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BB-xM Adapter (CAM)
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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.

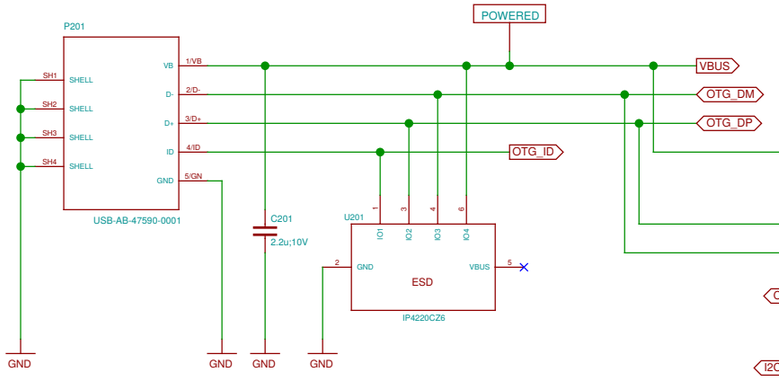
Unless indicated otherwise, all capacitors should be X5R or X6S,
or better (X7R, NP0, etc.)
If no voltage is specified, use >= 6.3 V.

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

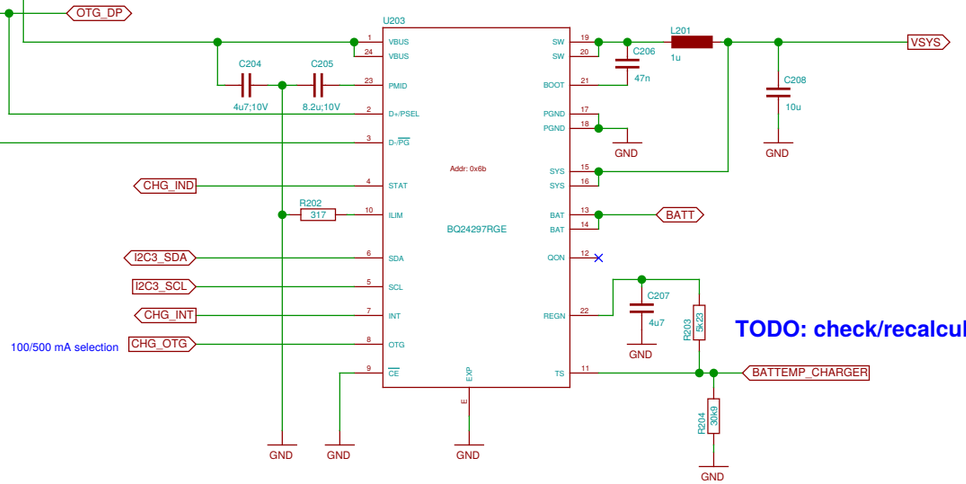
Signals that exist on both LOWER and UPPER (and maybe also BOB)
have a _U suffix on UPPER. No suffix is needed to distinguish
between LOWER and BOB becauses all BOB components are on
the same sheet and wires connecting them use sheet-local labels.

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

USB OTG connector



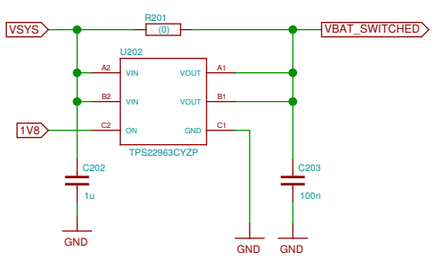
Battery charger with USB OTG



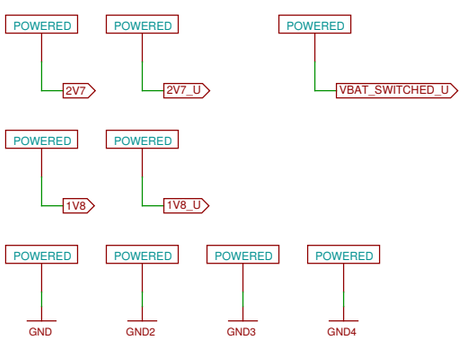
TODO: check/recalculate R203/R204 values

Power distribution and sequencing

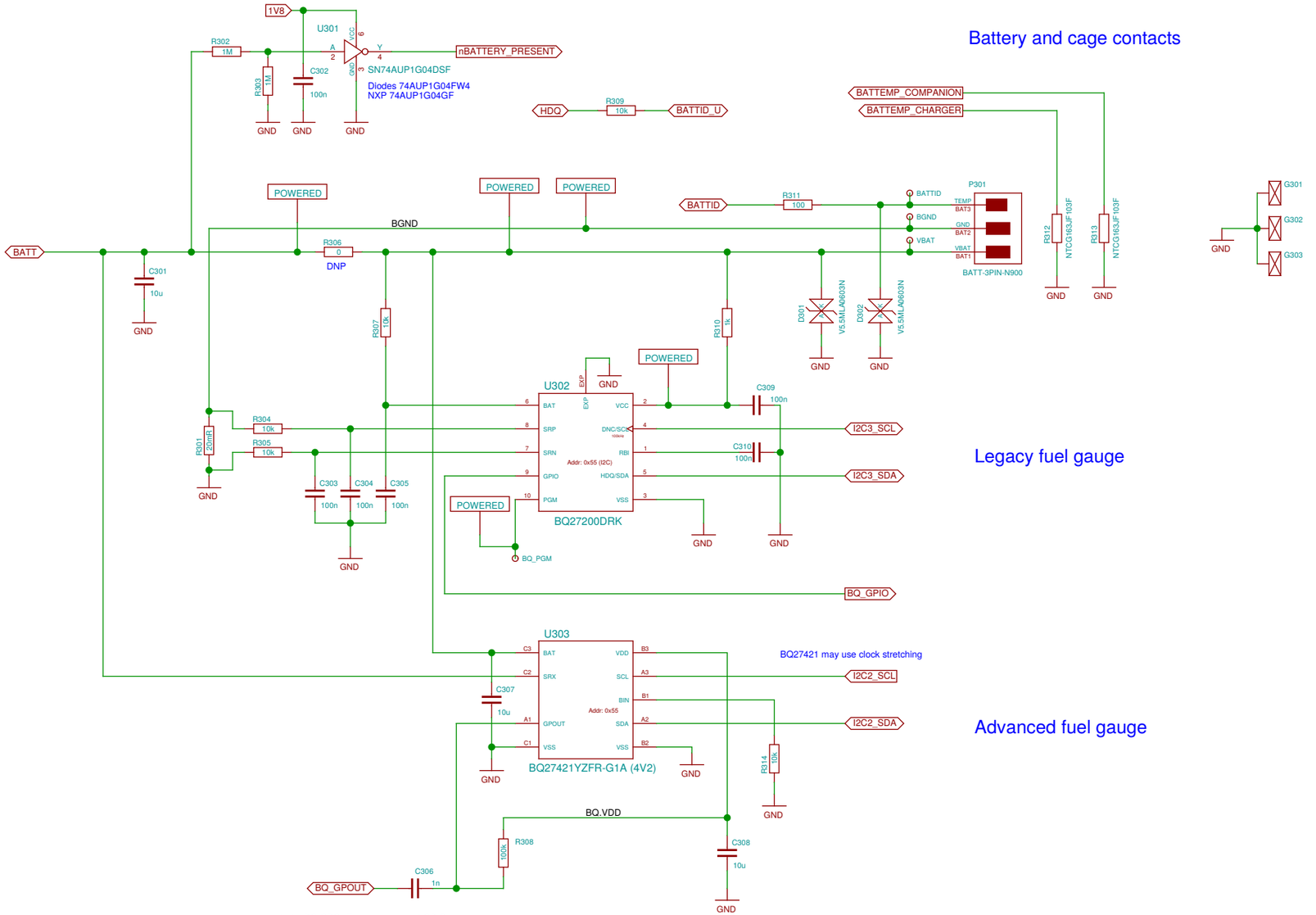
Most high-current consumers are on VBAT_SWITCHED.
1V8 signals that the regulators on UPPER are operational.



KiCad bureaucracy

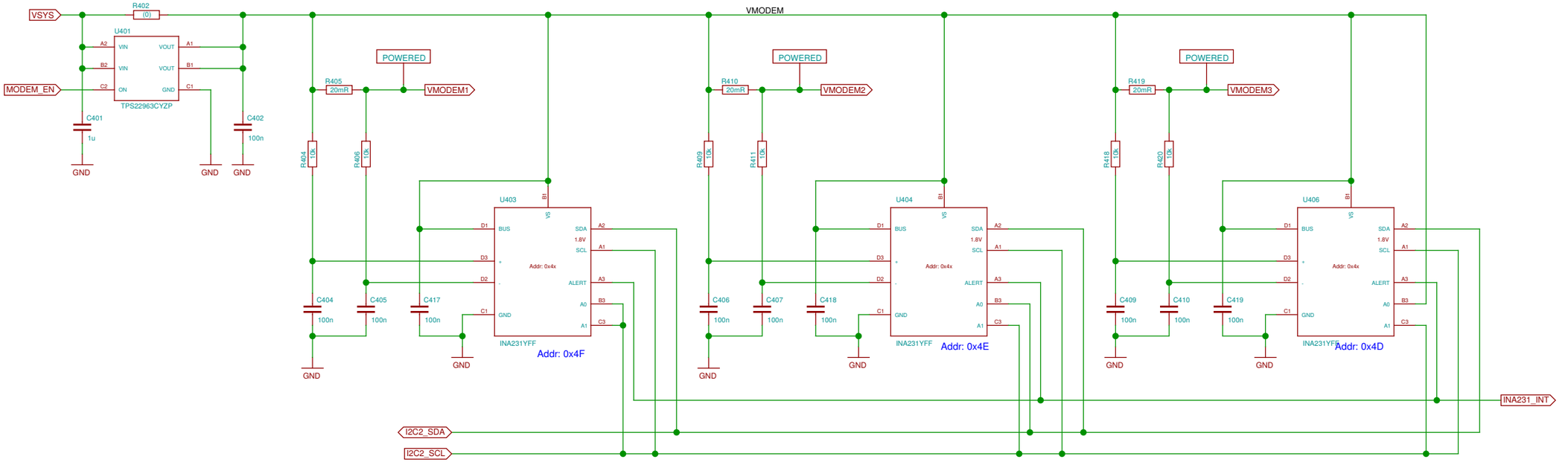


Sheet: /Charger/OTG/ File: charger.sch		
Title: Charger/OTG		
Size: A3	Date: 2016-11-30 16:58:16	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 2/25

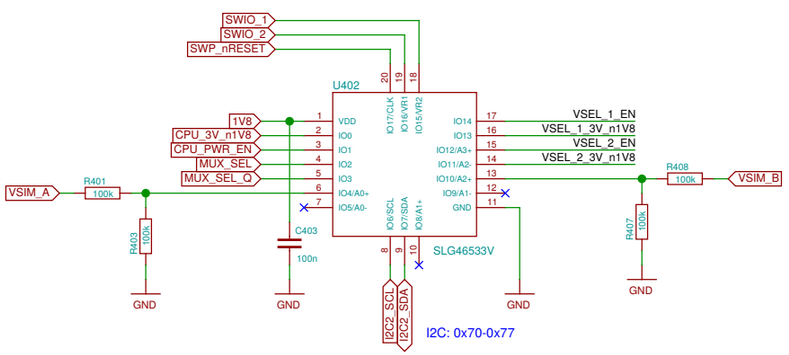


Sheet: /Battery/ File: battery.sch		
Title: Battery		
Size: A3	Date: 2016-11-29 23:12:49	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 3/25

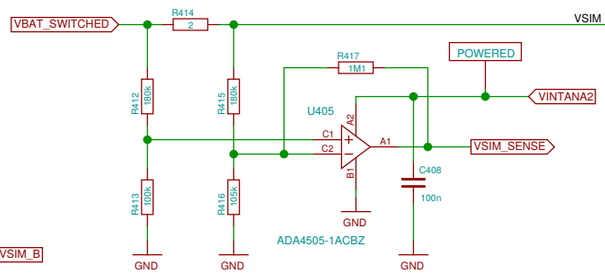
Modem current monitor



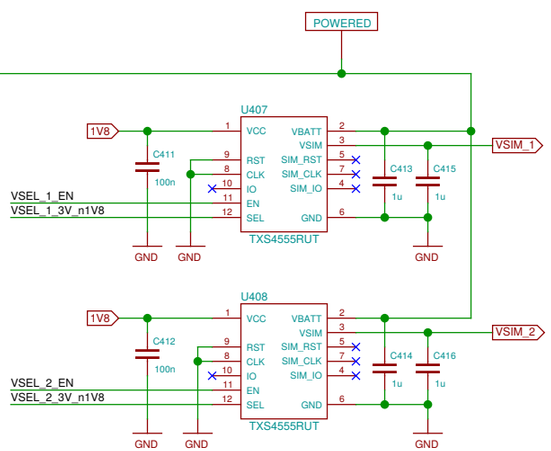
SIM power selection



SIM current sensing

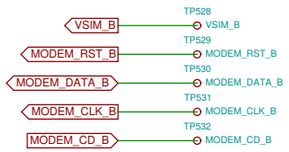


SIM power supply

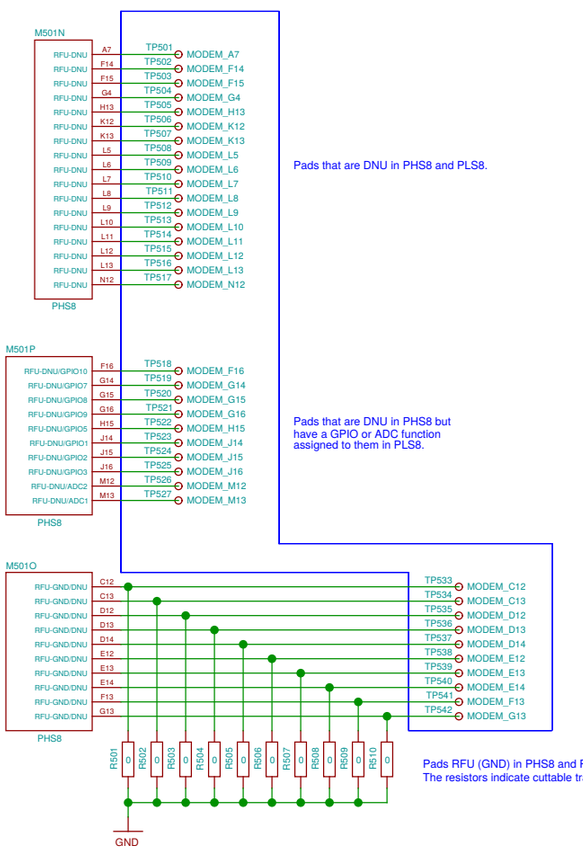


Sheet: /Modem Power/ File: modempwr.sch		
Title: Modem Power		
Size: A3	Date: 2016-11-29 20:11:45	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 4/25

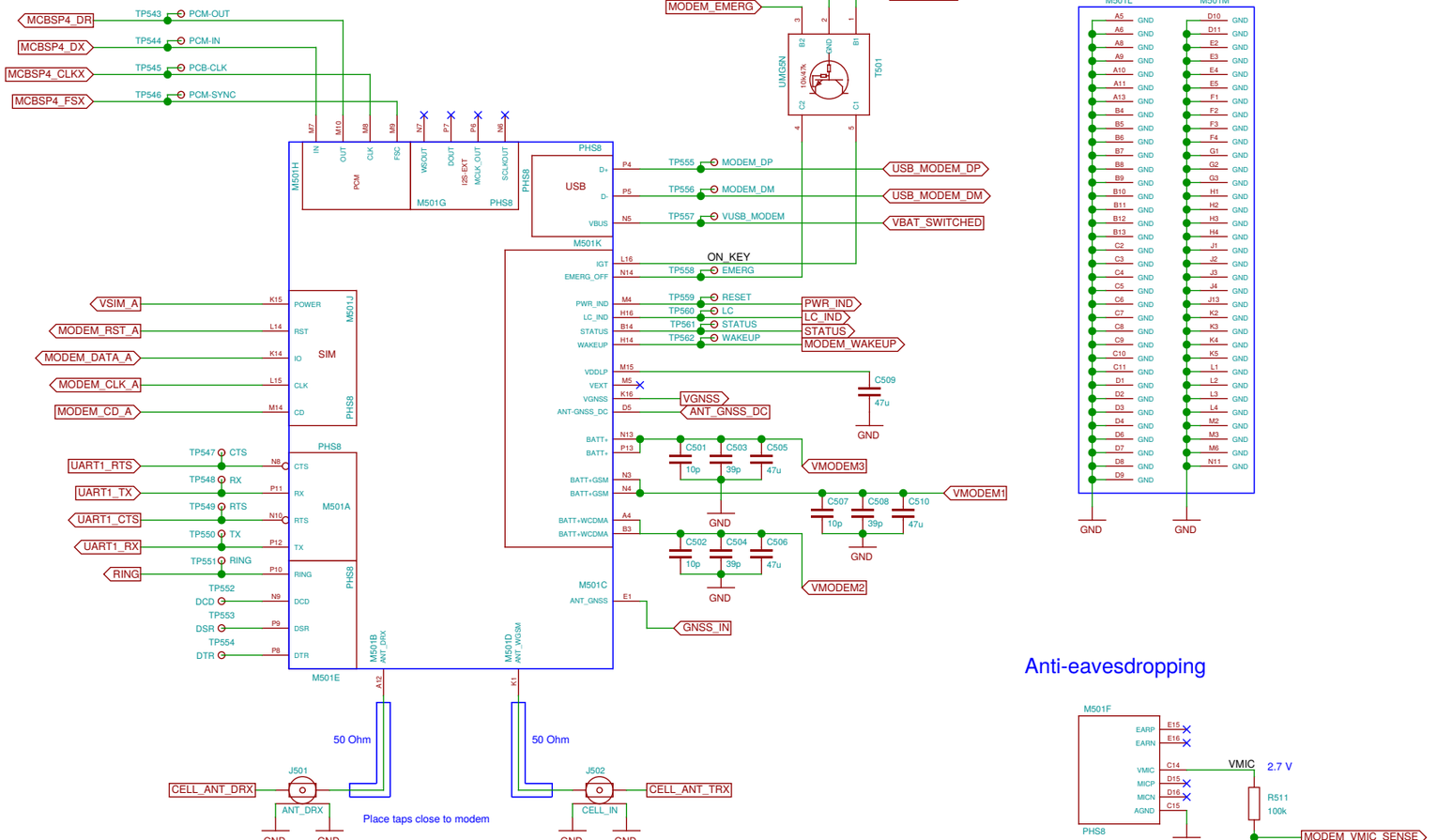
SIM B bus



17+10+10 = 37 test points. PCB space permitting, to be in arranged 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.

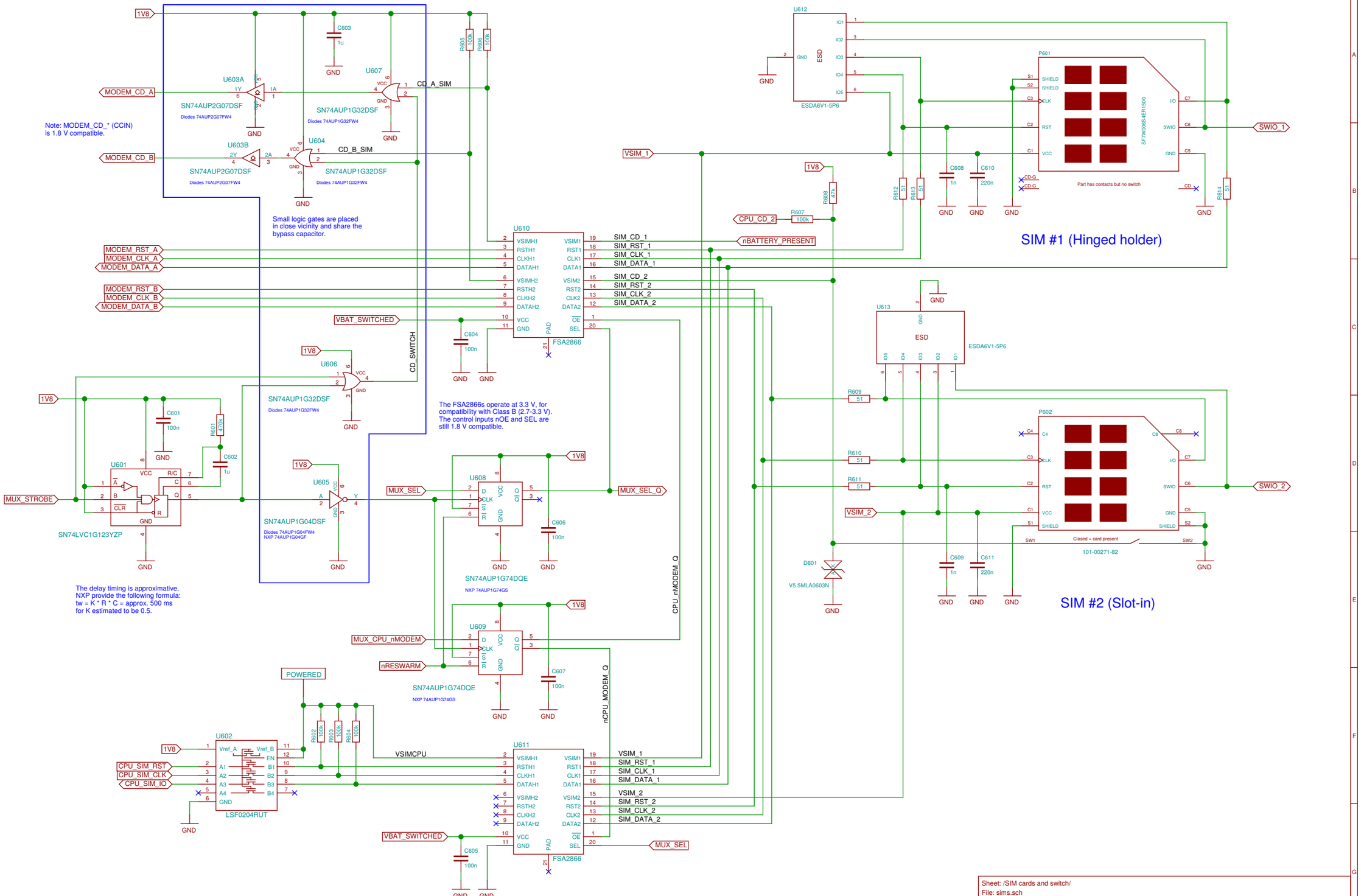


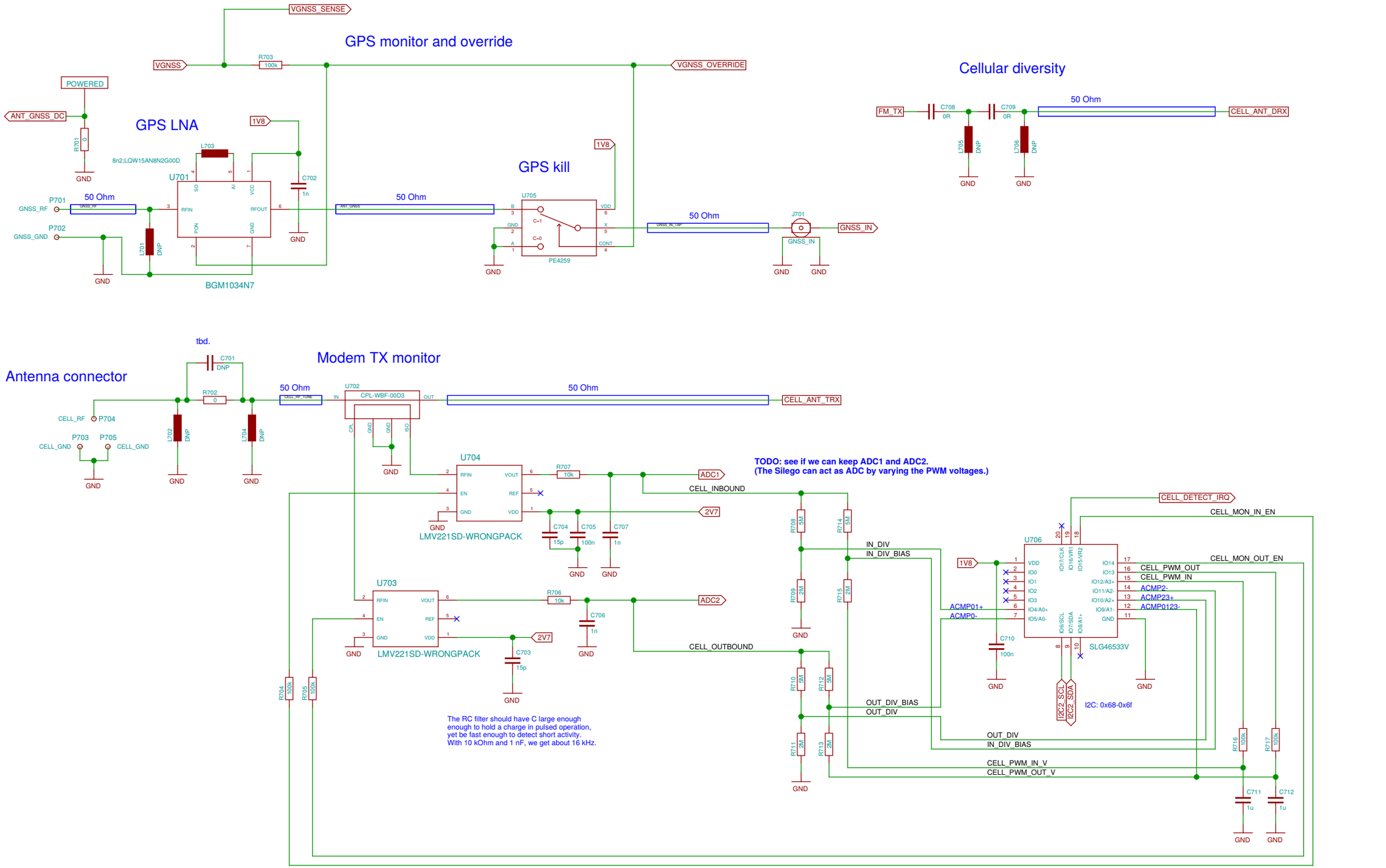
Modem (module)



Anti-eavesdropping

Sheet: /3G/4G Modem/ File: modem.sch		
Title: 3G/4G Modem		
Size: A3	Date: 2016-11-20 13:38:54	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 5/25


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: tw = K * R * C = approx. 500 ms for K estimated to be 0.5.
SIM #1 (Hinged holder)
SIM #2 (Slot-in)
Part has contacts but no switch
Closed = card present
SF-TW006S4ER1500
101-00271-82
ESDA6V1-5P6
SN74AUP2G07DSF
SN74AUP1G32DSF
SN74AUP1G04DSF
SN74LVC1G123YZP
SN74AUP1G74DQE
FSA2866
LSF0204RUT
MODEM_CD_A
MODEM_CD_B
CD_A_SIM
CD_B_SIM
CD_SWITCH
MODEM_RST_A
MODEM_CLK_A
MODEM_DATA_A
MODEM_RST_B
MODEM_CLK_B
MODEM_DATA_B
VBAT_SWITCHED
MUX_STROBE
MUX_SEL
MUX_SEL_Q
MUX_CPU_nMODEM
CPU_nMODEM_Q
nCPU_MODEM_Q
nRESWARM
POWERED
VSIMCPU
CPU_SIM_RST
CPU_SIM_CLK
CPU_SIM_IO
CPU_CD_2
nBATTERY_PRESENT
VSIM_1
VSIM_2
SIM_CD_1
SIM_RST_1
SIM_CLK_1
SIM_DATA_1
SIM_CD_2
SIM_RST_2
SIM_CLK_2
SIM_DATA_2
SWIO_1
SWIO_2
(c) CC-BY-SA 2014-2016 Neo900 & GDC
Sheet: /SIM cards and switch/
File: sims.sch
Title: SIM cards and switch
Size: A3
Date: 2016-11-21 23:56:50
Rev:
Plotted by eeshow 221aa28 20161208-00:03Z
Id: 6/25

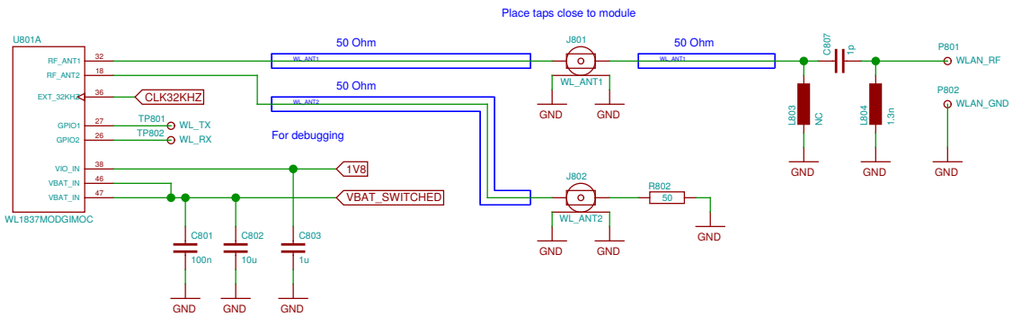


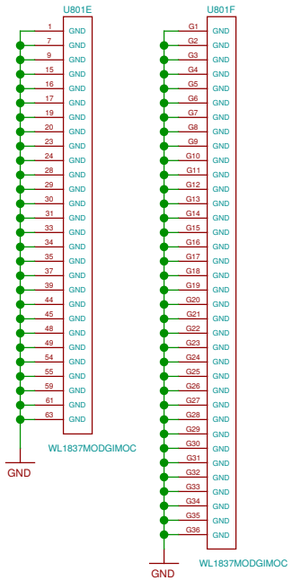
Sheet: /Modem Antennas/		
File: ants.sch		
Title: Modem Antennas		
Size: A3	Date: 2016-11-23 22:26:52	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 7/25

WiLink8

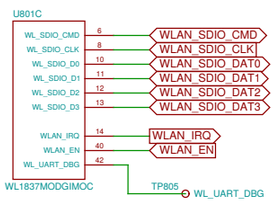
TODO: assign footprints for c-spring contacts

WLAN/BT antenna

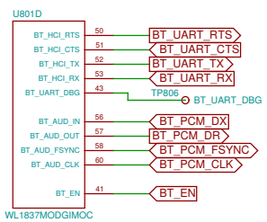




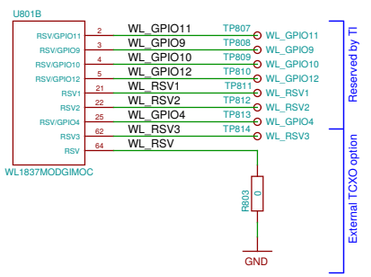
WLAN



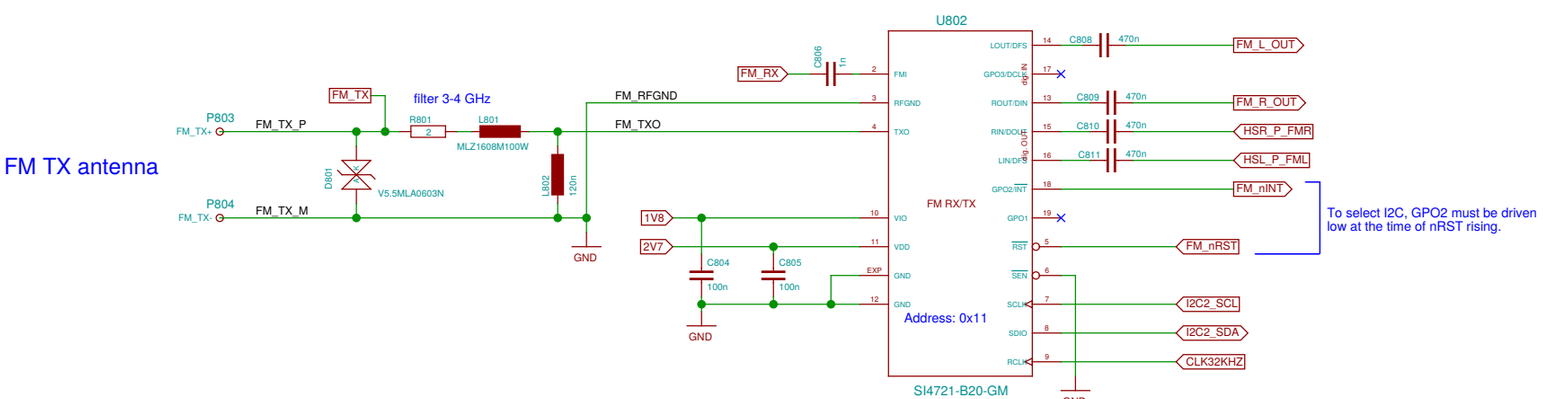
Bluetooth



Reserved / Debugging



FM Radio (TX/RX)



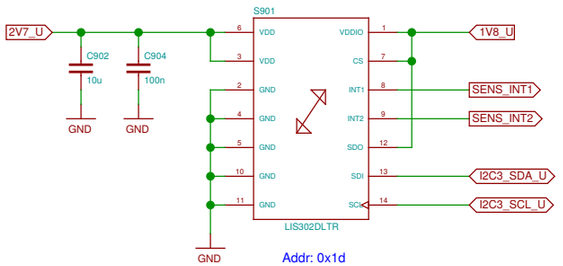
FM TX antenna

To select I2C, GPO2 must be driven low at the time of nRST rising.

Si4705 is pin compatible (mostly) but RX-only

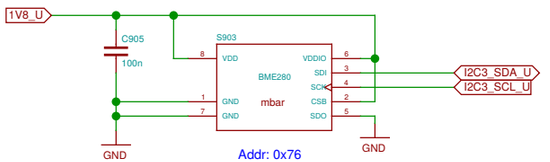
Sheet: /WLAN, Bluetooth, FM/		
File: wlan.sch		
Title: WLAN, Bluetooth, FM		
Size: A3	Date: 2016-11-20 21:45:03	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 8/25

Acceleration (legacy)



Addr: 0x1d

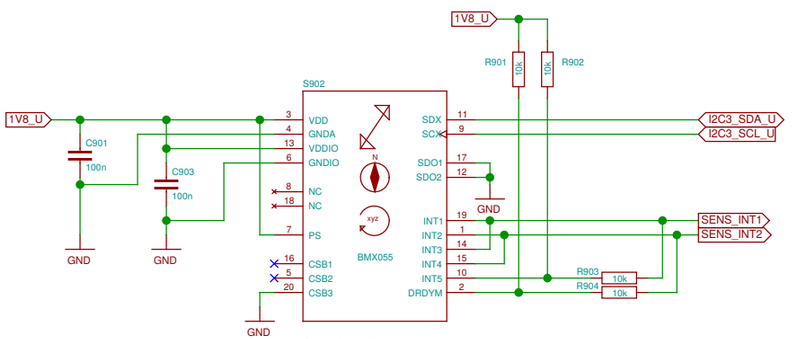
Pressure, humidity



Addr: 0x76

keep away from liquids and extreme temperatures

9-axis (acceleration, gyroscope, magnetometer)



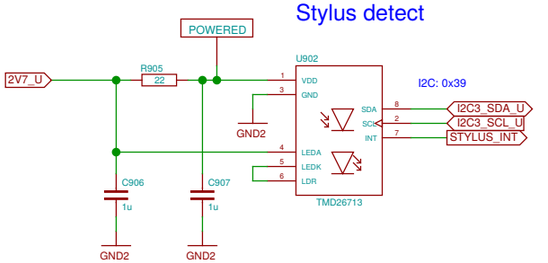
Addr: 0x18/68/10

Keep away from magnets, metal, high current traces.

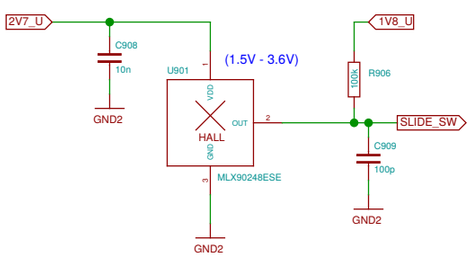
UPPER

LOWER

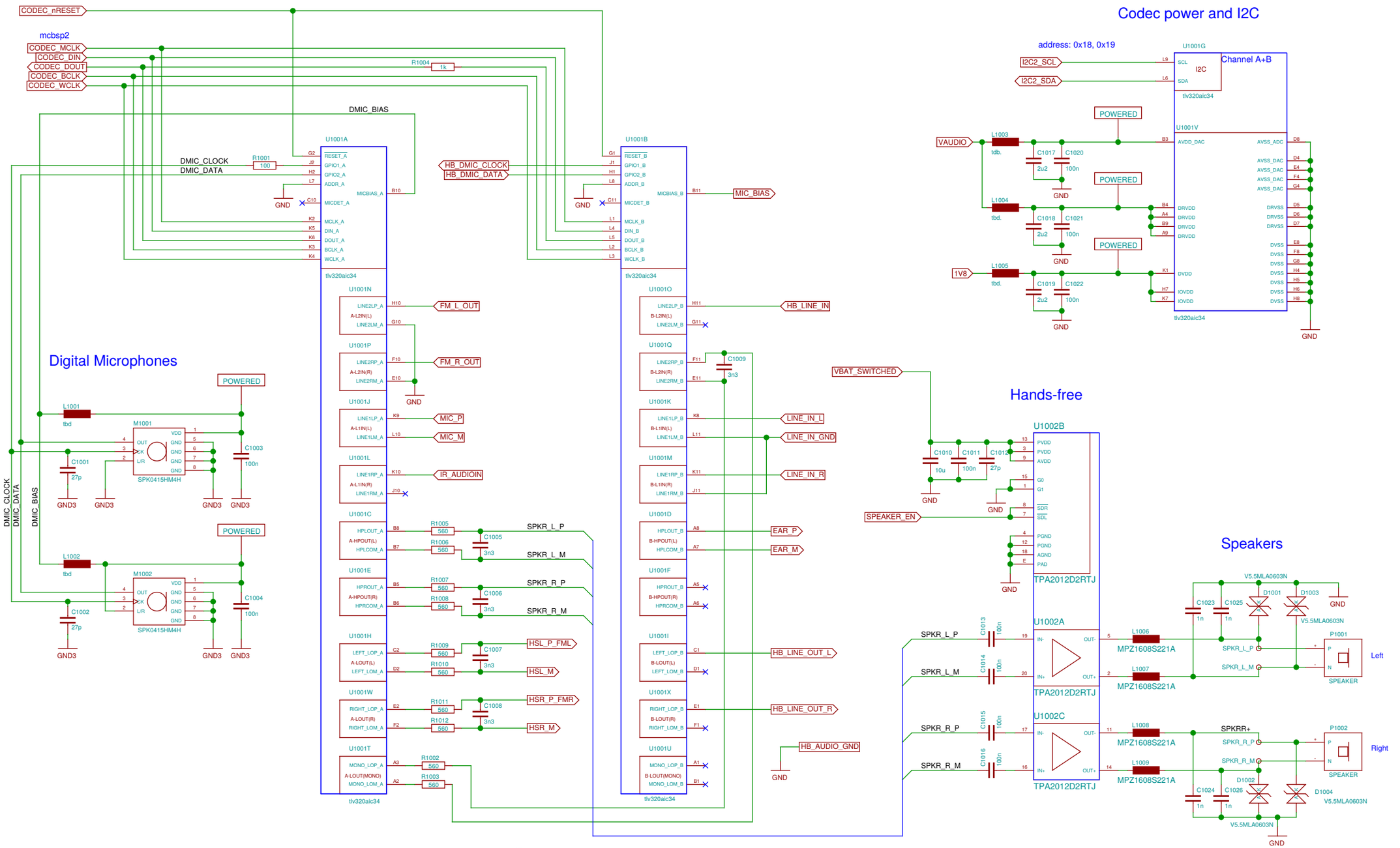
Stylus detect



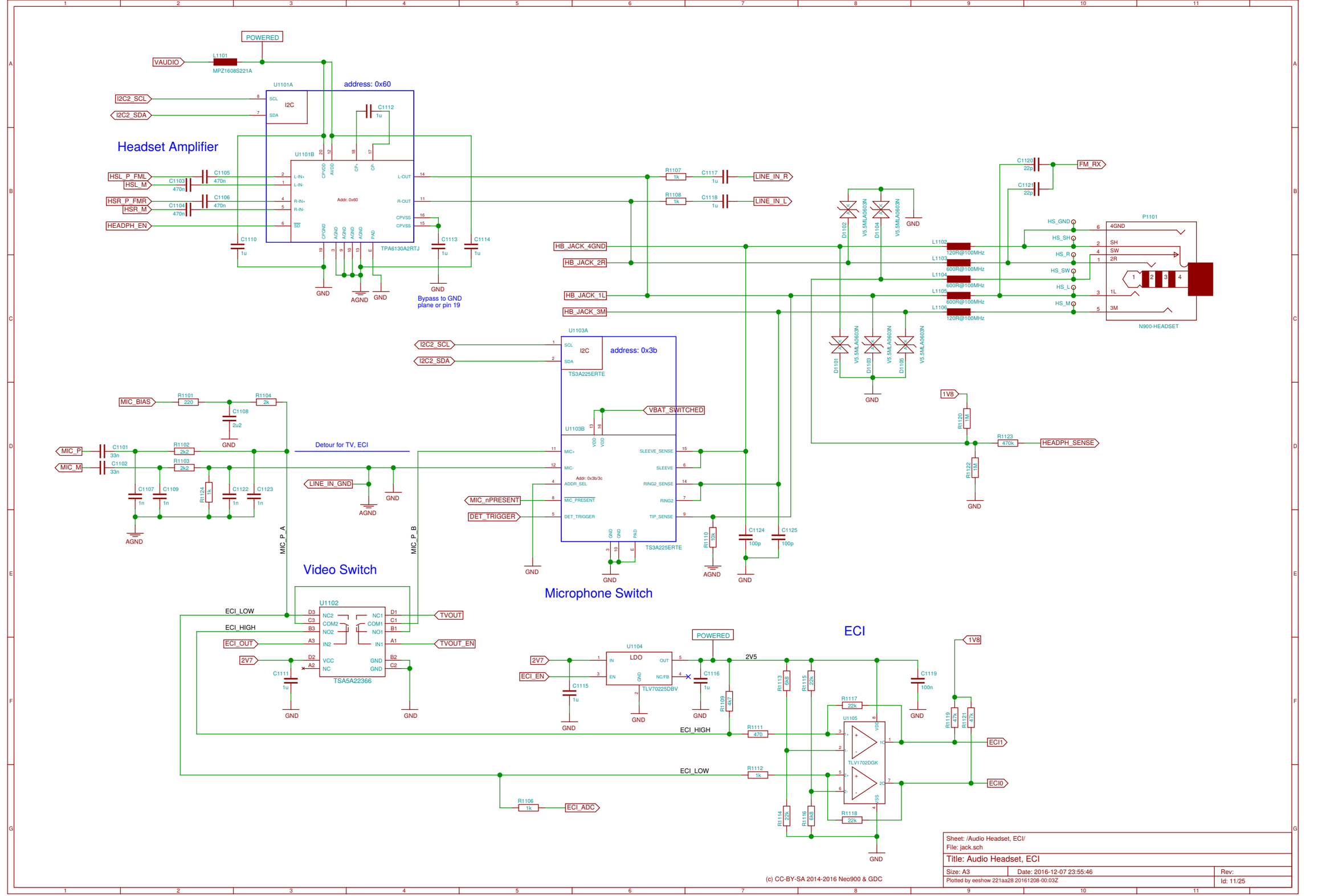
Slide sensor



Sheet: /Sensors/ File: sensors.sch		
Title: Sensors		
Size: A3	Date: 2016-11-28 14:16:48	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 9/25



Sheet: /Audio Codec/		
File: codec.sch		
Title: Audio Codec		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 10/25


POWERED
VAUDIO
L1101
MPZ1608S221A
U1101A
address: 0x60
I2C2_SCL
I2C2_SDA
I2C
SCL
SDA
C1112
1u
Headset Amplifier
U1101B
HSL_P_FML
HSL_M
HSR_P_FMR
HSR_M
HEADPH_EN
C1105
470n
C1103
470n
C1106
470n
C1104
470n
C1110
1u
L-IN+
L-IN-
R-IN+
R-IN-
SD
Addr: 0x60
L-OUT
R-OUT
CPVSS
CPVDD
AVDD
CP+
CP-
CPGND
AGND
PAD
TPA6130A2RTJ
C1113
1u
C1114
1u
GND
AGND
Bypass to GND plane or pin 19
R1107
1k
C1117
1u
LINE_IN_R
R1108
1k
C1118
1u
LINE_IN_L
HB_JACK_4GND
HB_JACK_2R
HB_JACK_1L
HB_JACK_3M
D1102
D1104
V5.5MLA0603N
L1102
120R@100MHz
L1103
600R@100MHz
L1104
600R@100MHz
L1105
600R@100MHz
L1106
120R@100MHz
C1120
22p
C1121
22p
FM_RX
HS_GND
HS_SH
HS_R
HS_SW
HS_L
HS_M
P1101
4GND
SH
SW
2R
1L
3M
N900-HEADSET
D1101
D1103
D1105
U1103A
I2C2_SCL
I2C2_SDA
address: 0x3b
TS3A225ERTE
U1103B
VBAT_SWITCHED
VDD
MIC+
MIC-
ADDR_SEL
MIC_PRESENT
DET_TRIGGER
SLEEVE_SENSE
SLEEVE
RING2_SENSE
RING2
TIP_SENSE
Addr: 0x3b/3c
1V8
R1120
1M
R1123
470k
HEADPH_SENSE
R1122
1M
MIC_BIAS
R1101
220
R1104
2k
C1108
2u2
MIC_P
MIC_M
C1101
33n
C1102
33n
R1102
2k2
R1103
2k2
C1107
1n
C1109
1n
R1124
1k
C1122
1n
C1123
1n
Detour for TV, ECI
LINE_IN_GND
MIC_nPRESENT
DET_TRIGGER
R1110
10k
C1124
100p
C1125
100p
MIC_P_A
MIC_P_B
Video Switch
Microphone Switch
U1102
TSA5A22366
ECI_LOW
ECI_HIGH
ECI_OUT
2V7
TVOUT
TVOUT_EN
C1111
1u
ECI
POWERED
U1104
LDO
TLV70225DBV
ECI_EN
C1115
1u
C1116
1u
2V5
C1119
100n
R1113
6k8
R1115
22k
R1109
4k7
R1111
470
R1112
1k
R1106
1k
ECI_ADC
U1105
TLV1702DGK
R1117
22k
R1118
22k
R1114
22k
R1116
6k8
R1119
47k
R1121
47k
ECI1
ECI0
(c) CC-BY-SA 2014-2016 Neo900 & GDC
Sheet: /Audio Headset, ECI/
File: jack.sch
Title: Audio Headset, ECI
Size: A3
Date: 2016-12-07 23:55:46
Rev:
Plotted by eeshow 221aa28 20161208-00:03Z
Id: 11/25

No-Solder Components

N1201
N900 case assembly

N1202
N97-CAMERA-HOLE

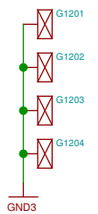
N1205
headset jack

N1203
STENCIL-TOP

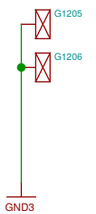
N1204
STENCIL-BOTTOM

Shield Contacts on UPPER

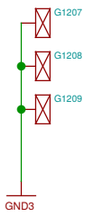
For the display



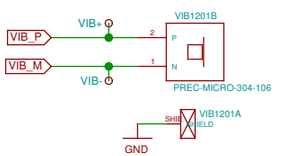
For the key mat



For the "key frame hook"



Vibramotor

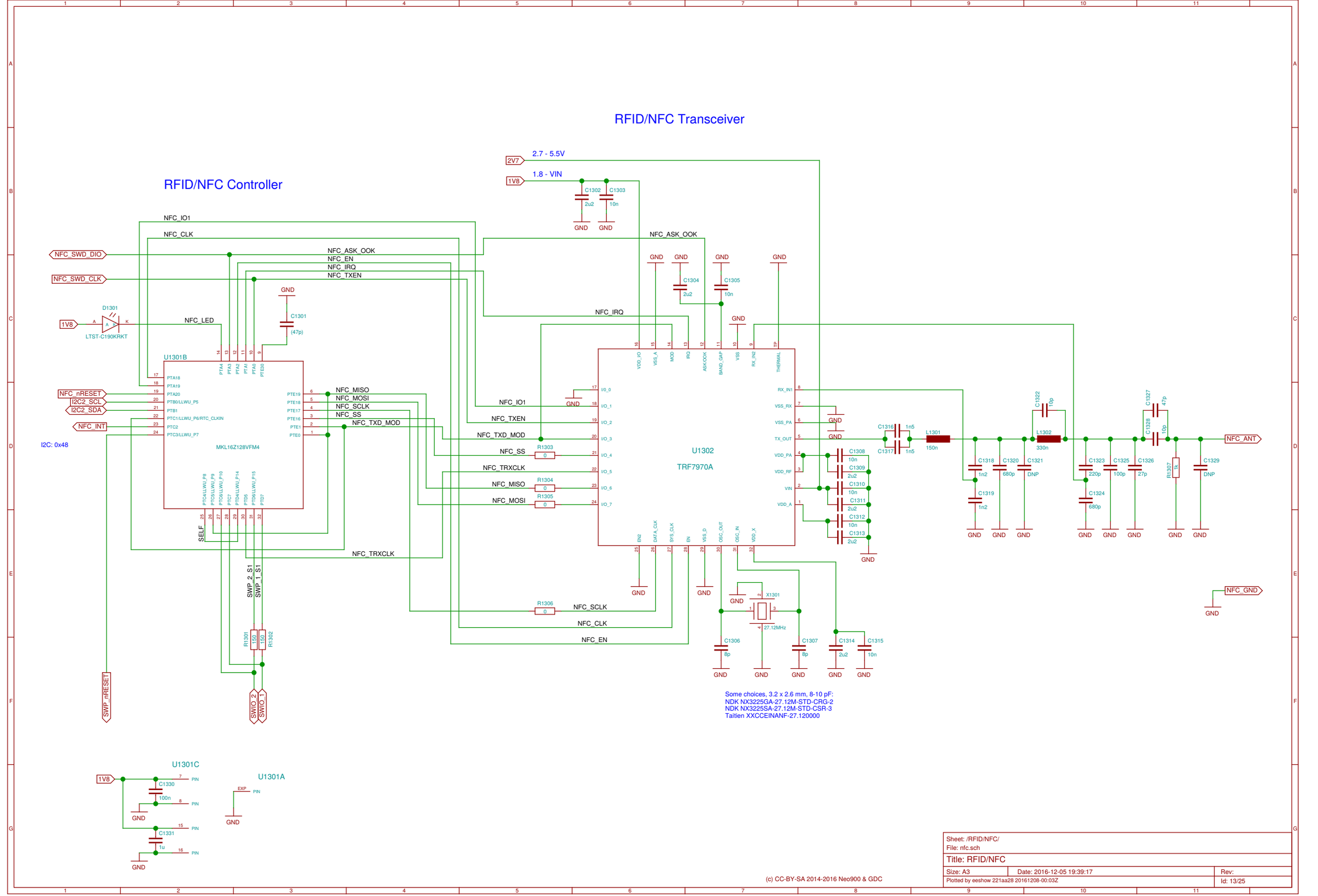


Sheet: /Misc/
File: misc.sch

Title: Misc

Size: A3 | Date: 2016-11-18 15:49:26 | Rev:

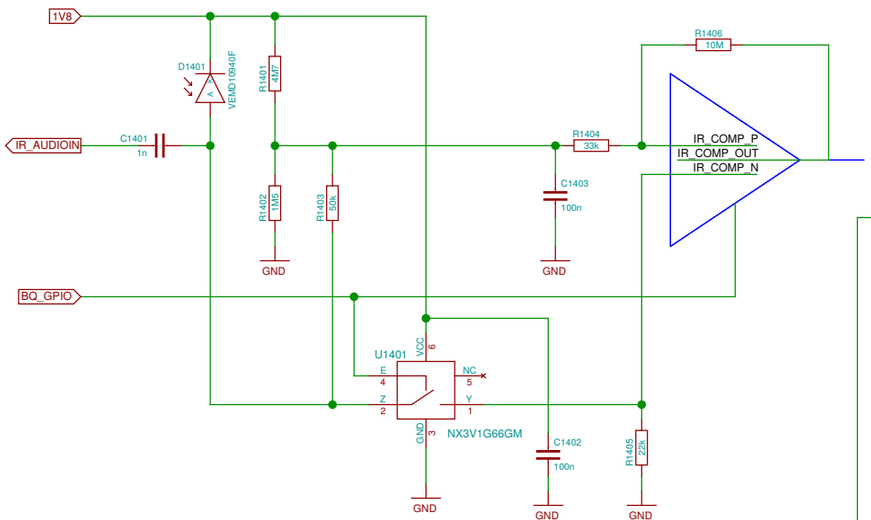
Plotted by eeshow 221aa28 20161208-00:03Z | Id: 12/25



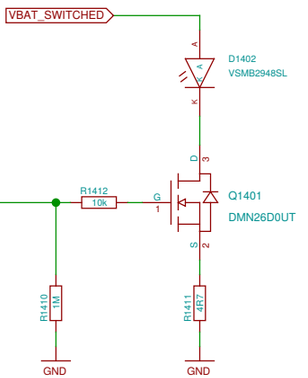
Sheet: /RFID/NFC/		
File: nfc.sch		
Title: RFID/NFC		
Size: A3	Date: 2016-12-05 19:39:17	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 13/25

IR receiver

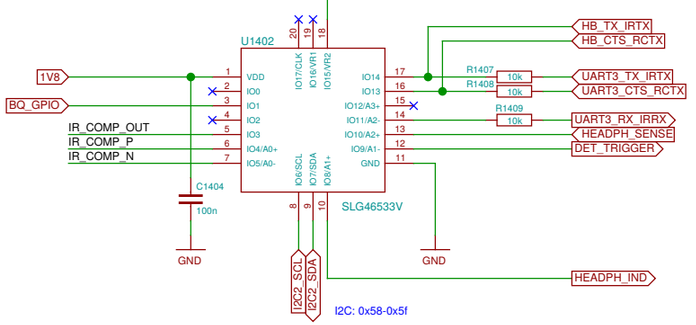
NOTE: 1V8 may be quite noisy



IR transmitter



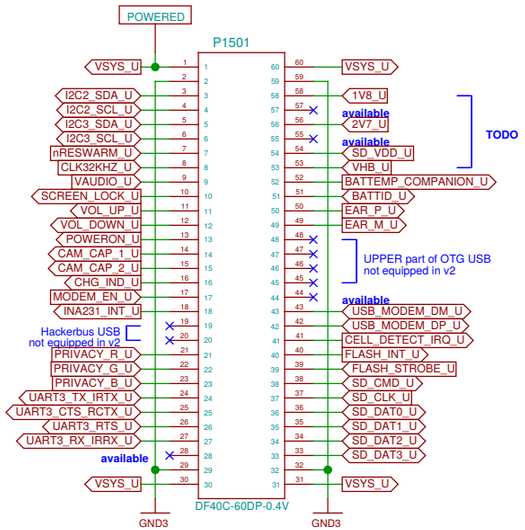
IR send/receive logic

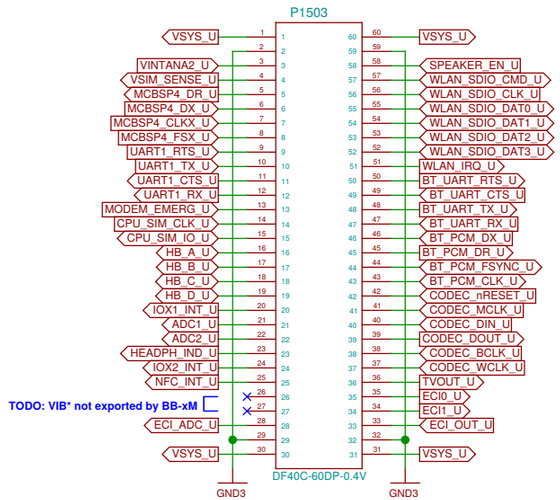


TODO: update D1401 footprint

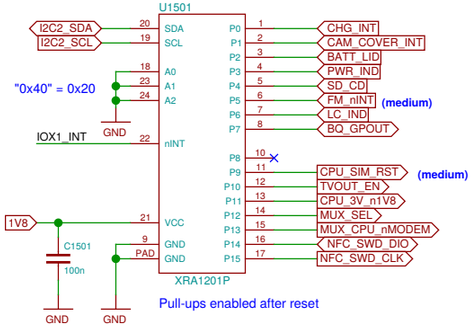
Sheet: /Infrared/ File: ir.sch		
Title: Infrared		
Size: A3	Date: 2016-12-08 00:16:47	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 14/25

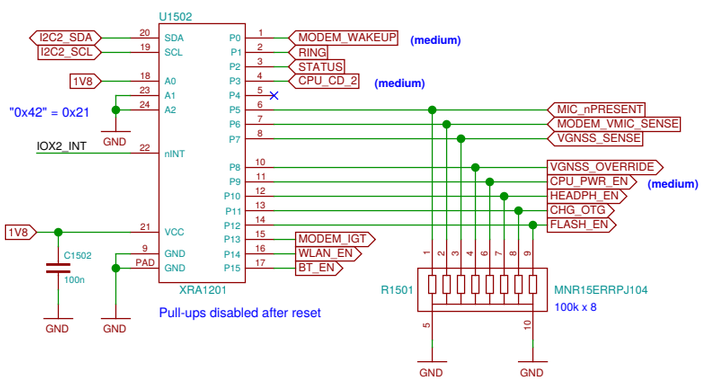
This is just the collection of signals we have.
Assignment can still change, e.g., to improve layout.

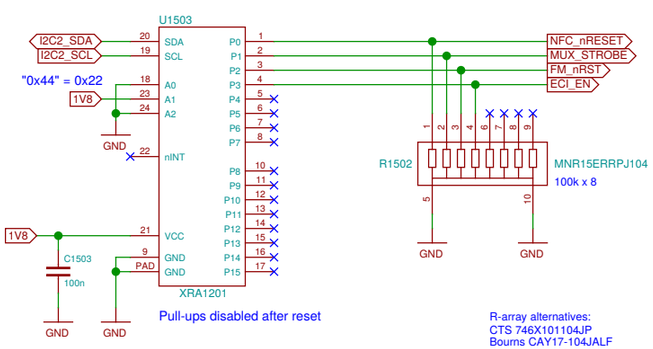




IO expanders (on LOWER)

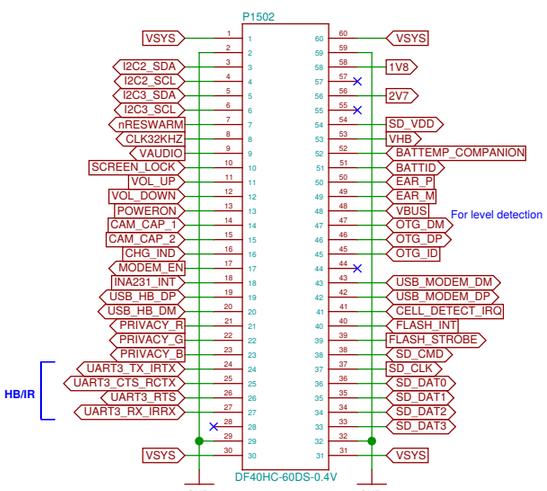


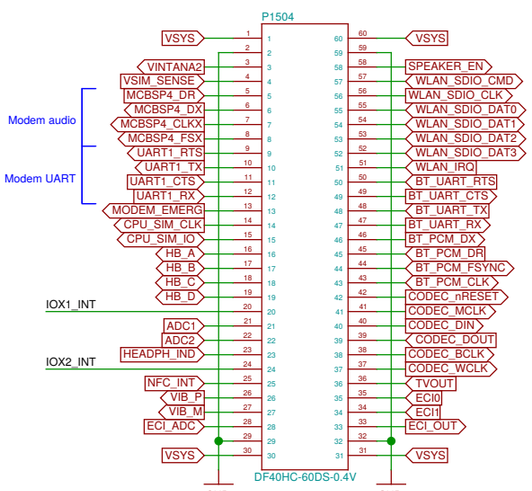




UPPER

LOWER



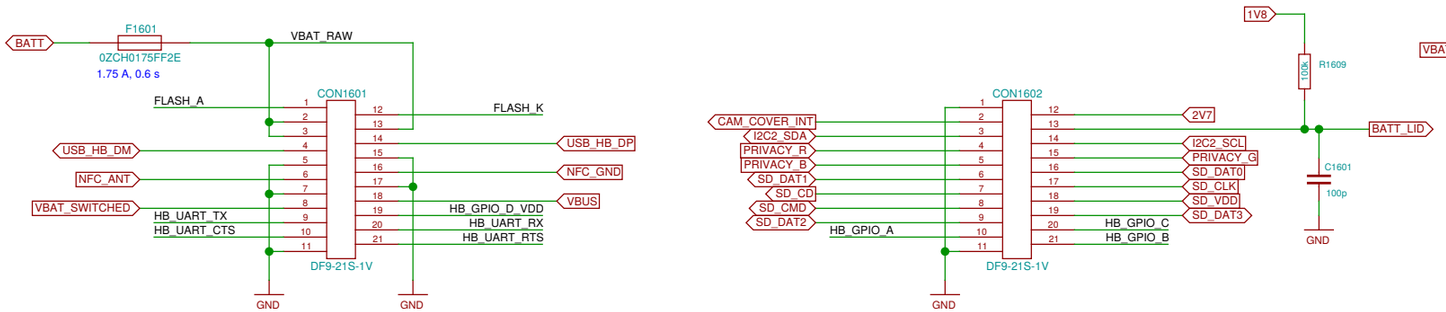


Current rating per contact: 0.3 A

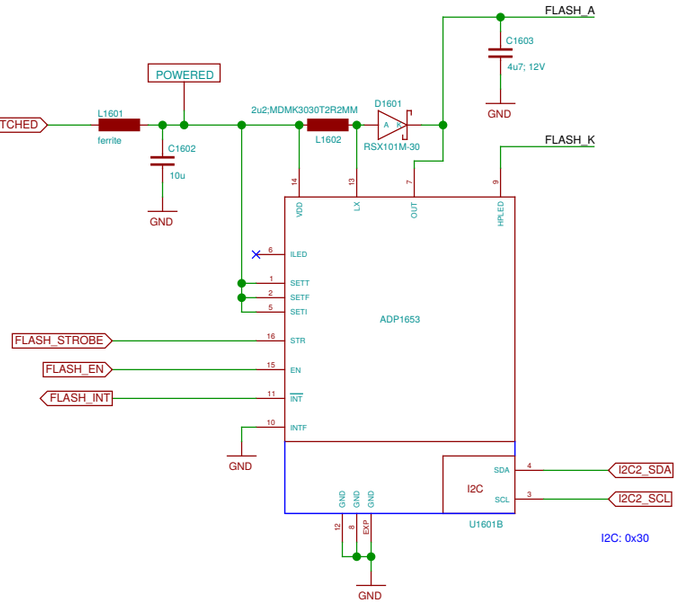
Sheet: /B2B LOWER-UPPER/		
File: b2b.sch		
Title: B2B LOWER-UPPER		
Size: A3	Date: 2016-11-22 10:44:58	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 15/25

LOWER-BOB Interconnect (LOWER side)

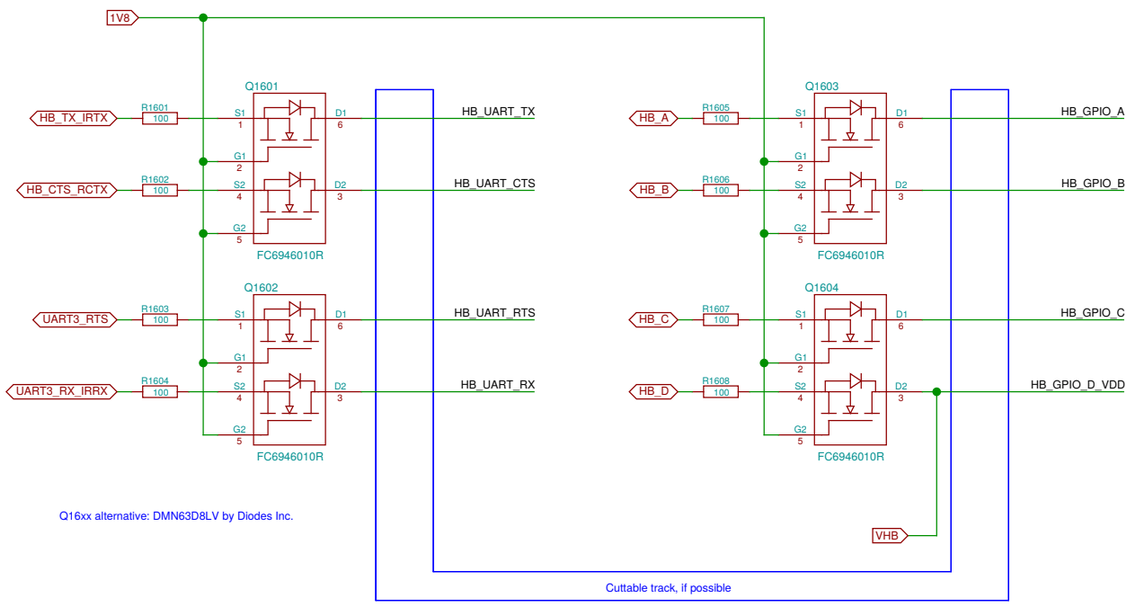
Defined in the Hackerbus specification, http://neo900.org/stuff/papers/hb.pdf



Flash/Torch



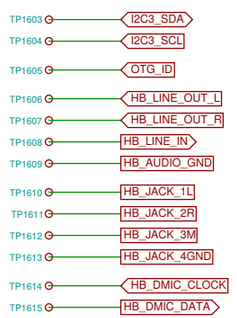
Level shifters for Hackerbus GPIO and UART



Q16xx alternative: DMN63D8LV by Diodes Inc.

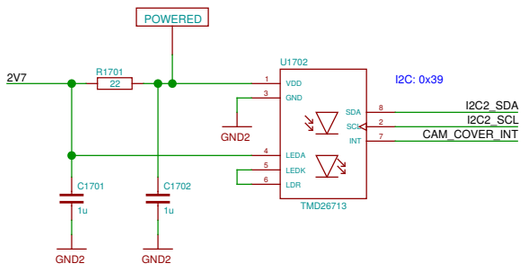
Patch field

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.

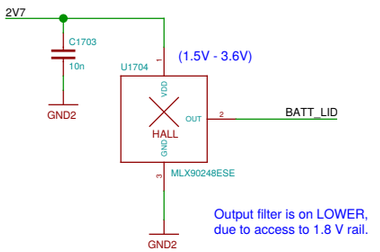


Sheet: /Hackerbus/ File: hb.sch		
Title: Hackerbus		
Size: A3	Date: 2016-11-23 22:26:52	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 16/25

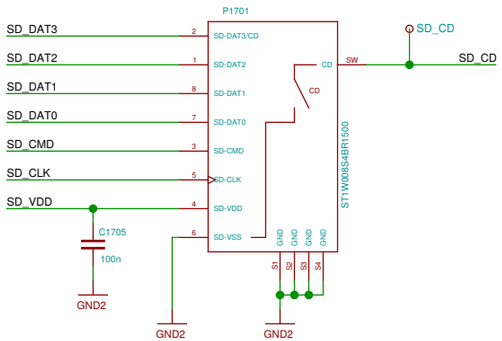
Camera Cover detect



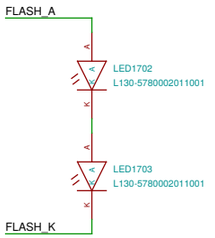
Battery Cover detect



Memory card holder

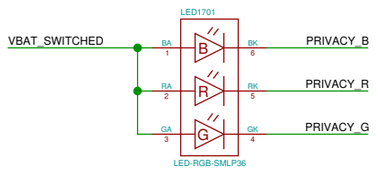


Camera flash



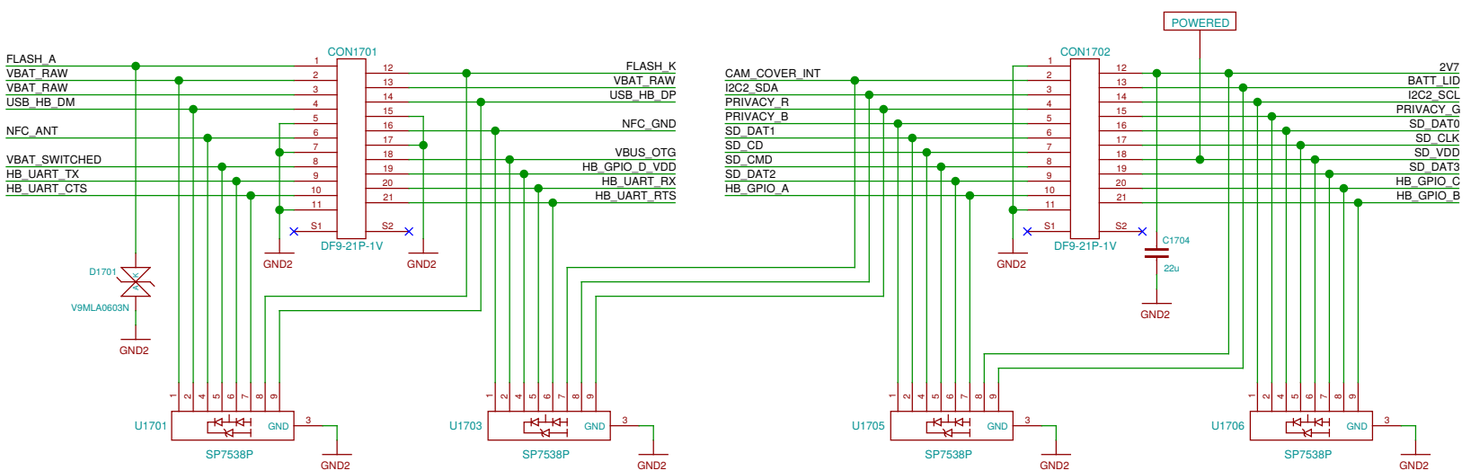
Camera lens plate

Privacy LED

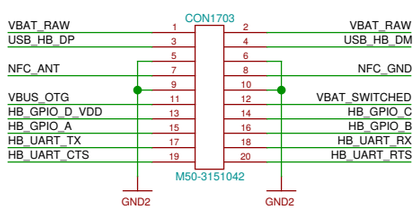


LOWER-BOB Interconnect (BOB side)

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



Hackerbus

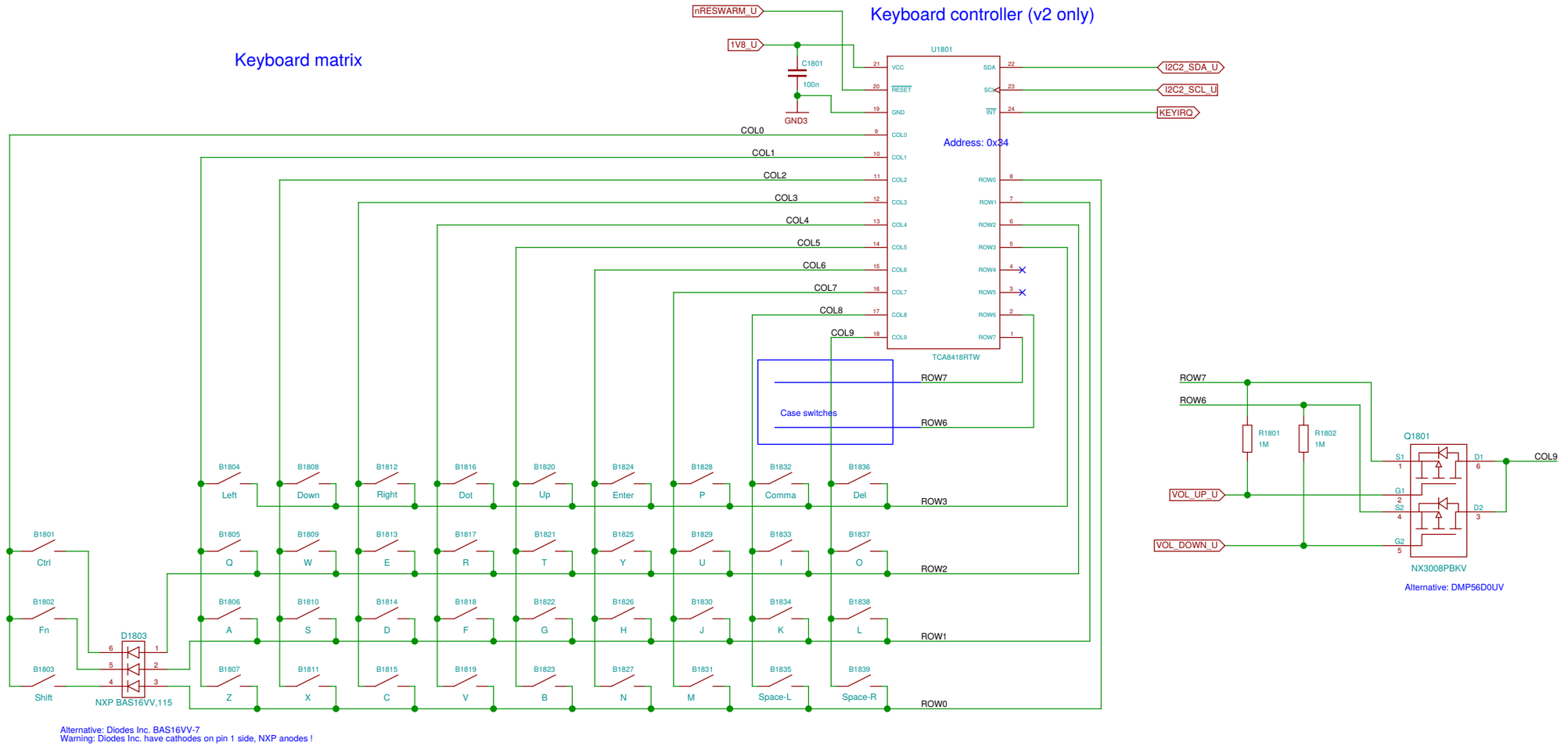


ESD pin assignment is only indicative.
Actual assignment to be defined by layout.

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

Keyboard matrix

Keyboard controller (v2 only)



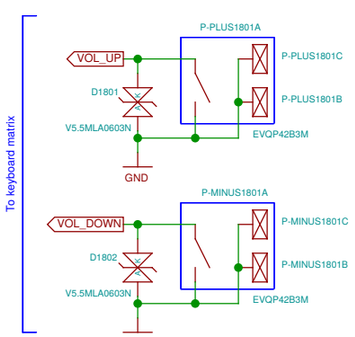
Alternative: Diodes Inc. BAS16VV-7
Warning: Diodes Inc. have cathodes on pin 1 side, NXP anodes !

Alternative: DMP56D0UV

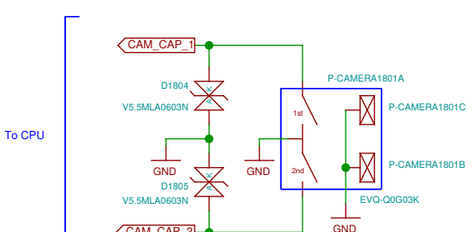
UPPER

LOWER

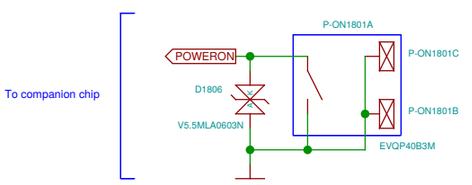
Volume



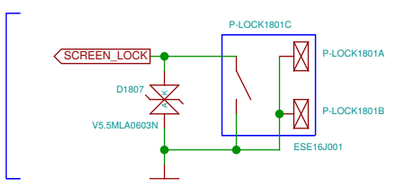
Camera trigger



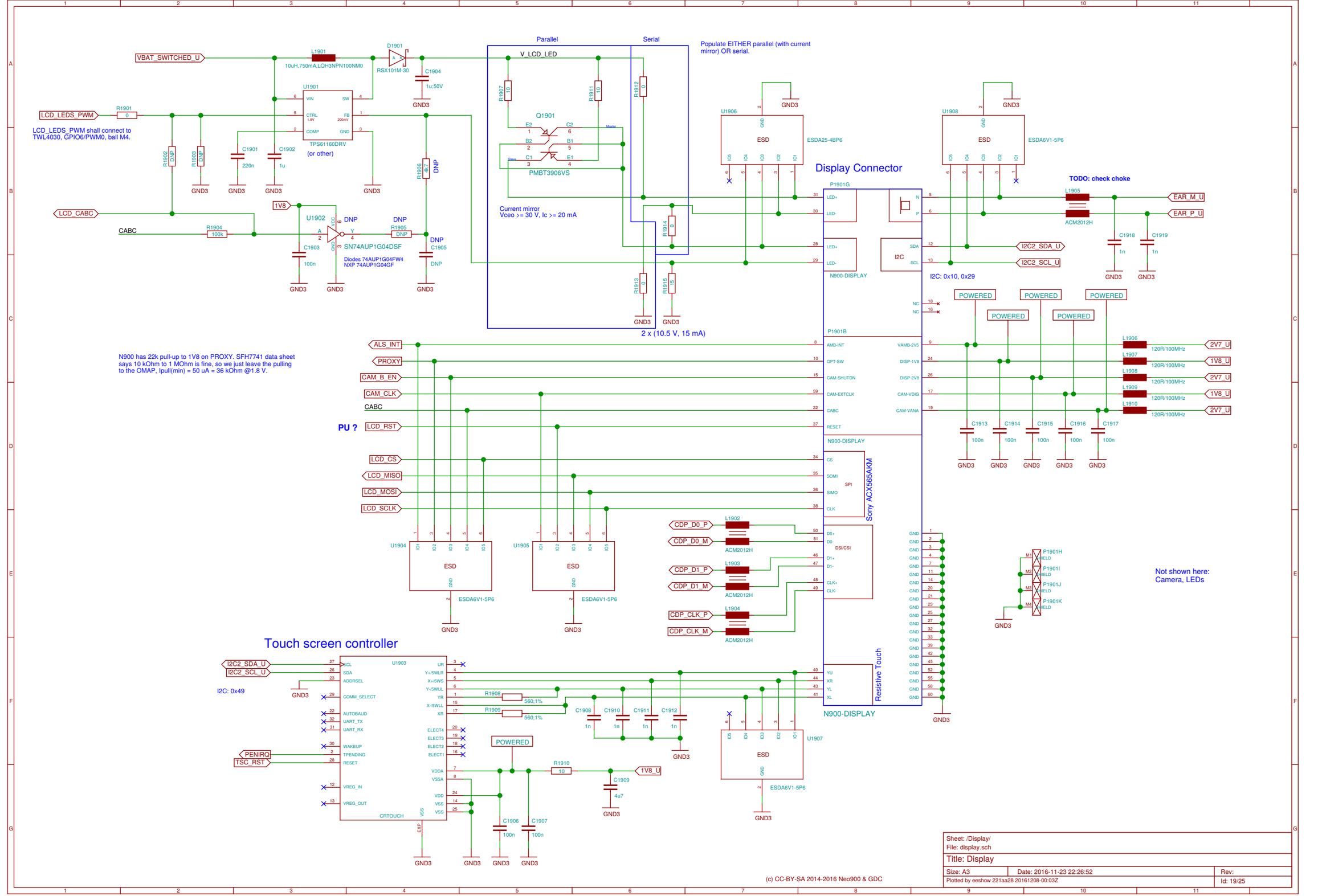
On-off

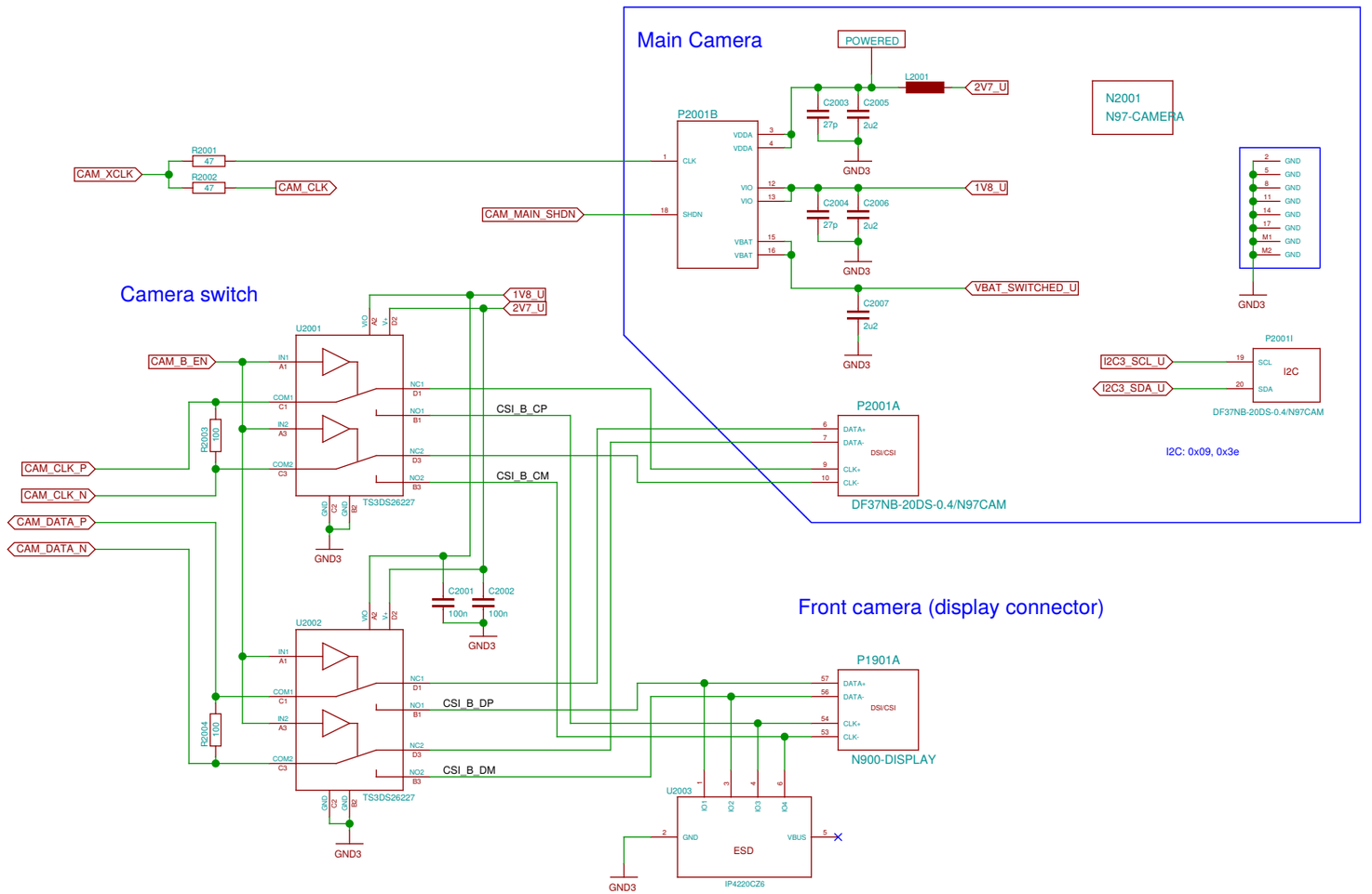


Lock switch

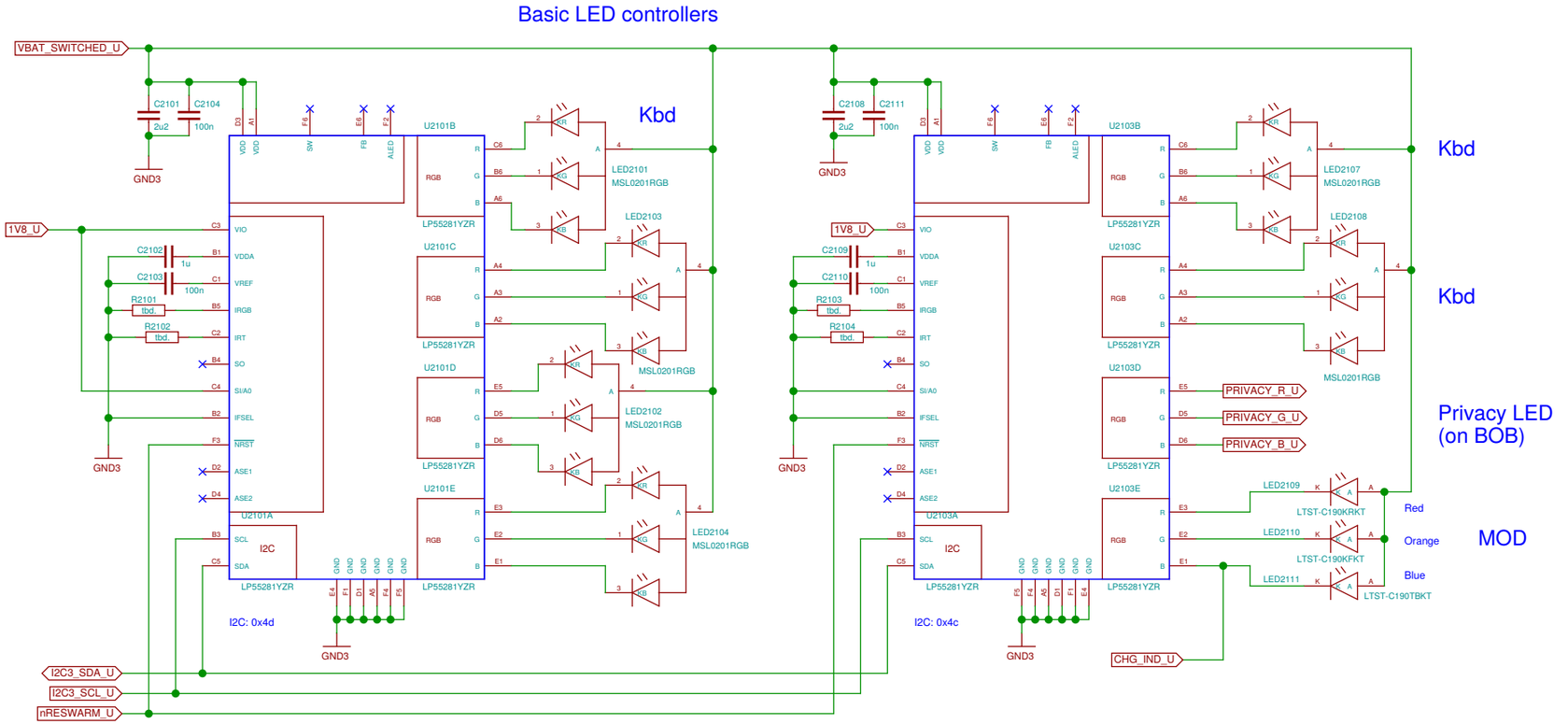


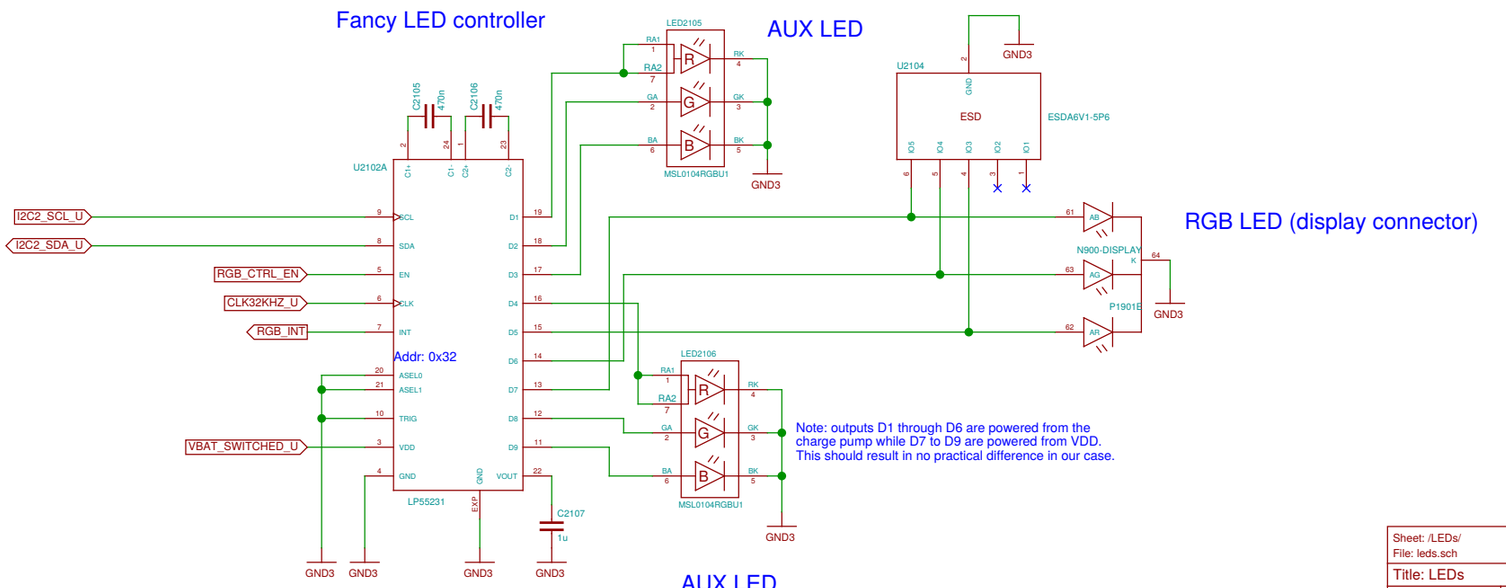
Sheet: /Keypad and buttons/ File: keys.sch		
Title: Keypad and buttons		
Size: A3	Date: 2016-12-07 23:57:31	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 18/25


VBAT_SWITCHED_U
L1901
10uH,750mA,LQH3NPN100NM0
D1901
RSX101M-30
C1904
1u;50V
GND3
U1901
VIN
SW
CTRL
1.8V
FB
200mV
COMP
GND
TPS61160DRV
(or other)
C1901
220n
C1902
1u
LCD_LEDS_PWM
R1901
0
LCD_LEDS_PWM shall connect to TWL4030, GPIO6/PWM0, ball M4.
R1902
DNP
R1903
DNP
R1906
4k7
DNP
Parallel
Serial
V_LCD_LED
R1907
10
R1911
10
R1912
0
Q1901
E2
C2
B2
B1
C1
E1
Master
Slave
PMBT3906VS
Populate EITHER parallel (with current mirror) OR serial.
Current mirror
Vceo >= 30 V, Ic >= 20 mA
R1914
0
R1913
0
R1915
15
2 x (10.5 V, 15 mA)
U1906
ESD
ESDA25-4BP6
U1908
ESDA6V1-5P6
Display Connector
P1901G
LED+
LED-
N900-DISPLAY
I2C
SDA
SCL
I2C2_SDA_U
I2C2_SCL_U
I2C: 0x10, 0x29
TODO: check choke
L1905
ACM2012H
EAR_M_U
EAR_P_U
C1918
1n
C1919
1n
LCD_CABC
CABC
R1904
100k
1V8
U1902
SN74AUP1G04DSF
Diodes 74AUP1G04FW4
NXP 74AUP1G04GF
DNP
R1905
C1903
100n
C1905
P1901B
AMB-INT
OPT-SW
CAM-SHUTDN
CAM-EXTCLK
CABC
RESET
VAMB-2V5
DISP-1V8
DISP-2V8
CAM-VDIG
CAM-VANA
NC
POWERED
L1906
L1907
L1908
L1909
L1910
120R/100MHz
2V7_U
1V8_U
C1913
C1914
C1915
C1916
C1917
100n
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, Ipull(min) = 50 uA = 36 kOhm @1.8 V.
ALS_INT
PROXY
CAM_B_EN
CAM_CLK
CABC
PU ?
LCD_RST
LCD_CS
LCD_MISO
LCD_MOSI
LCD_SCLK
SPI
Sony ACX565AKM
U1904
U1905
ESD
ESDA6V1-5P6
CDP_D0_P
CDP_D0_M
CDP_D1_P
CDP_D1_M
CDP_CLK_P
CDP_CLK_M
L1902
L1903
L1904
ACM2012H
DSI/CSI
Resistive Touch
P1901H
P1901I
P1901J
P1901K
FIELD
Not shown here:
Camera, LEDs
Touch screen controller
U1903
CRTOUCH
I2C2_SDA_U
I2C2_SCL_U
I2C: 0x49
PENIRQ
TSC_RST
ADDRSEL
COMM_SELECT
AUTOBAUD
UART_TX
UART_RX
WAKEUP
TPENDING
RESET
VREG_IN
VREG_OUT
R1908
560;1%
R1909
560;1%
R1910
10
C1908
C1910
C1911
C1912
1n
C1909
4u7
C1906
C1907
100n
U1907
ESDA6V1-5P6
(c) CC-BY-SA 2014-2016 Neo900 & GDC
Sheet: /Display/
File: display.sch
Title: Display
Size: A3
Date: 2016-11-23 22:26:52
Rev:
Plotted by eeshow 221aa28 20161208-00:03Z
Id: 19/25



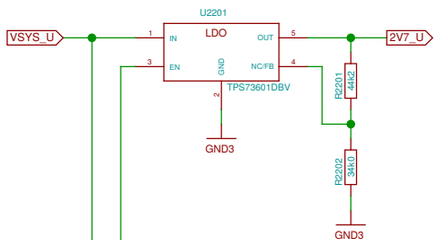
Sheet: /Cameras/ File: cams.sch		
Title: Cameras		
Size: A3	Date: 2016-11-23 22:26:52	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 20/25



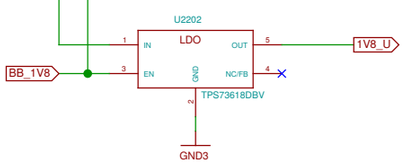


Sheet: /LEDs/ File: leds.sch		
Title: LEDs		
Size: A3	Date: 2016-11-23 22:26:52	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 21/25

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

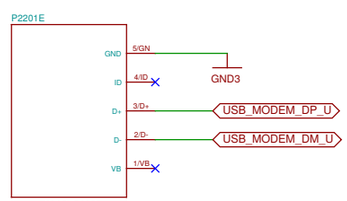


TODO: use REGEN ?

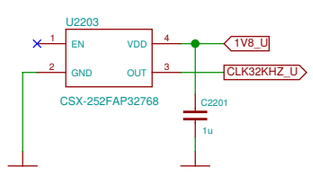


Modem USB

connect to BB
by some Micro-USB cable

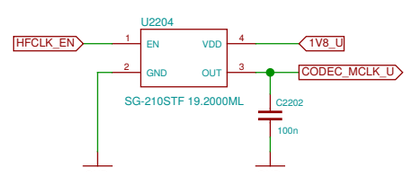


32 kHz clock



Alternative: OYKTGLJANF-0.032768

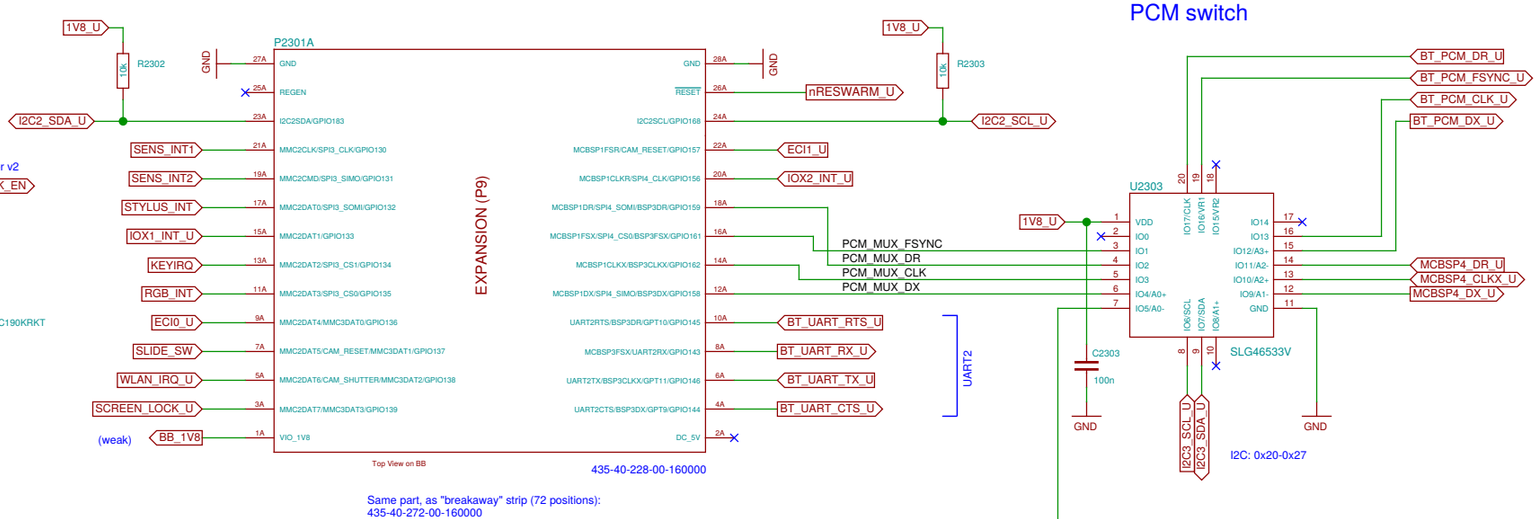
19.2 MHz clock



Alternative: KC2520B19.2000C1GE00

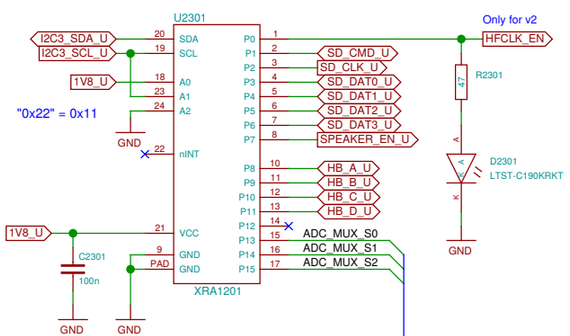
Sheet: /Adaptation (v2 only)/		
File: v2.sch		
Title: Adaptation (v2 only)		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 22/25

BB-xM Main Expansion Header (P9, 7.24)



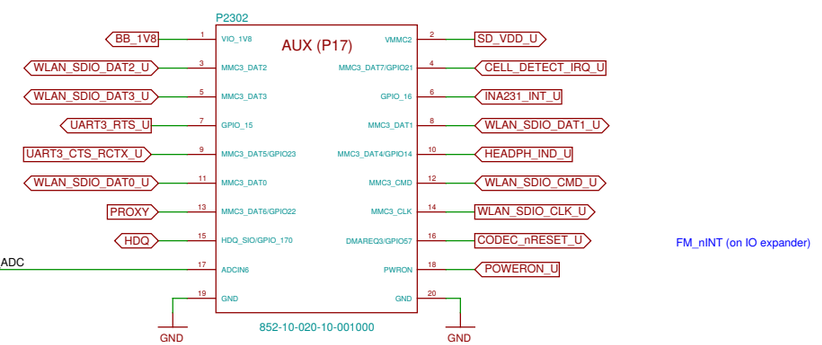
Same part, as "breakaway" strip (72 positions):
435-40-272-00-160000

IO expander



PCM switch

Auxiliary Expansion Header (P17, 7.26)



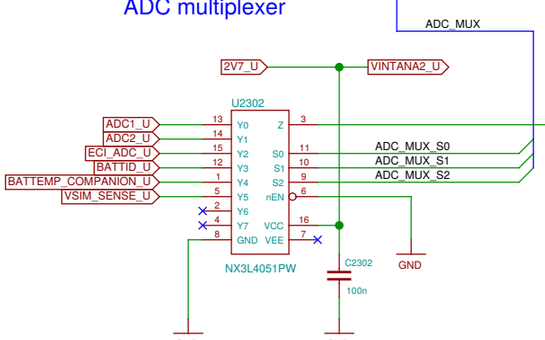
No UART3_RTS on BB-xM, using GPIO

No UART3_CTS on BB-xM, using GPIO

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

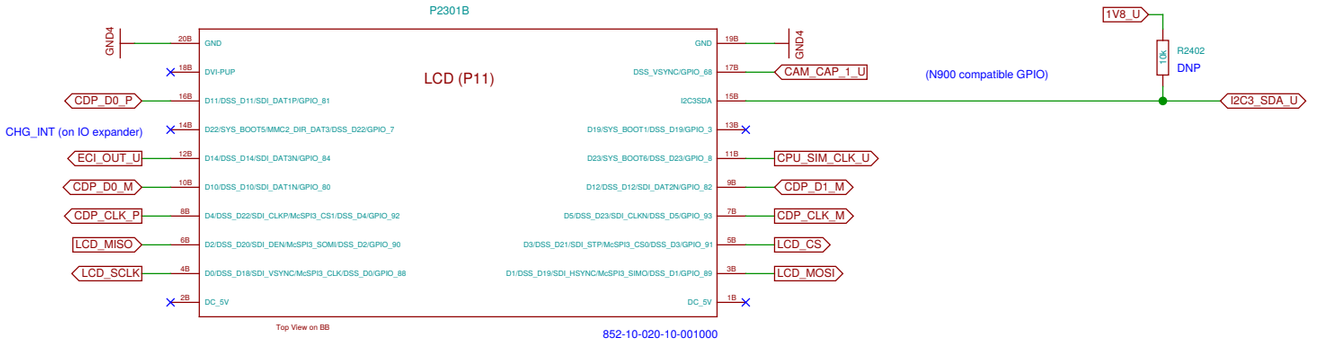
FM_nINT (on IO expander)

ADC multiplexer

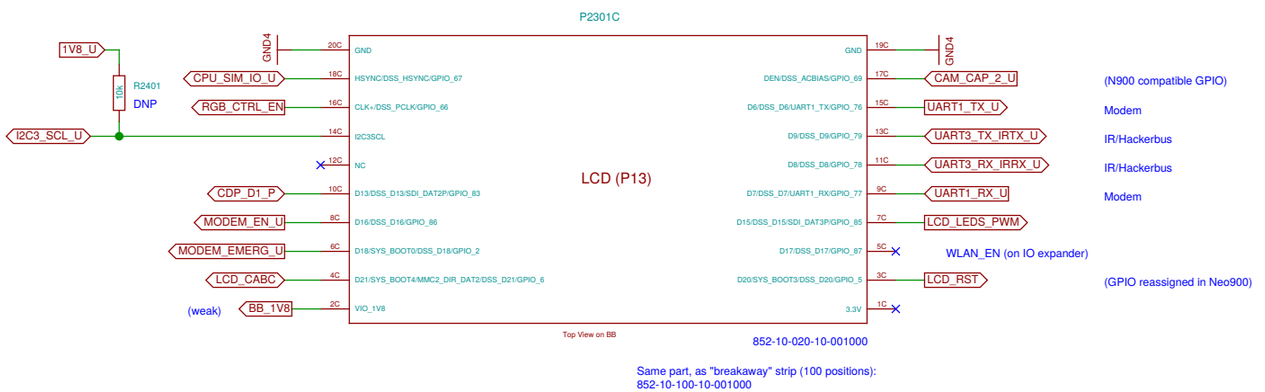


Sheet: /BB-xM Adapter (CPU)/ File: bbcpu.sch		
Title: BB-xM Adapter (CPU)		
Size: A3	Date: 2016-12-03 14:54:41	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 23/25

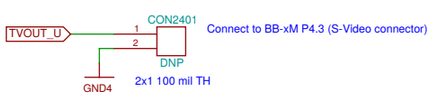
P11 (7.25)



P13 (7.25)



P4 (7.19)



Sheet: /BB-xM Adapter (DISP)/ File: bbdisp.sch		
Title: BB-xM Adapter (DISP)		
Size: A3	Date: 2016-12-03 14:54:41	Rev:
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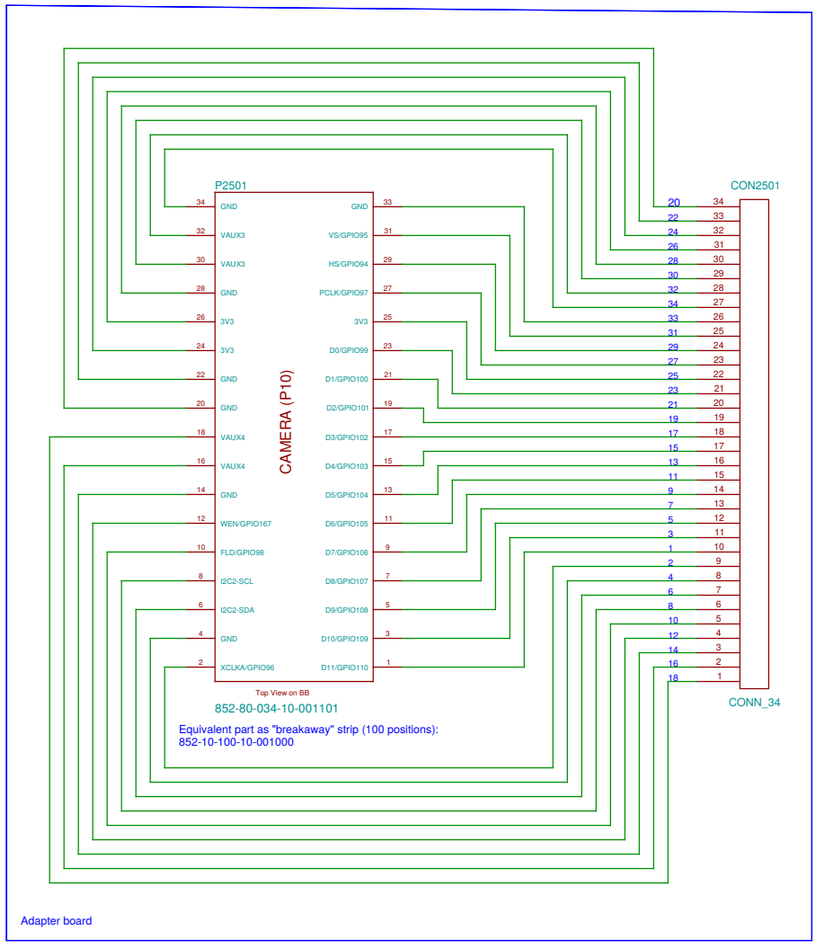
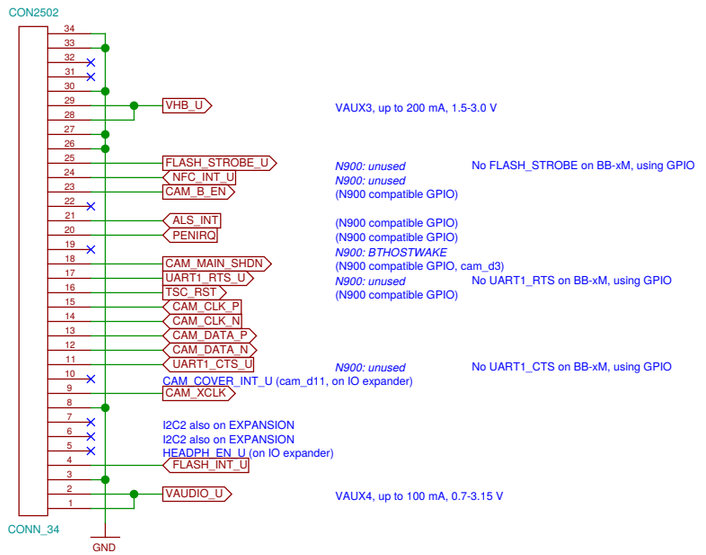
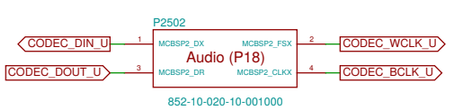
Processor Camera Port Interface (P10, 7.20.3)





34 x 1, 1.27 mm TH row (for ribbon cable)



This part is a "breakaway" strip (20 positions) and needs to be customized (cut) before assembly.
Alternatively, 852-10-100-10-001000 (100 positions) could be used.

Sheet: /BB-xM Adapter (CAM)/		
File: bbcam.sch		
Title: BB-xM Adapter (CAM)		
Size: A3	Date: 2016-12-03 14:54:41	Rev:
Plotted by eeshow 221aa28 20161208-00:03Z		Id: 25/25