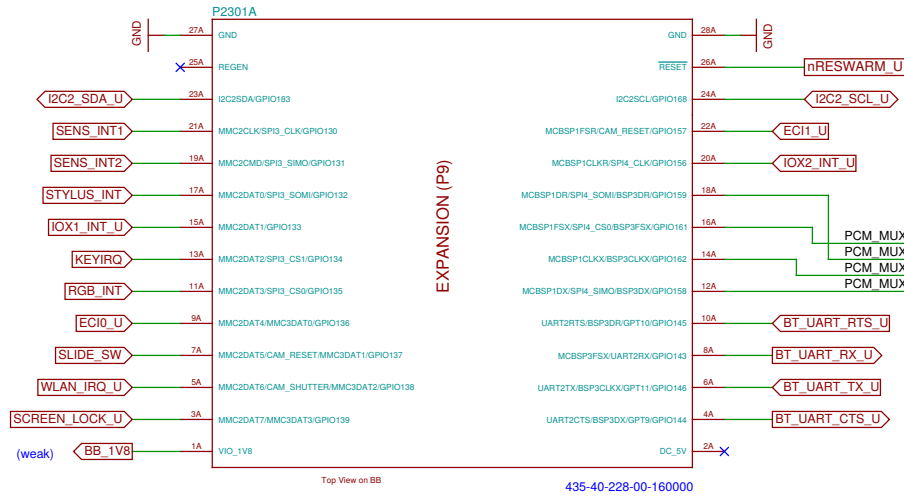


Alternative: KC2520B19.2000C1GE00

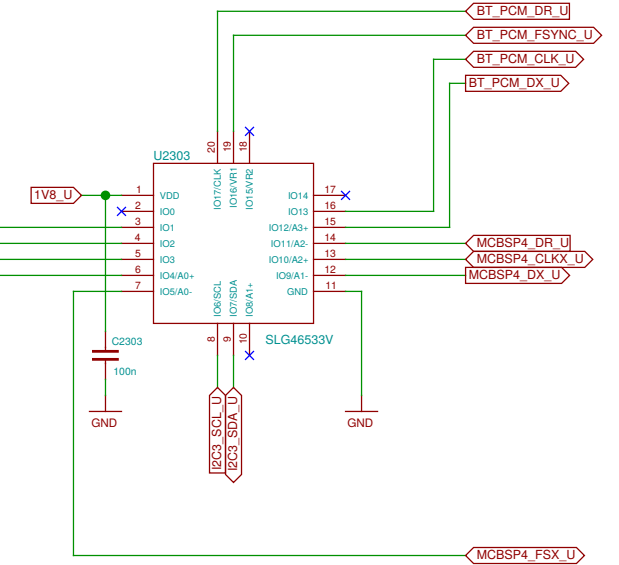
Sheet: /Adaptation (v2 only)/		
File: v2.sch		
Title: Adaptation (v2 only)		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow a9b66dd+ 20161113-21:01Z		Id: 22/25

TODO: update pin names in footprint

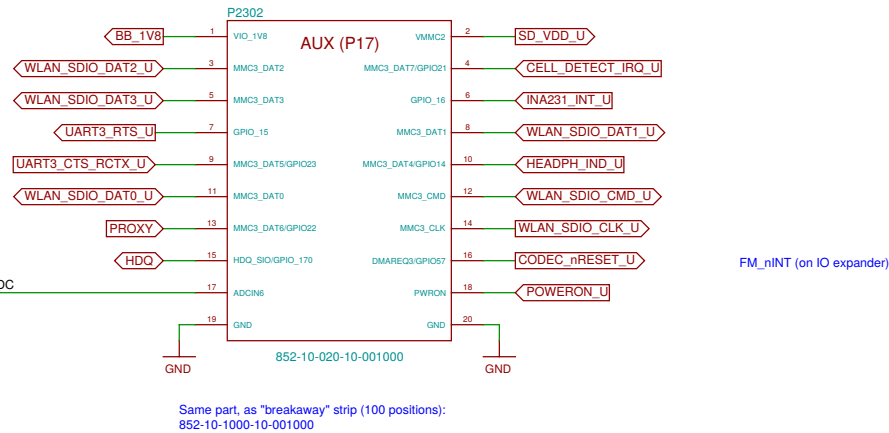
BB-xM Main Expansion Header (P9, 7.24)



PCM switch



Auxiliary Expansion Header (P17, 7.26)

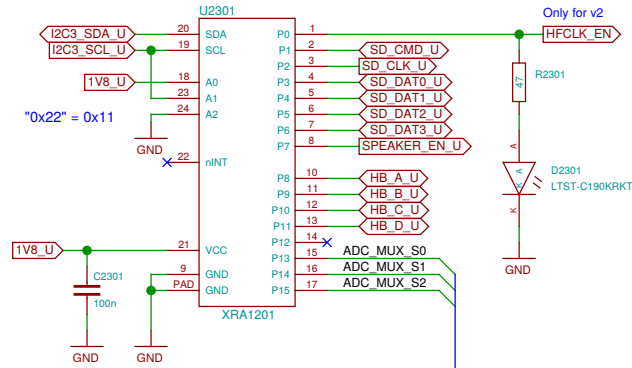


No UART3_RTS on BB-xM, using GPIO

No UART3_CTS on BB-xM, using GPIO

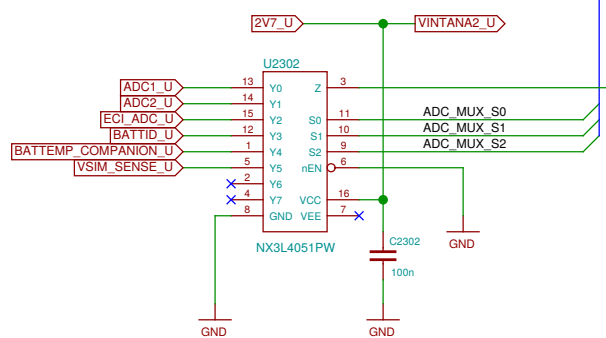
FM_nINT (on IO expander)

IO expander



"0x22" = 0x11

ADC multiplexer



Sheet: /BB-xM Adapter (CPU)/
File: bbcpu.sch

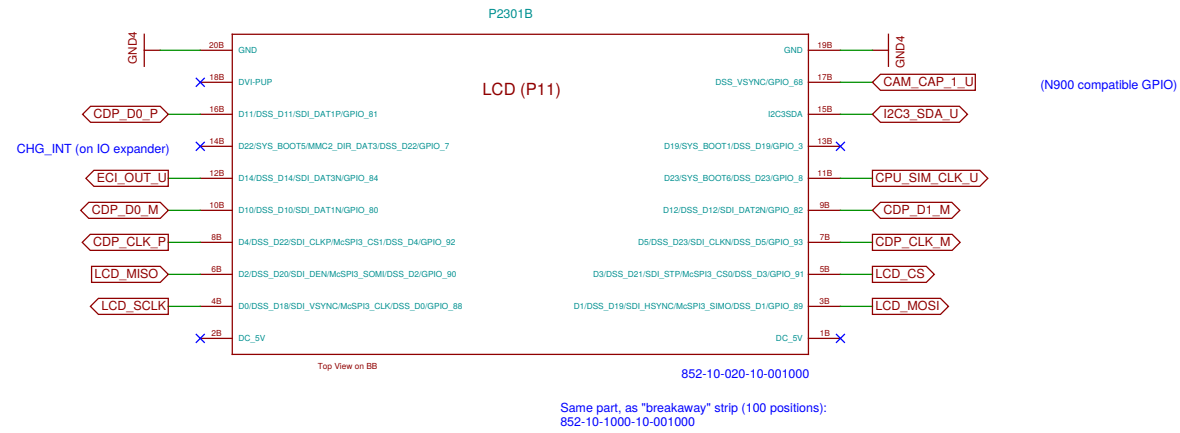
Title: BB-xM Adapter (CPU)

Size: A3 Date: 2016-11-18 15:48:54

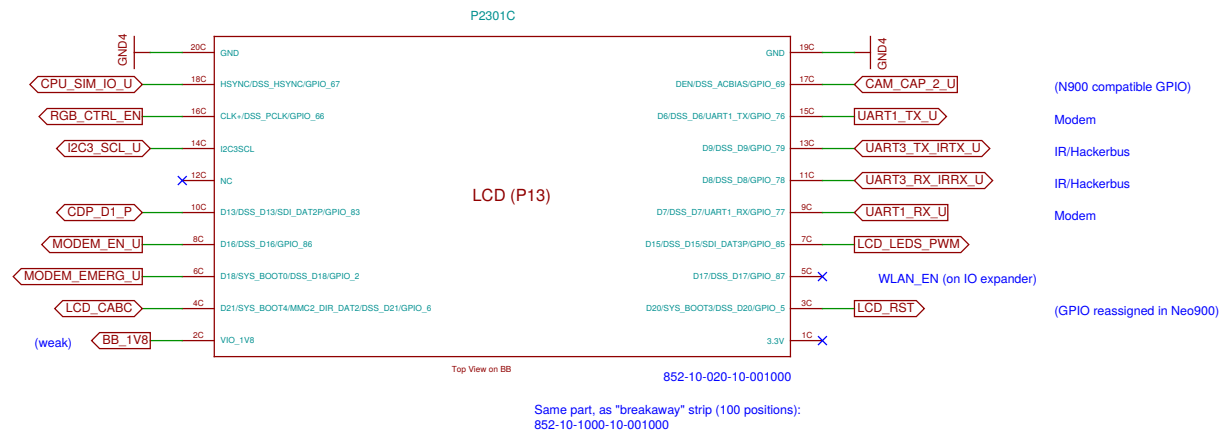
Rev:
Id: 23/25

TODO: update pin names in footprint

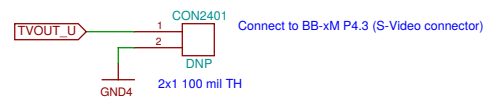
P11 (7.25)



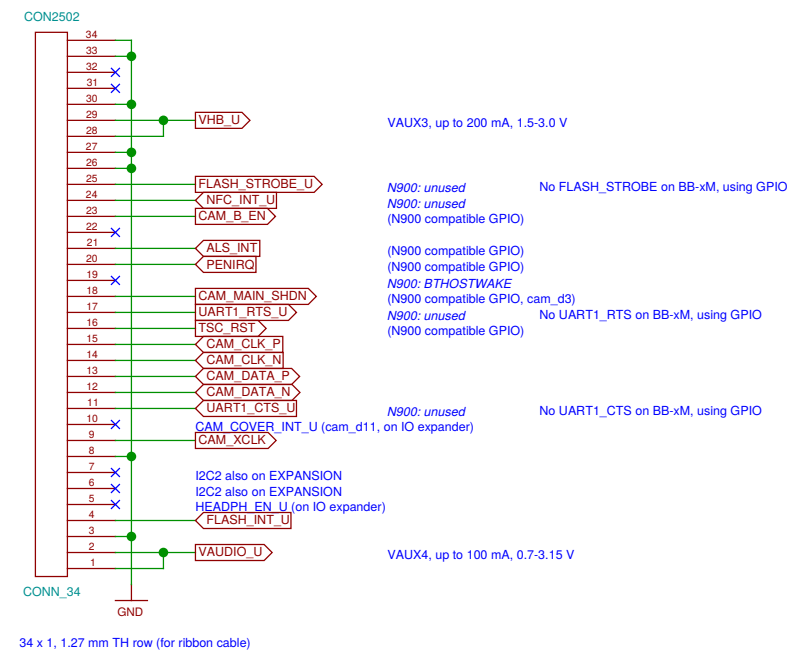
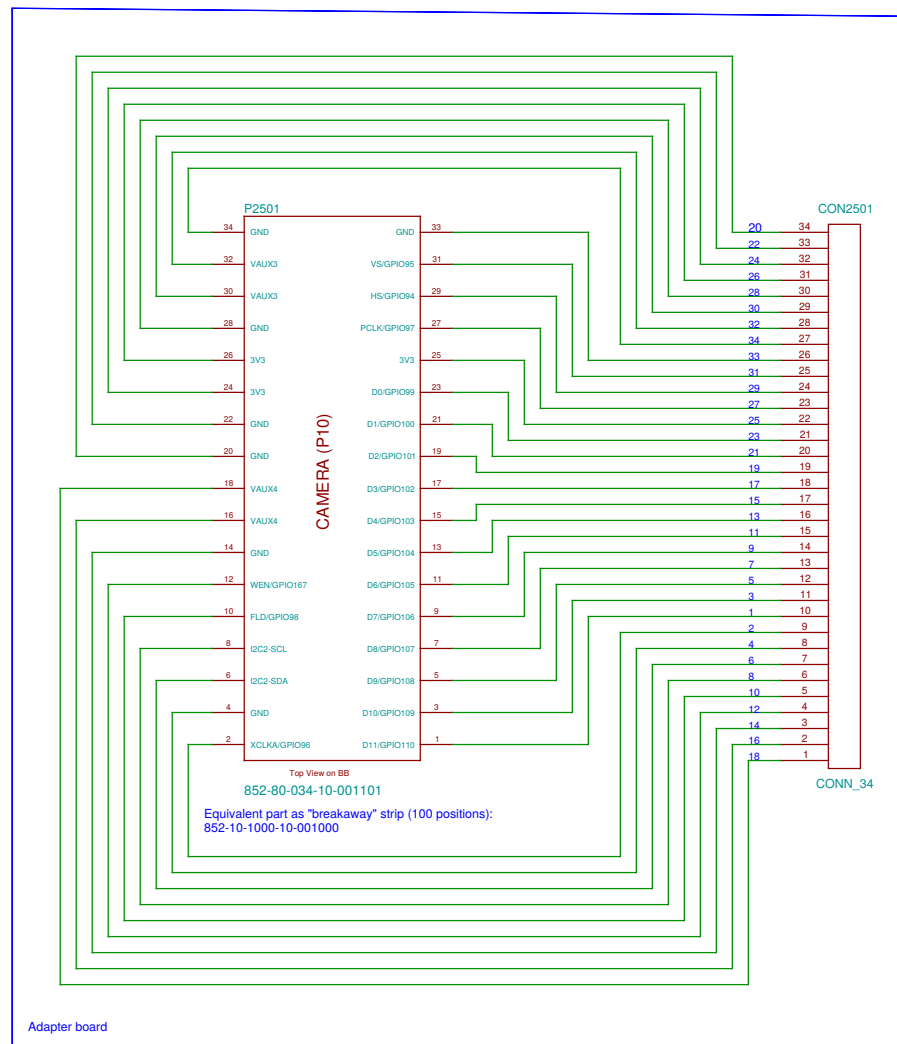
P13 (7.25)



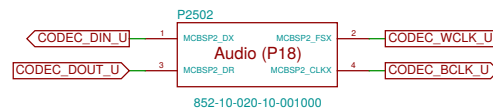
P4 (7.19)



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.

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

Title: BB-xM Adapter (CAM)

Size: A3 Date: 2016-11-18 15:49:26
Plotted by eeshow a9b66dd+ 20161113-21:01Z

Rev:
Id: 25/25