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Sheet: BB-xM Adapter (CAM)
BB-xM Adapter (CAM)
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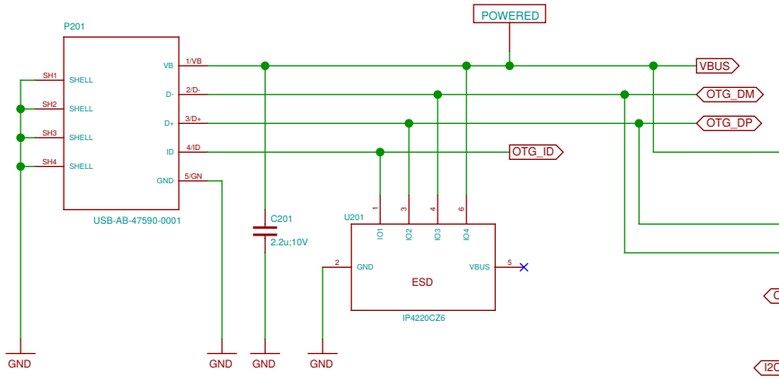
Circuits that exist in the v2 prototype only
and that will not be part of the final design.

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

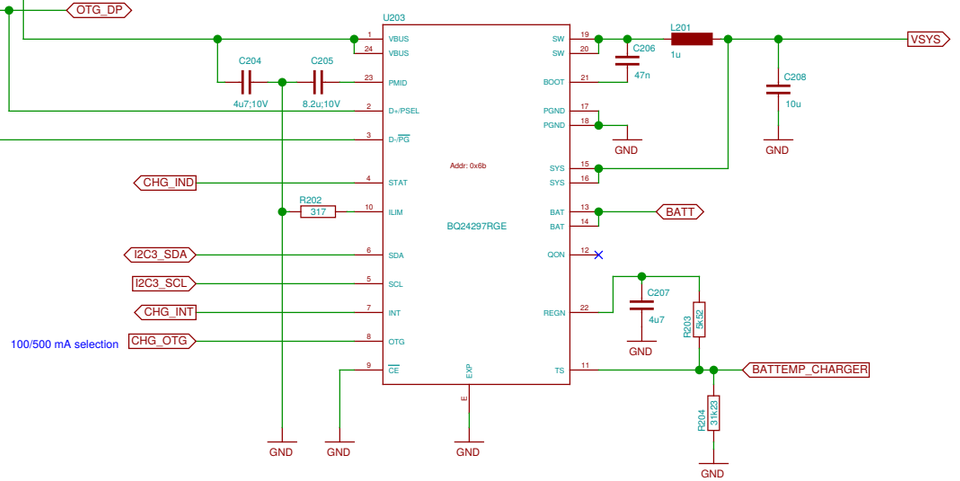
Signals that exist on both LOWER and UPPER (and maybe also BOB)
have a _U suffix on UPPER. No suffix is needed to distinguish
between LOWER and BOB becauses all BOB components are on
the same sheet and wires connecting them use sheet-local labels.

Sheet: / File: neo900.sch		
Title: Neo900		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 1/25

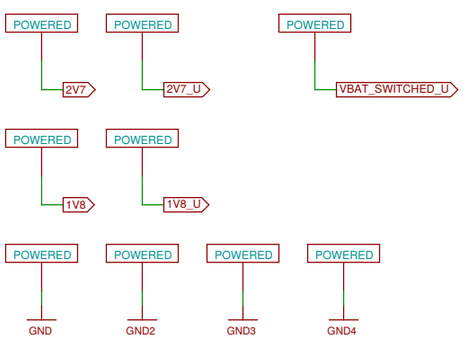
USB OTG connector



Battery charger with USB OTG

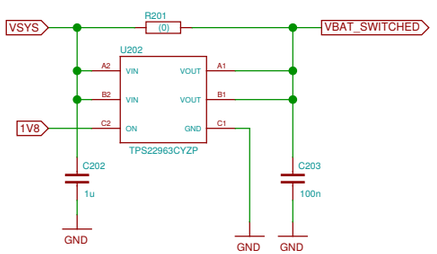


KiCad bureaucracy

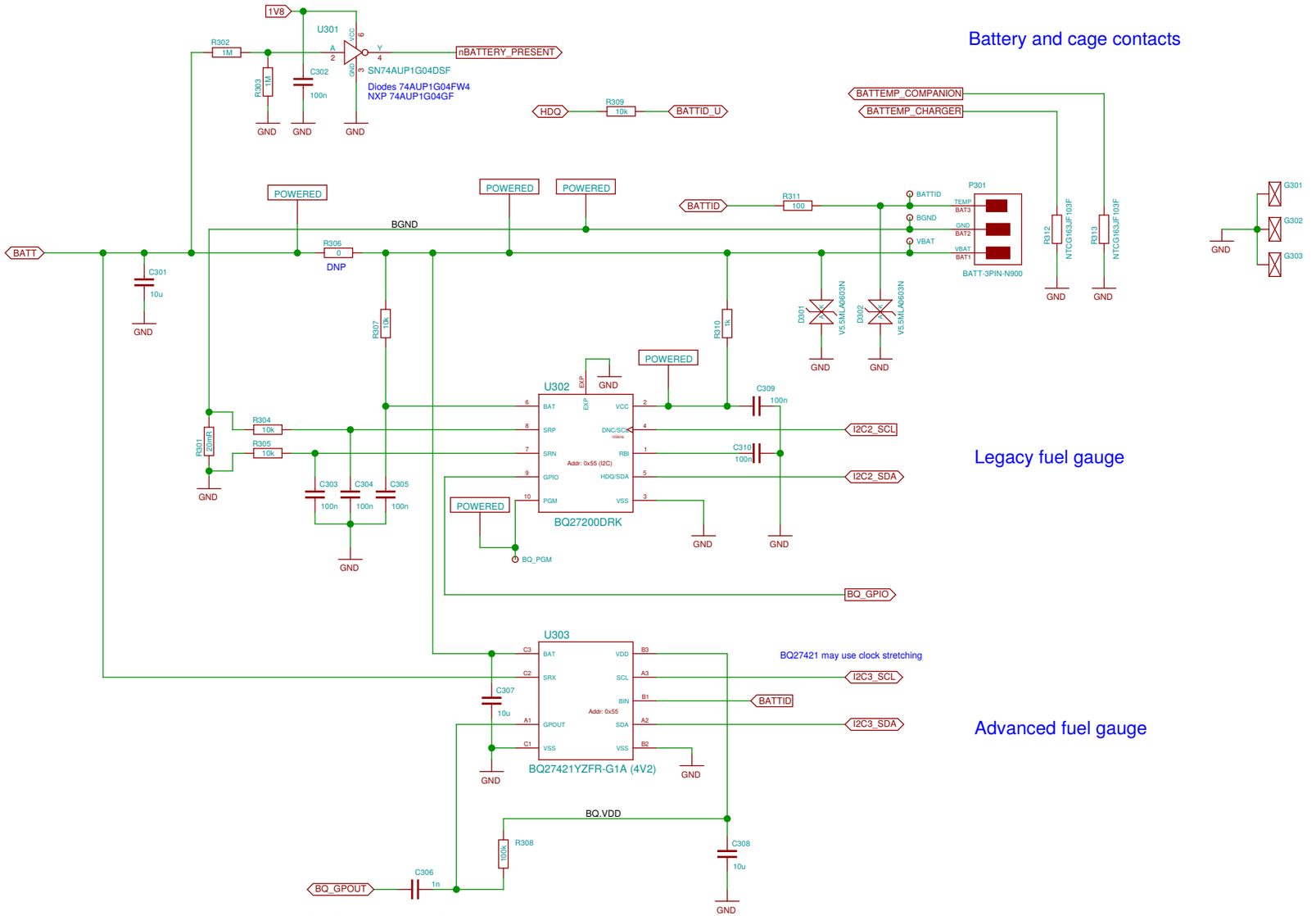


Power distribution and sequencing

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

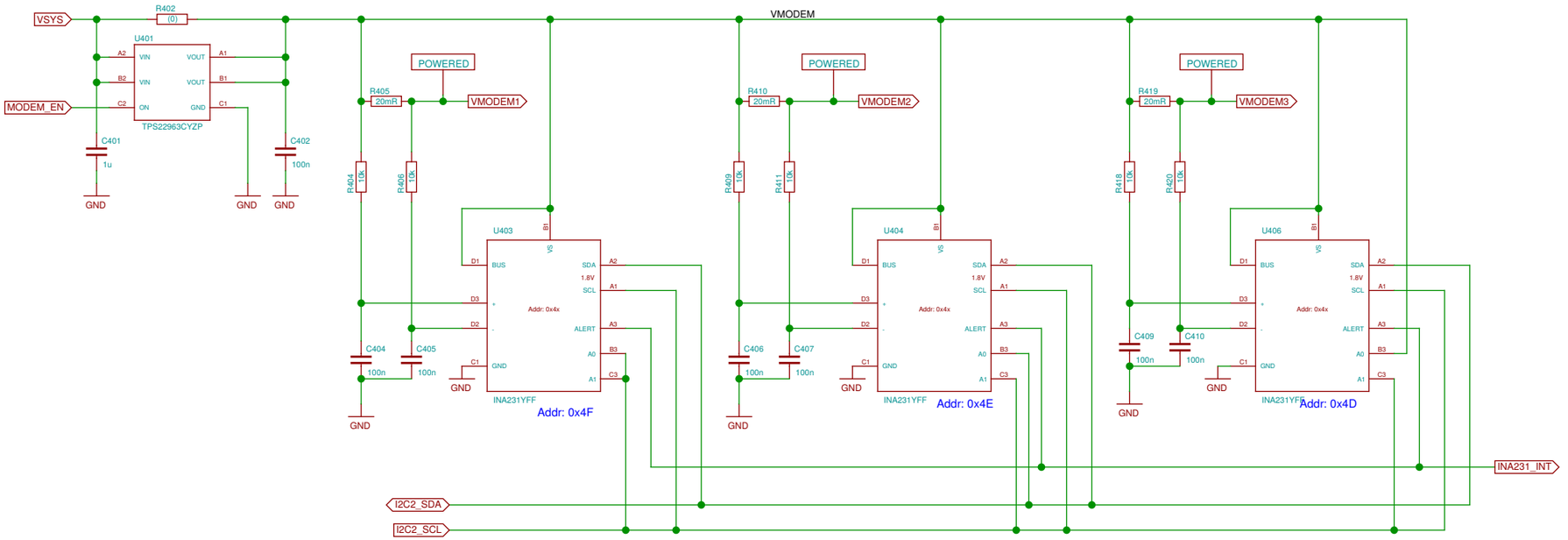


Sheet: /Charger/OTG/ File: charger.sch		
Title: Charger/OTG		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 2/25

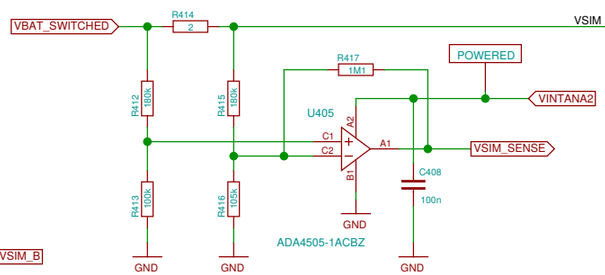


Sheet: /Battery/ File: battery.sch		
Title: Battery		
Size: A3	Date: 2016-11-18 04:02:08	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 3/25

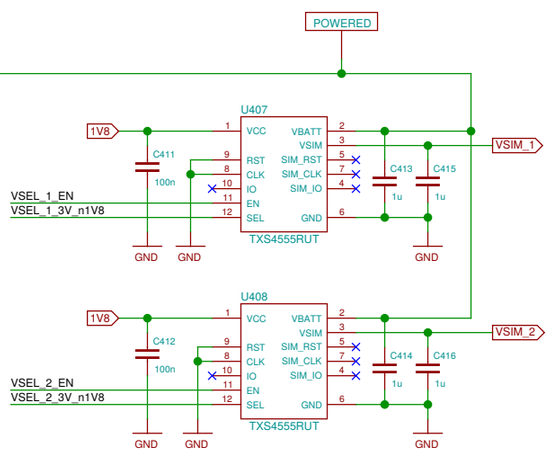
Modem current monitor



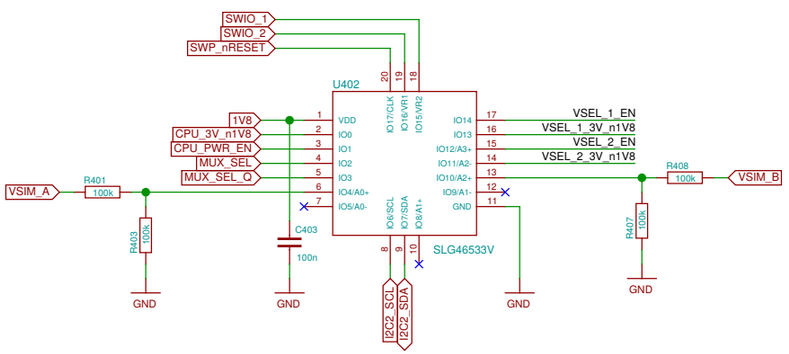
SIM current sensing



SIM power supply

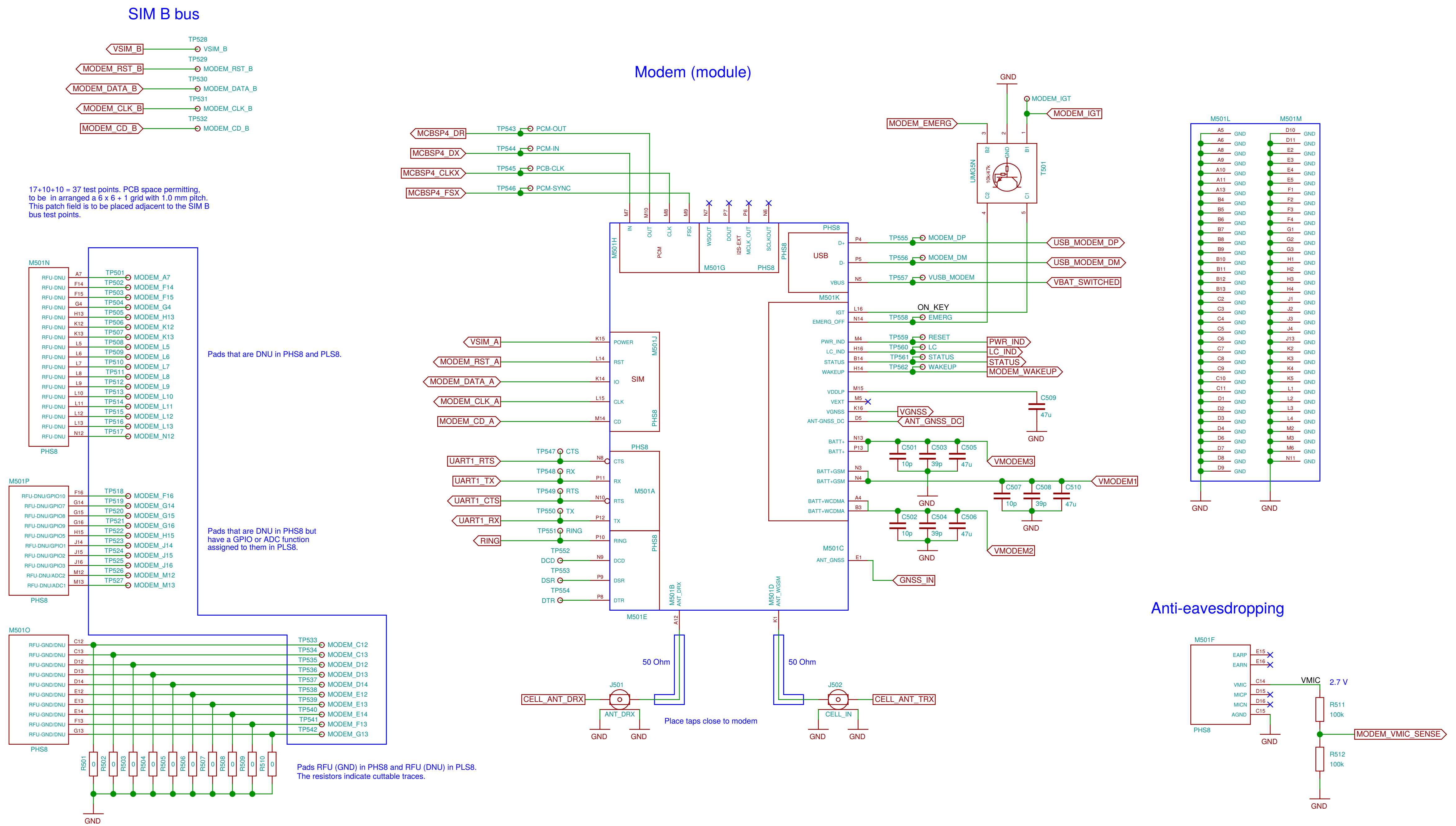


SIM power selection



TODO: update SLG design for changed pins

Sheet: /Modem Power/ File: modempwr.sch		
Title: Modem Power		
Size: A3	Date: 2016-11-14 18:26:18	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 4/25

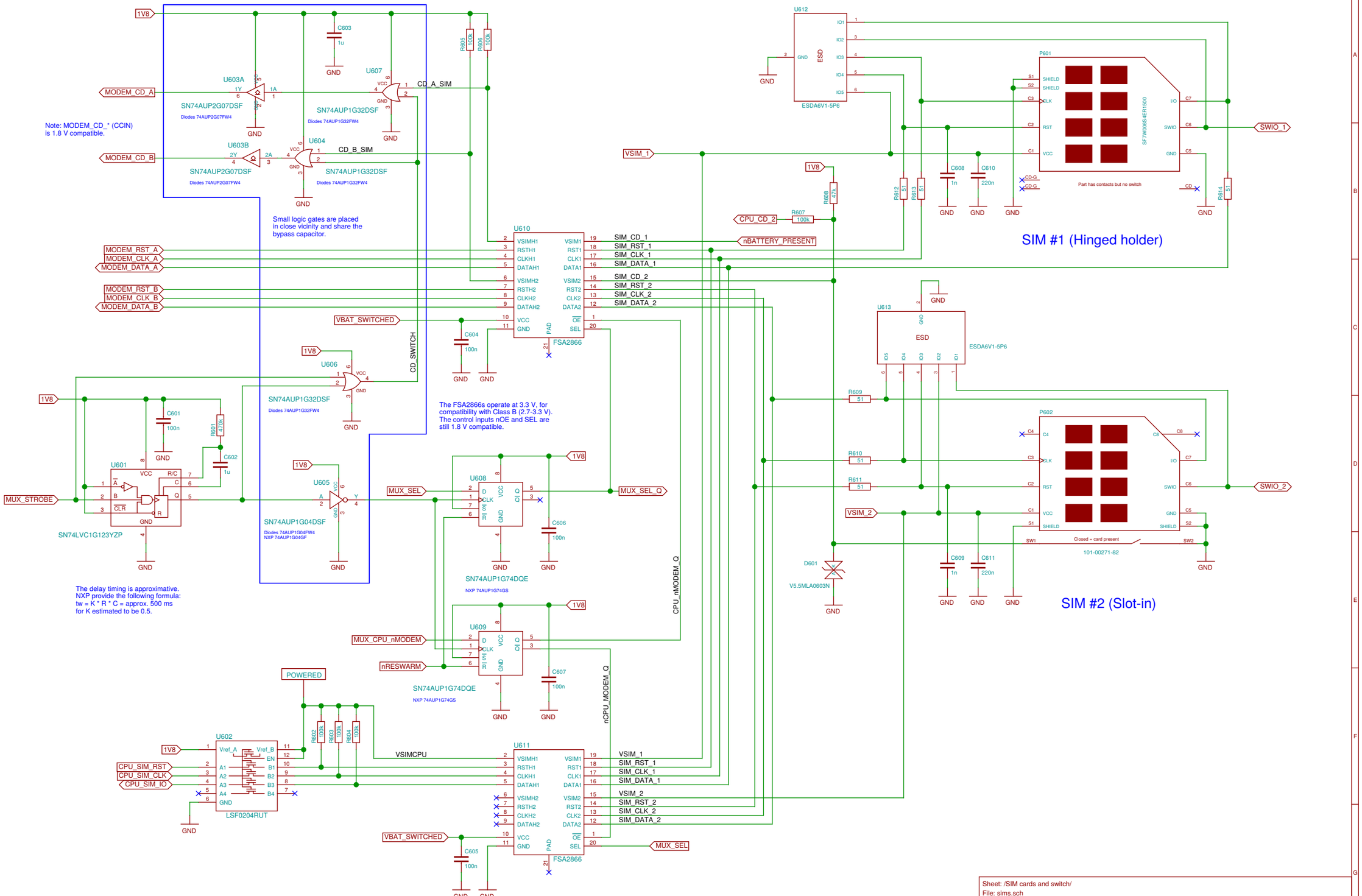


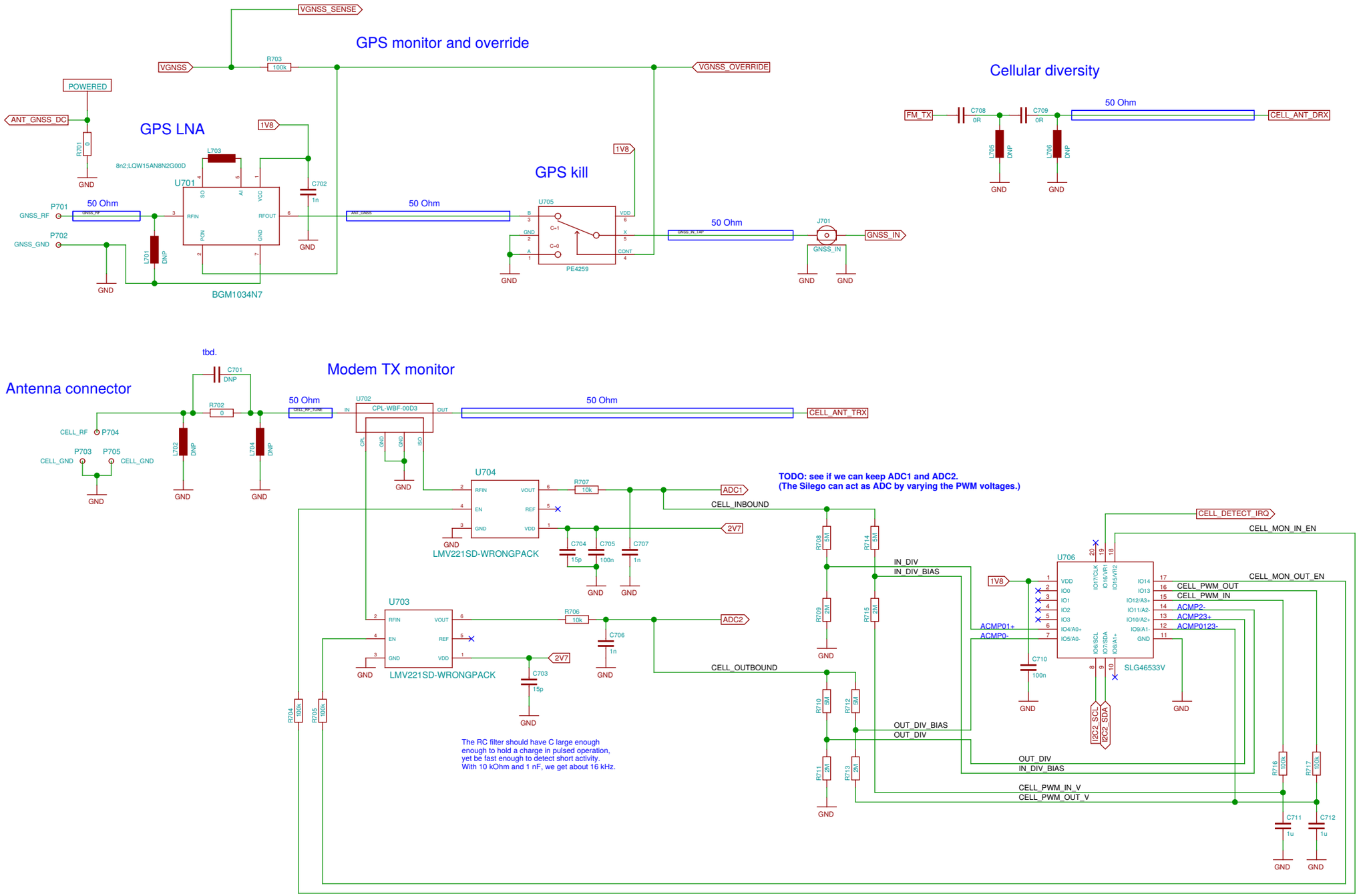
Sheet: /3G/4G Modem/
File: modem.sch

Title: 3G/4G Modem

Size: A3 | Date: 2016-11-20 13:38:54 | Rev:

Plotted by eeshow e90e812+ 20161120-16:10Z


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
101-00271-82
SF-TW006S4ER1500
ESDA6V1-5P6
SN74AUP2G07DSF
SN74AUP1G32DSF
SN74AUP1G04DSF
SN74LVC1G123YZP
SN74AUP1G74DQE
FSA2866
LSF0204RUT
1V8
GND
MODEM_CD_A
MODEM_CD_B
CD_A_SIM
CD_B_SIM
CD_SWITCH
VBAT_SWITCHED
MODEM_RST_A
MODEM_CLK_A
MODEM_DATA_A
MODEM_RST_B
MODEM_CLK_B
MODEM_DATA_B
SIM_CD_1
SIM_RST_1
SIM_CLK_1
SIM_DATA_1
SIM_CD_2
SIM_RST_2
SIM_CLK_2
SIM_DATA_2
VSIM_1
VSIM_2
nBATTERY_PRESENT
CPU_CD_2
SWIO_1
SWIO_2
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
U603A
U603B
U604
U605
U606
U607
U608
U609
U610
U611
U612
U613
U601
U602
P601
P602
D601
V5.5MLA0603N
C601
C602
C603
C604
C605
C606
C607
C608
C609
C610
C611
R601
R602
R603
R604
R605
R606
R607
R608
R609
R610
R611
R612
R613
R614
(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 e90e812+ 20161120-16:10Z
Id: 6/25

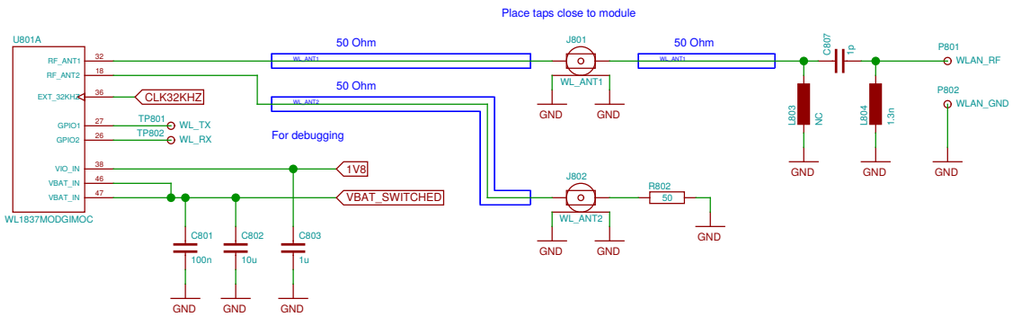


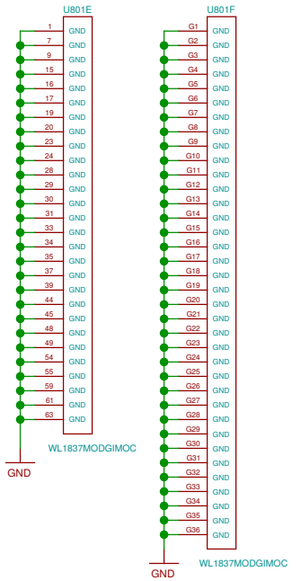
Sheet: /Modem Antennas/		
File: ants.sch		
Title: Modem Antennas		
Size: A3	Date: 2016-11-18 15:48:54	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 7/25

WiLink8

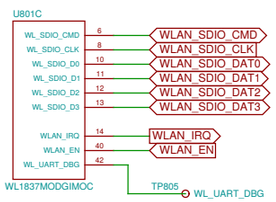
TODO: assign footprints for c-spring contacts

WLAN/BT antenna

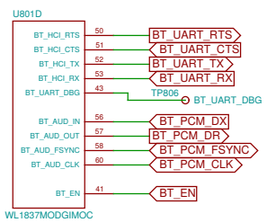




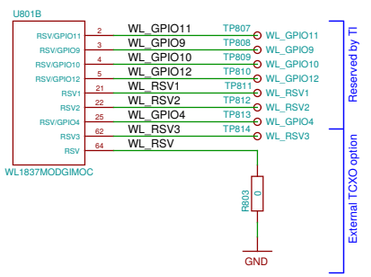
WLAN



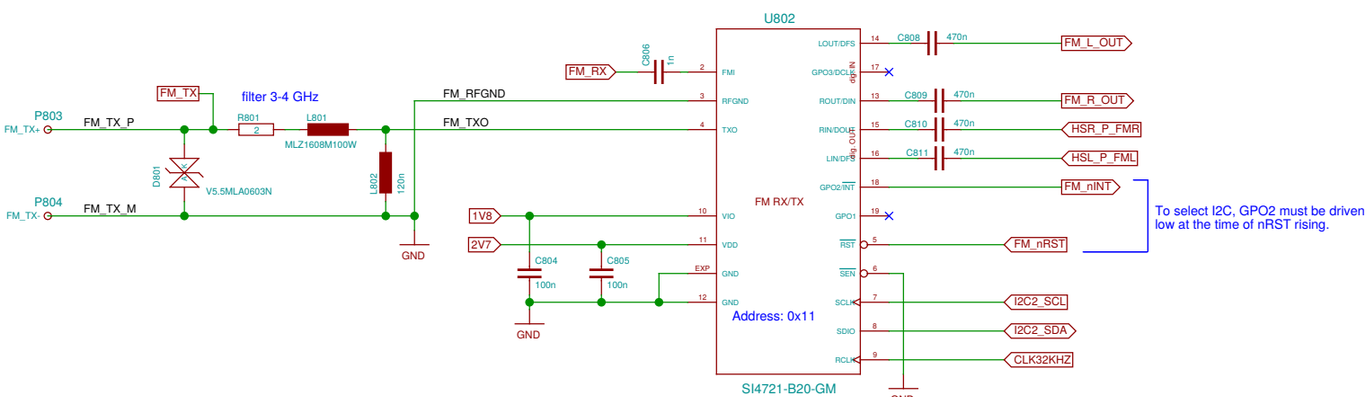
Bluetooth



Reserved / Debugging



FM Radio (TX/RX)

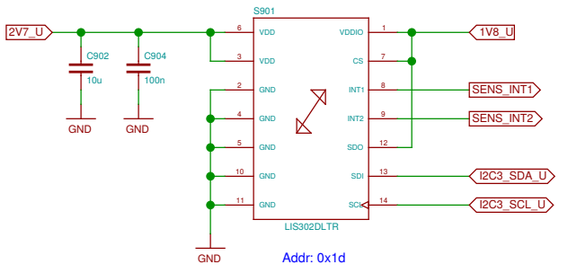


FM TX antenna

Si4705 is pin compatible (mostly) but RX-only

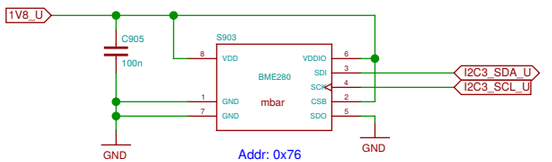
Sheet: /WLAN, Bluetooth, FM/		
File: wlan.sch		
Title: WLAN, Bluetooth, FM		
Size: A3	Date: 2016-11-20 21:45:03	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 8/25

Acceleration (legacy)



Addr: 0x1d

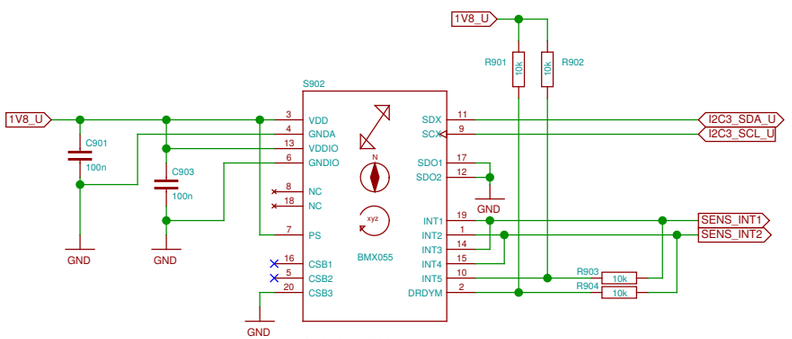
Pressure, humidity



Addr: 0x76

keep away from liquids and extreme temperatures

9-axis (acceleration, gyroscope, magnetometer)



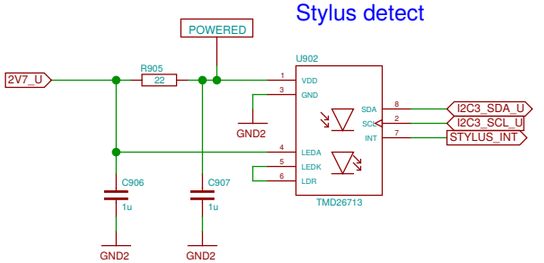
Addr: 0x18/68/10

keep away from magnets and metal

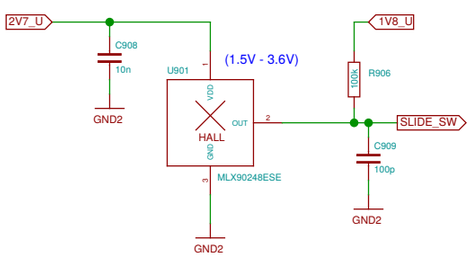
UPPER

LOWER

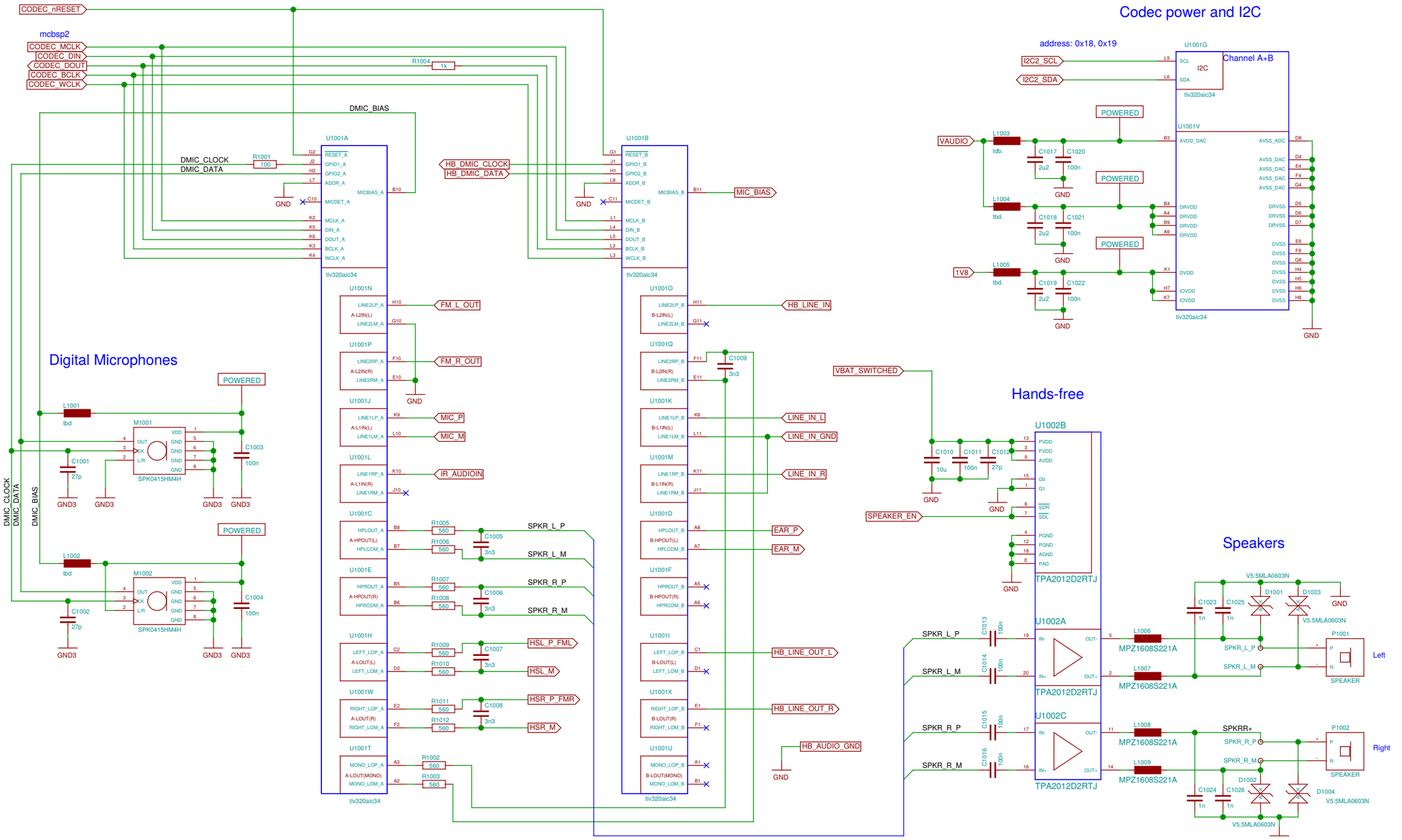
Stylus detect

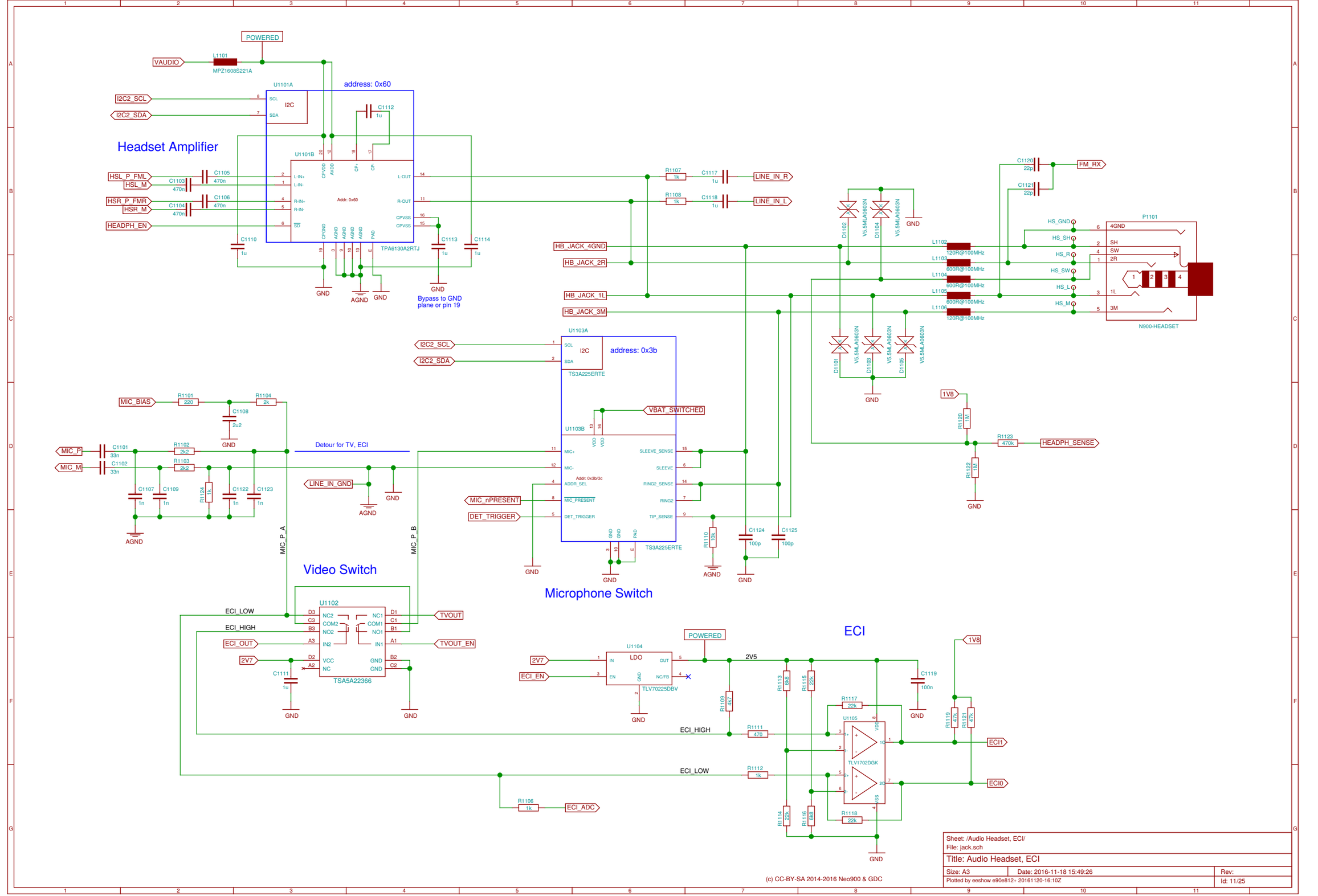


Slide sensor



Sheet: /Sensors/ File: sensors.sch		
Title: Sensors		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 9/25


Codec power and I2C
address: 0x18, 0x19
U1001G
Channel A+B
I2C
tlv320aic34
I2C2_SCL
I2C2_SDA
U1001V
POWERED
VAUDIO
1V8
L1003
L1004
L1005
tdb.
C1017
C1020
C1018
C1021
C1019
C1022
2u2
100n
GND
Digital Microphones
POWERED
L1001
L1002
tbd
M1001
M1002
SPK0415HM4H
C1001
C1002
C1003
C1004
27p
100n
GND3
DMIC_CLOCK
DMIC_DATA
DMIC_BIAS
CODEC_nRESET
mcbsp2
CODEC_MCLK
CODEC_DIN
CODEC_DOUT
CODEC_BCLK
CODEC_WCLK
R1004
1k
R1001
100
U1001A
U1001B
HB_DMIC_CLOCK
HB_DMIC_DATA
MIC_BIAS
FM_L_OUT
FM_R_OUT
MIC_P
MIC_M
IR_AUDIOIN
HB_LINE_IN
LINE_IN_L
LINE_IN_GND
LINE_IN_R
EAR_P
EAR_M
HB_LINE_OUT_L
HB_LINE_OUT_R
HB_AUDIO_GND
R1005
R1006
R1007
R1008
R1009
R1010
R1011
R1012
R1002
R1003
560
C1005
C1006
C1007
C1008
C1009
3n3
SPKR_L_P
SPKR_L_M
SPKR_R_P
SPKR_R_M
HSL_P_FML
HSL_M
HSR_P_FMR
HSR_M
Codec
Hands-free
VBAT_SWITCHED
SPEAKER_EN
U1002B
TPA2012D2RTJ
C1010
C1011
C1012
10u
100n
27p
U1002A
U1002C
C1013
C1014
C1015
C1016
Speakers
L1006
L1007
L1008
L1009
MPZ1608S221A
V5.5MLA0603N
D1001
D1003
D1002
D1004
C1023
C1025
C1024
C1026
1n
P1001
P1002
SPEAKER
Left
Right
SPKRR+
(c) CC-BY-SA 2014-2016 Neo900 & GDC
Sheet: /Audio Codec/
File: codec.sch
Title: Audio Codec
Size: A3
Date: 2016-11-18 15:49:26
Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z
Id: 10/25


POWERED
VAUDIO
L1101
MPZ1608S221A
U1101A
address: 0x60
I2C2_SCL
I2C2_SDA
I2C
C1112
1u
Headset Amplifier
U1101B
HSL_P_FML
HSL_M
HSR_P_FMR
HSR_M
HEADPH_EN
C1105
C1103
C1106
C1104
470n
L-IN+
L-IN-
R-IN+
R-IN-
SD
L-OUT
R-OUT
CPVSS
Addr: 0x60
TPA6130A2RTJ
C1110
C1113
C1114
GND
AGND
Bypass to GND plane or pin 19
R1107
R1108
1k
C1117
C1118
LINE_IN_R
LINE_IN_L
HB_JACK_4GND
HB_JACK_2R
HB_JACK_1L
HB_JACK_3M
D1102
D1104
D1101
D1103
D1105
V5.5MLA0603N
L1102
L1103
L1104
L1105
L1106
120R@100MHz
600R@100MHz
C1120
C1121
22p
FM_RX
P1101
HS_GND
HS_SH
HS_R
HS_SW
HS_L
HS_M
4GND
SH
SW
2R
1L
3M
N900-HEADSET
U1103A
TS3A225ERTE
U1103B
VBAT_SWITCHED
MIC+
MIC-
Addr: 0x3b/3c
ADDR_SEL
MIC_PRESENT
DET_TRIGGER
SLEEVE_SENSE
SLEEVE
RING2_SENSE
RING2
TIP_SENSE
1V8
R1120
R1122
1M
R1123
470k
HEADPH_SENSE
MIC_BIAS
R1101
220
R1104
2k
C1108
2u2
MIC_P
MIC_M
C1101
C1102
33n
R1102
R1103
2k2
C1107
C1109
C1122
C1123
1n
R1124
1k
Detour for TV, ECI
LINE_IN_GND
MIC_P_A
MIC_P_B
R1110
10k
C1124
C1125
100p
Video Switch
Microphone Switch
U1102
TSA5A22366
ECI_LOW
ECI_HIGH
ECI_OUT
2V7
TVOUT
TVOUT_EN
C1111
ECI
U1104
TLV70225DBV
LDO
ECI_EN
2V5
R1109
4k7
R1113
6k8
R1115
22k
C1119
100n
R1117
22k
R1118
22k
R1114
22k
R1116
6k8
U1105
TLV1702DGK
R1111
470
R1112
1k
R1119
47k
R1121
47k
ECI1
ECI0
R1106
ECI_ADC
(c) CC-BY-SA 2014-2016 Neo900 & GDC
Sheet: /Audio Headset, ECI/
File: jack.sch
Title: Audio Headset, ECI
Size: A3
Date: 2016-11-18 15:49:26
Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z
Id: 11/25

No-Solder Components

N1201
N900 case assembly

N1202
N97-CAMERA-HOLE

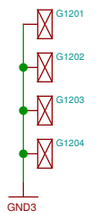
N1205
headset jack

N1203
STENCIL-TOP

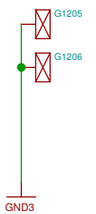
N1204
STENCIL-BOTTOM

Shield Contacts on UPPER

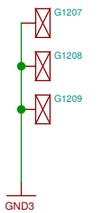
For the display



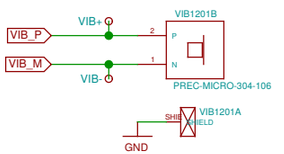
For the key mat



For the "key frame hook"



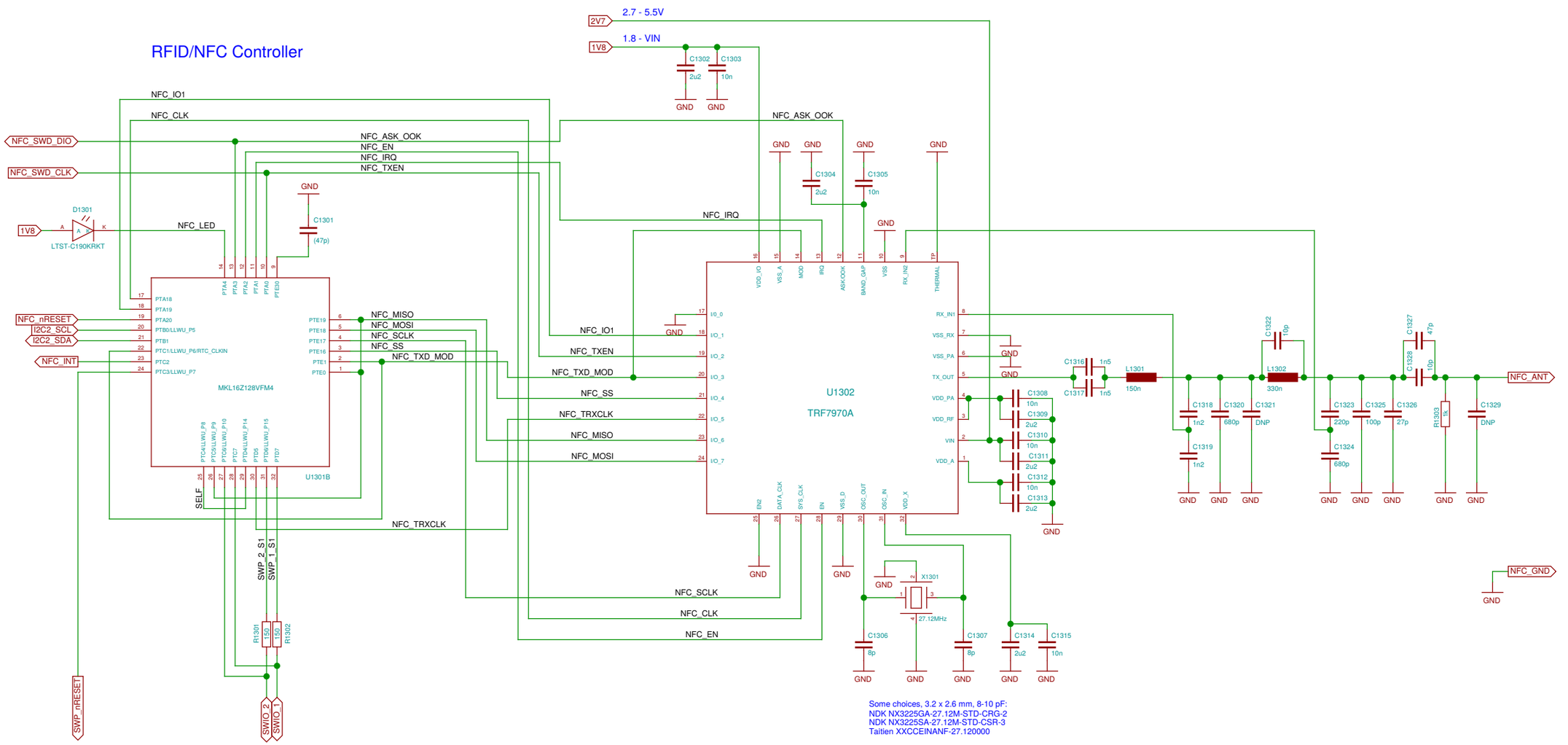
Vibramotor



Sheet: /Misc/ File: misc.sch		
Title: Misc		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 12/25

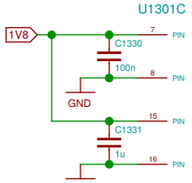
RFID/NFC Transceiver

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
Taitien XXCCEINANF-27.120000

U1301C

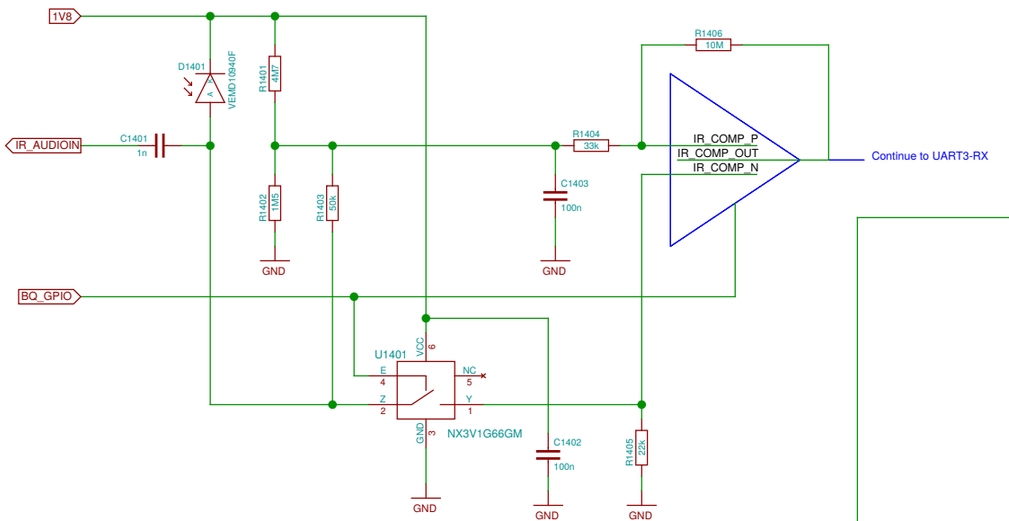


U1301A

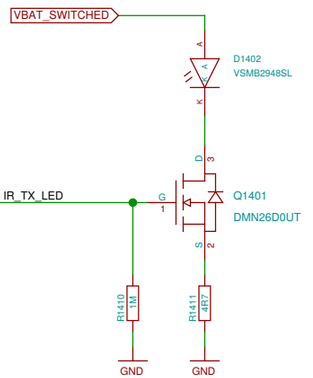
Sheet: /RFID/NFC/ File: nfc.sch		
Title: RFID/NFC		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 13/25

IR receiver

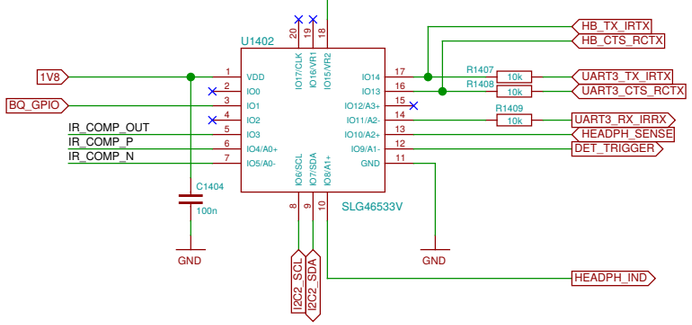
NOTE: 1V8 may be quite noisy



IR transmitter



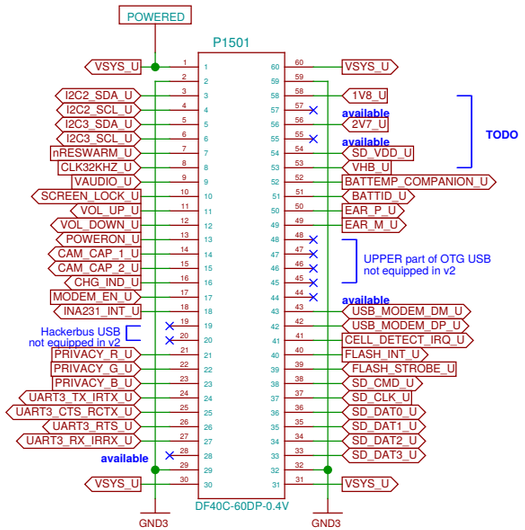
IR send/receive logic

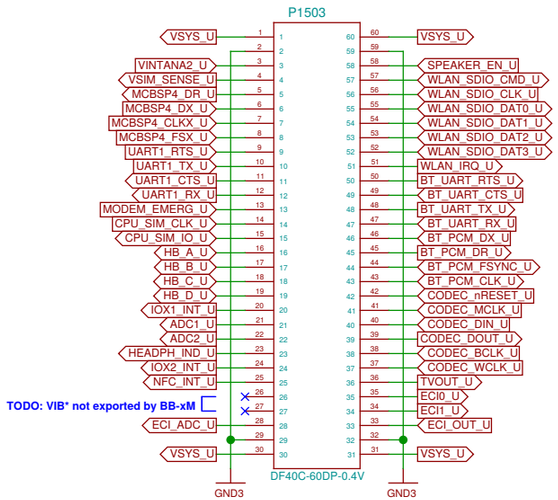


TODO: update D1401 footprint

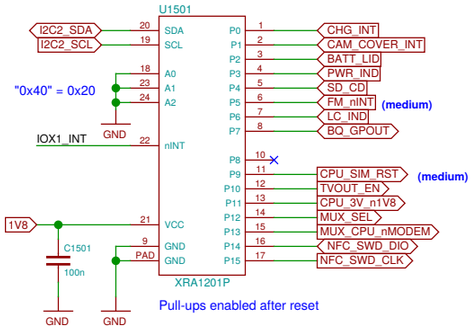
Sheet: /Infrared/ File: ir.sch		
Title: Infrared		
Size: A3	Date: 2016-11-18 15:48:54	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 14/25

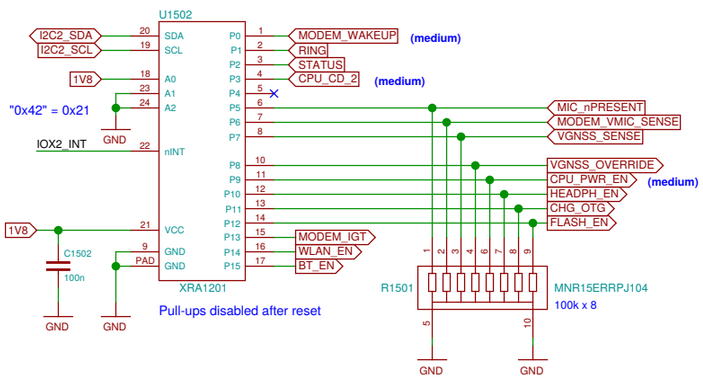
This is just the collection of signals we have.
Assignment can still change, e.g., to improve layout.

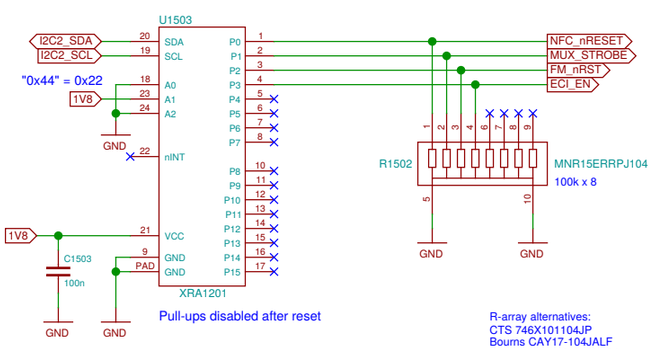




IO expanders (on LOWER)

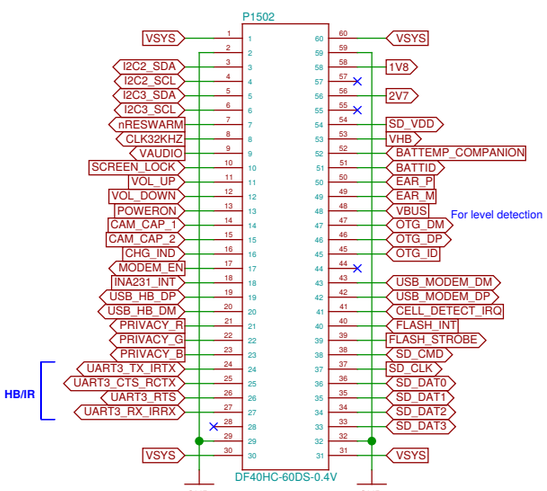


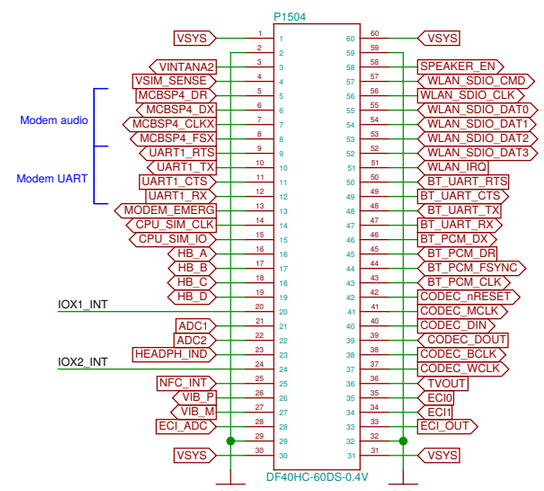




UPPER

LOWER





Current rating per contact: 0.3 A

Sheet: /B2B LOWER-UPPER/
File: b2b.sch

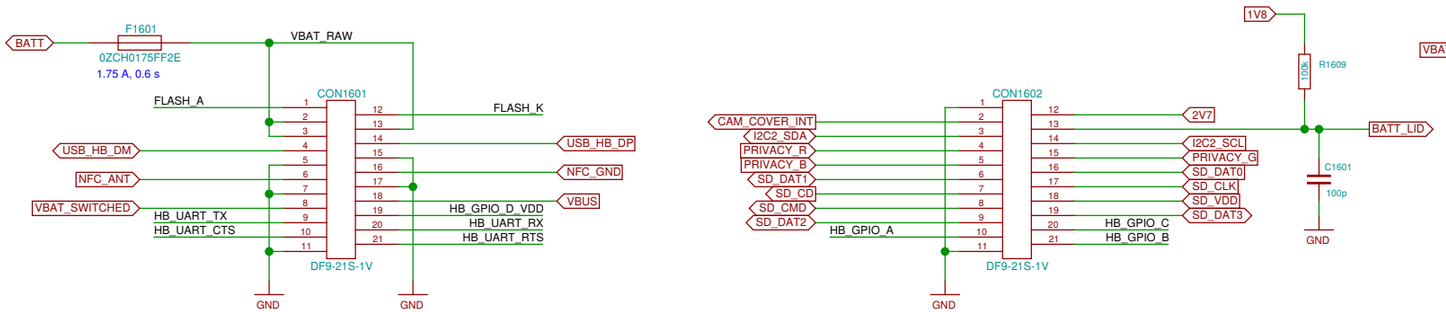
Title: B2B LOWER-UPPER

Size: A3 | Date: 2016-11-22 10:44:58 | Rev:

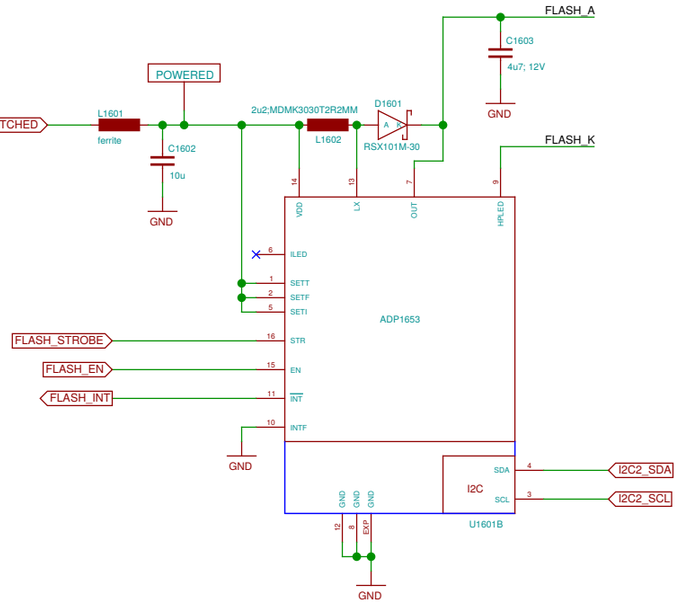
Plotted by eeshow e90e812+ 20161120-16:10Z | Id: 15/25

LOWER-BOB Interconnect (LOWER side)

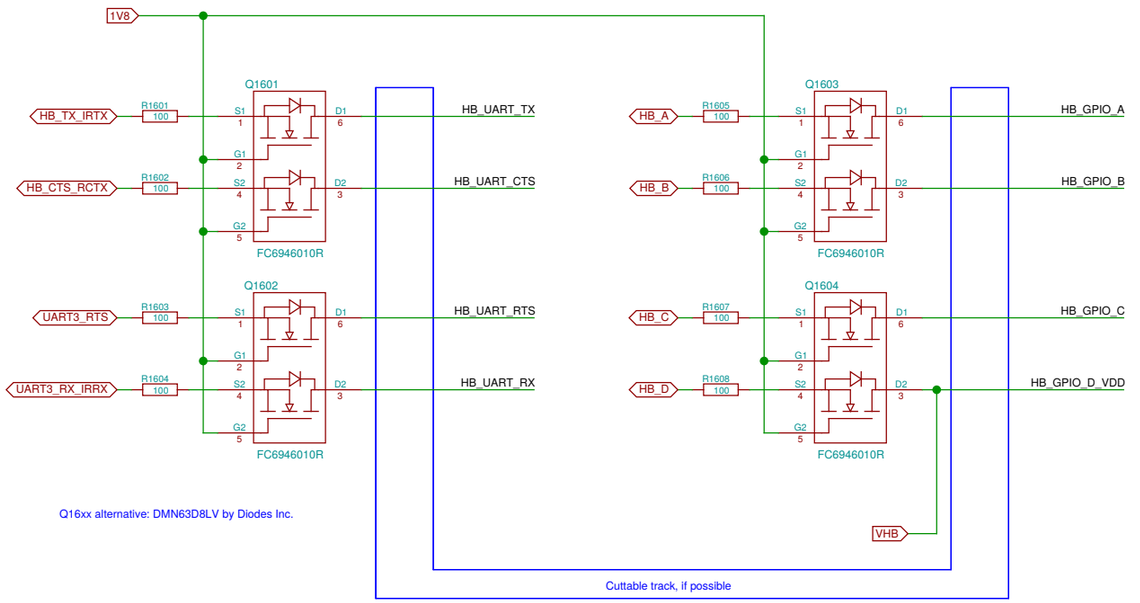
Defined in the Hackerbus specification, http://neo900.org/stuff/papers/hb.pdf



Flash/Torch



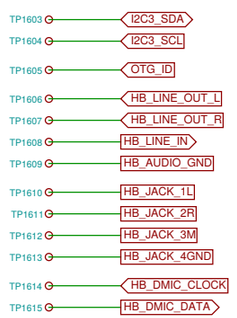
Level shifters for Hackerbus GPIO and UART



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.



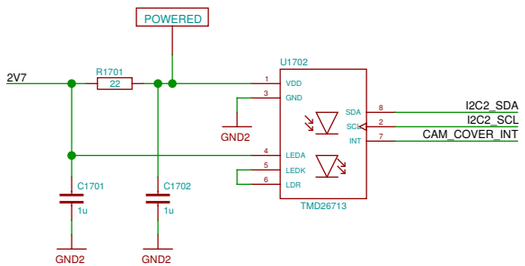
Sheet: /Hackerbus/
File: hb.sch

Title: Hackerbus

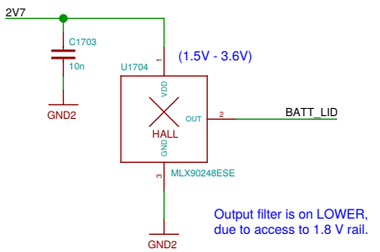
Size: A3 | Date: 2016-11-22 00:28:59 | Rev:

Plotted by eeshow e90e812+ 20161120-16:10Z | Id: 16/25

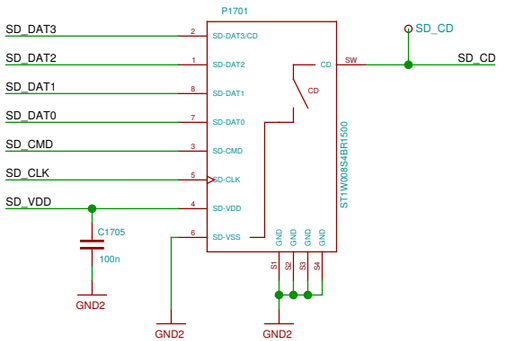
Camera Cover detect



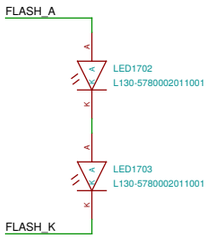
Battery Cover detect



Memory card holder

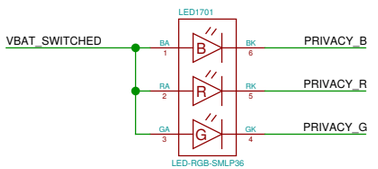


Camera flash



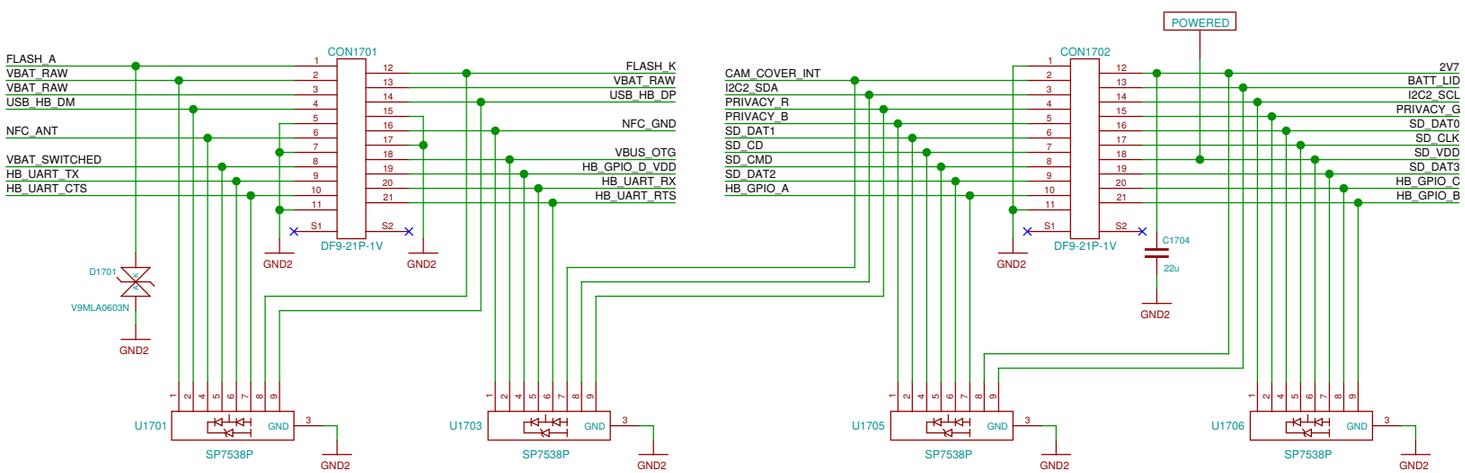
Camera lens plate

Privacy LED

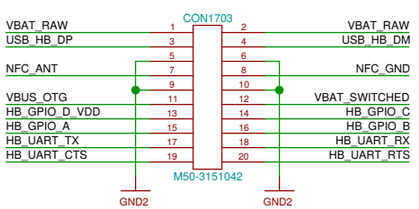


LOWER-BOB Interconnect (BOB side)

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



Hackerbus

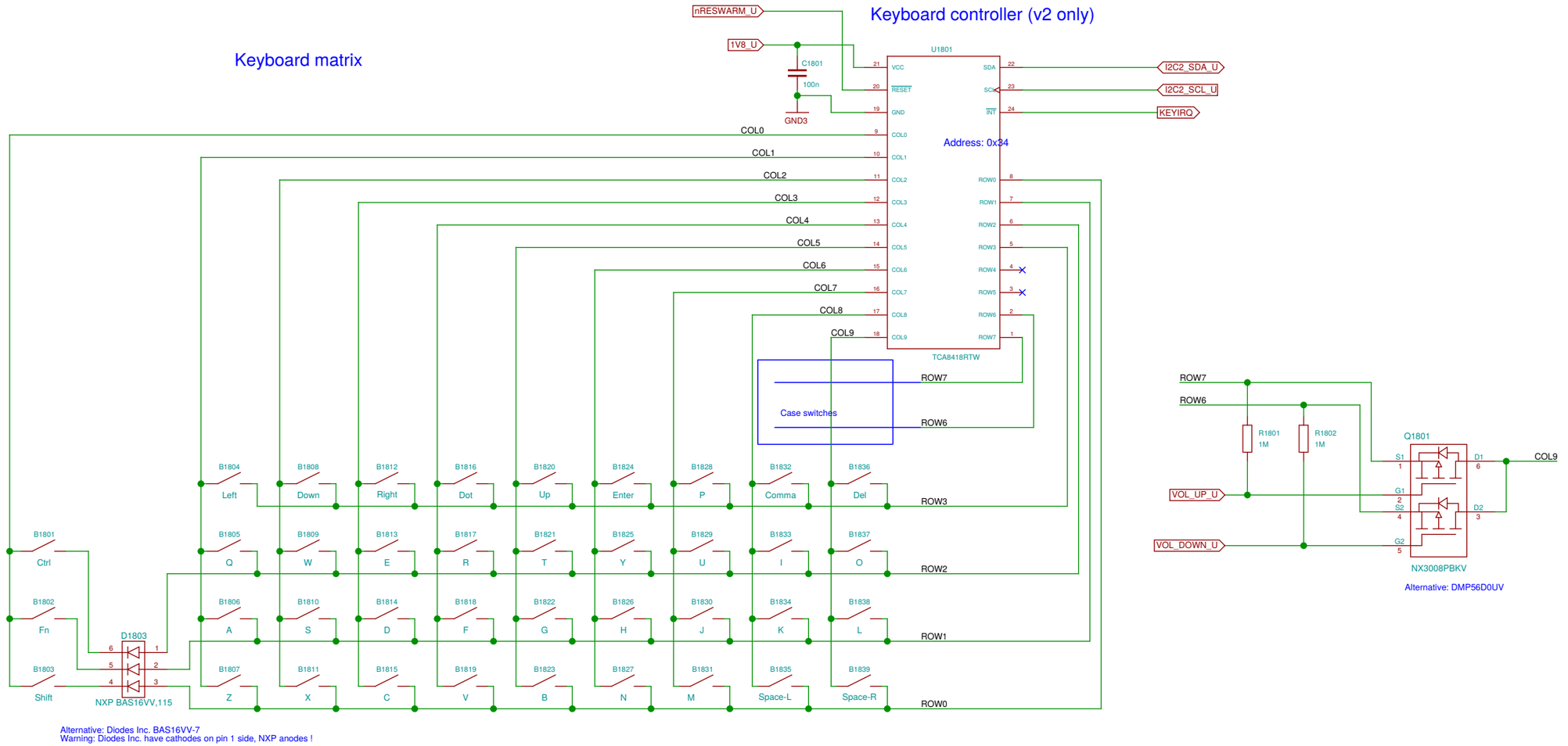


ESD pin assignment is only indicative.
Actual assignment to be defined by layout.

Sheet: /uSD Breakout Board/ File: bob.sch		
Title: uSD Breakout Board		
Size: A3	Date: 2016-11-20 14:27:47	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 17/25

Keyboard matrix

Keyboard controller (v2 only)



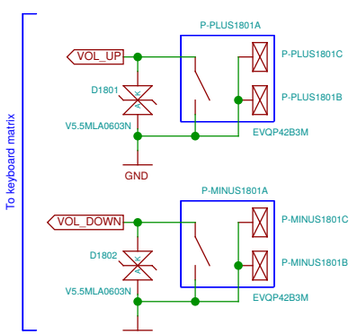
Alternative: Diodes Inc. BAS16VV-7
Warning: Diodes Inc. have cathodes on pin 1 side, NXP anodes !

Alternative: DMP56D0UV

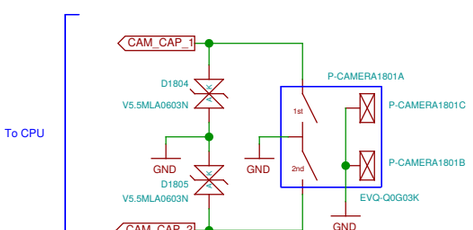
UPPER

LOWER

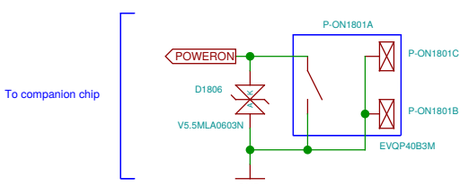
Volume



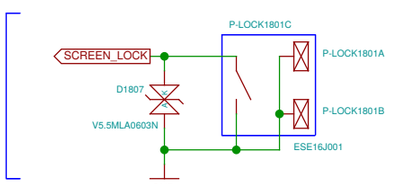
Camera trigger



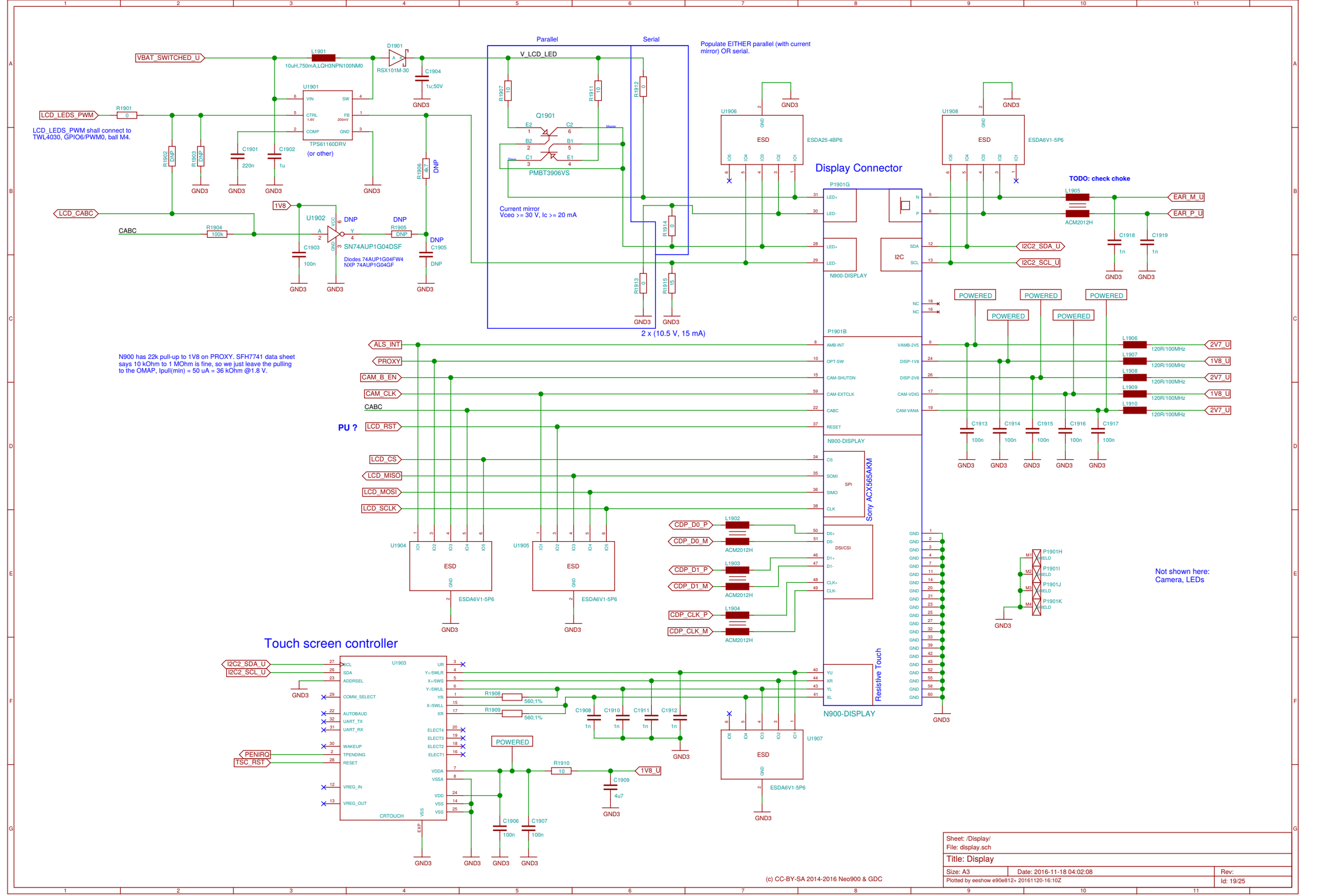
On-off

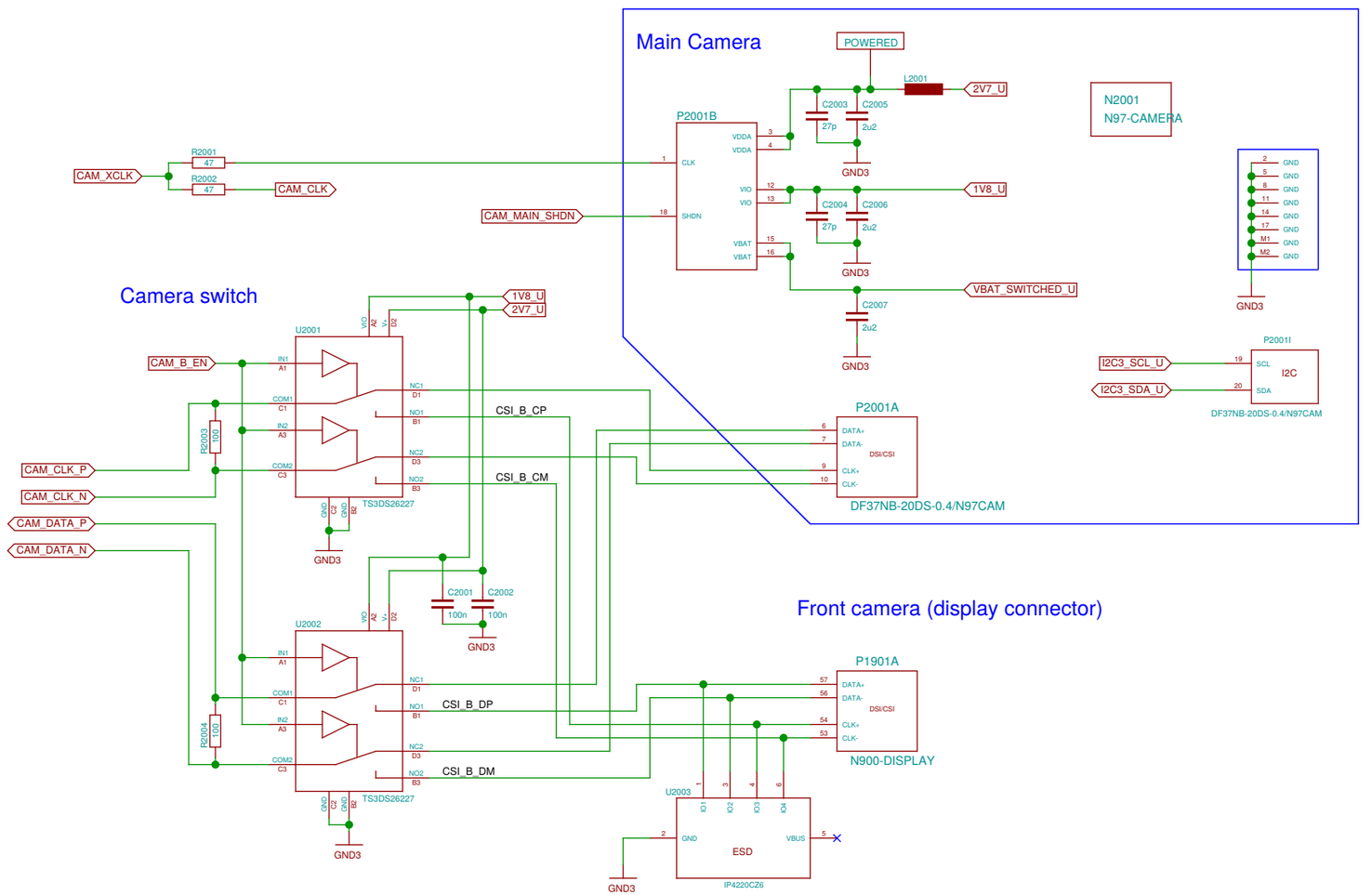


Lock switch



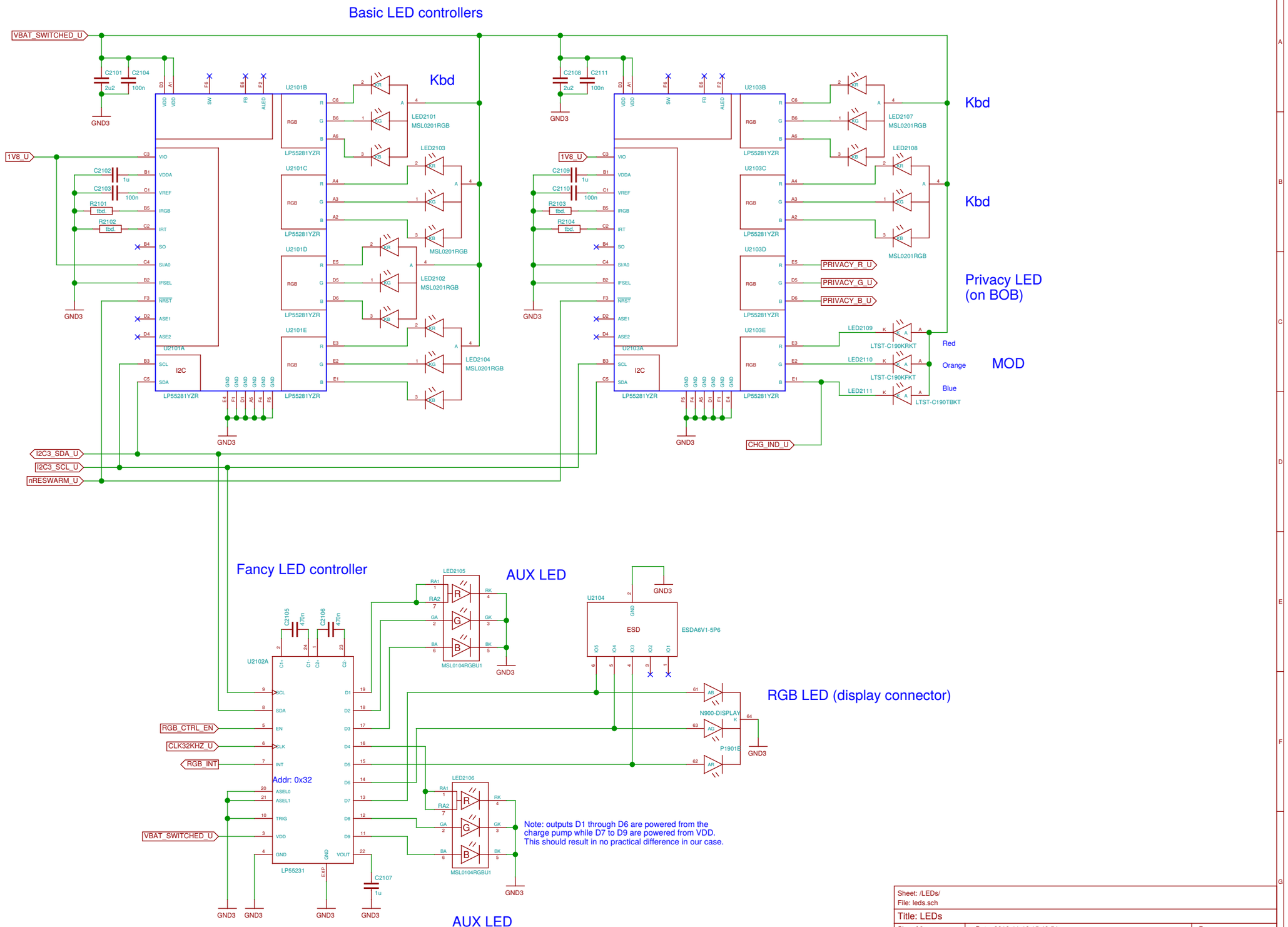
Sheet: /Keypad and buttons/ File: keys.sch		
Title: Keypad and buttons		
Size: A3	Date: 2016-11-18 15:48:54	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 18/25


Parallel
Serial
Populate EITHER parallel (with current mirror) OR serial.
VBAT_SWITCHED_U
L1901
10uH,750mA,LQH3NPN100NM0
D1901
RSX101M-30
C1904
1u;50V
U1901
TPS61160DRV
(or other)
LCD_LEDS_PWM
R1901
LCD_LEDS_PWM shall connect to TWL4030, GPIO6/PWM0, ball M4.
V_LCD_LED
R1907
R1911
R1912
Q1901
PMBT3906VS
Current mirror
Vceo >= 30 V, Ic >= 20 mA
R1914
R1913
R1915
2 x (10.5 V, 15 mA)
U1906
ESDA25-4BP6
U1908
ESDA6V1-5P6
Display Connector
P1901G
N900-DISPLAY
I2C
I2C2_SDA_U
I2C2_SCL_U
TODO: check choke
L1905
ACM2012H
EAR_M_U
EAR_P_U
C1918
C1919
LCD_CABC
CABC
R1904
100k
U1902
SN74AUP1G04DSF
Diodes 74AUP1G04FW4
NXP 74AUP1G04GF
1V8
C1903
C1905
POWERED
P1901B
N900-DISPLAY
Sony ACX565AKM
L1906
L1907
L1908
L1909
L1910
120R/100MHz
2V7_U
1V8_U
C1913
C1914
C1915
C1916
C1917
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.
PU ?
ALS_INT
PROXY
CAM_B_EN
CAM_CLK
CABC
LCD_RST
LCD_CS
LCD_MISO
LCD_MOSI
LCD_SCLK
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
Not shown here:
Camera, LEDs
P1901H
P1901I
P1901J
P1901K
Touch screen controller
U1903
CRTOUCH
I2C2_SDA_U
I2C2_SCL_U
PENIRQ
TSC_RST
R1908
R1909
560;1%
C1908
C1910
C1911
C1912
R1910
10
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: 2016-11-18 04:02:08
Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z
Id: 19/25



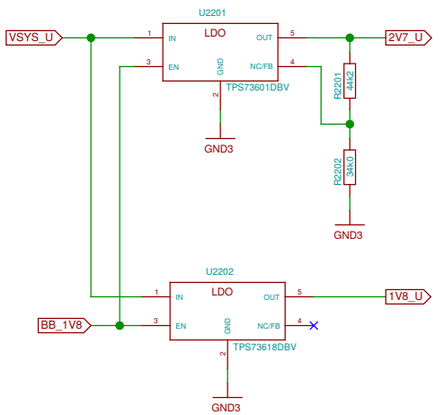
(c) CC-BY-SA 2014-2016 Neo900 & GDC

Sheet: /Cameras/ File: cams.sch		
Title: Cameras		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 20/25



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

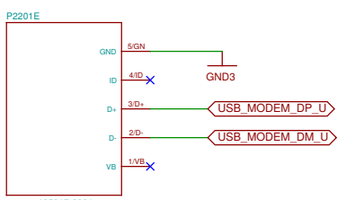
simple capless 400mA LDO for TPS65950 substitute
(only for prototype)



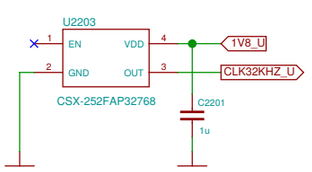
TODO: use REGEN ?

Modem USB

connect to BB
by some Micro-USB cable

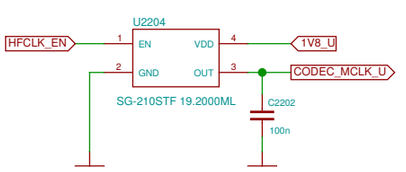


32 kHz clock



Alternative: OYKTGLJANF-0.032768

19.2 MHz clock

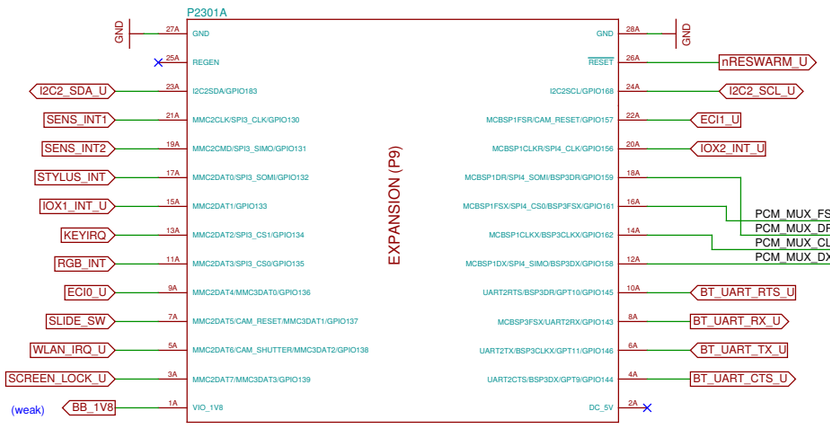


Alternative: KC2520B19.2000C1GE00

Sheet: /Adaptation (v2 only)/		
File: v2.sch		
Title: Adaptation (v2 only)		
Size: A3	Date: 2016-11-18 15:49:26	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 22/25

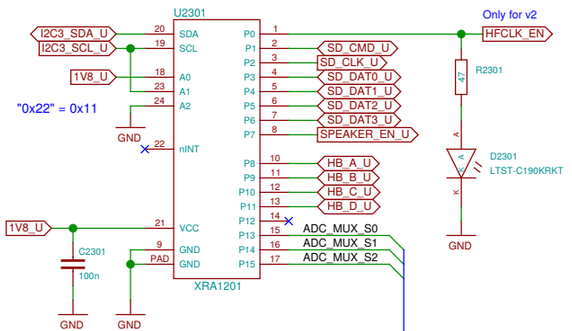
TODO: update pin names in footprint

BB-xM Main Expansion Header (P9, 7.24)

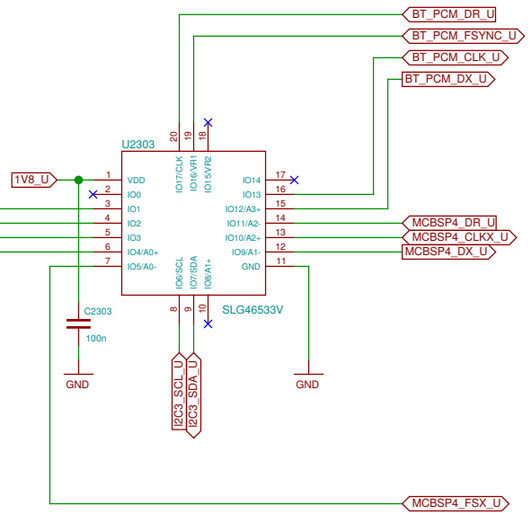


Same part, as "breakaway" strip (72 positions):
435-40-272-00-160000

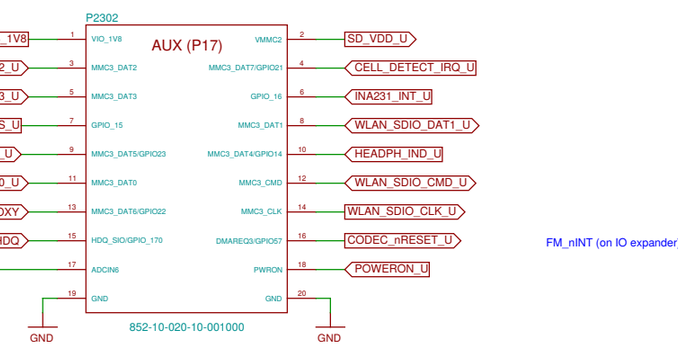
IO expander



PCM switch



Auxiliary Expansion Header (P17, 7.26)



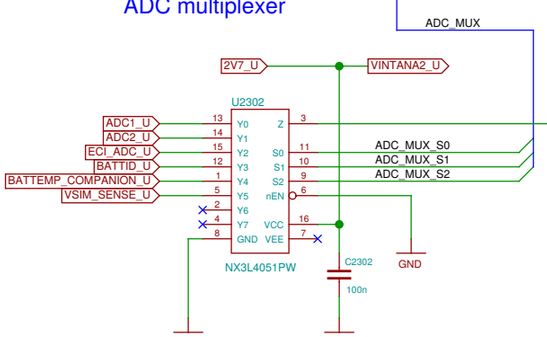
No UART3_RTS on BB-xM, using GPIO

No UART3_CTS on BB-xM, using GPIO

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

FM_nINT (on IO expander)

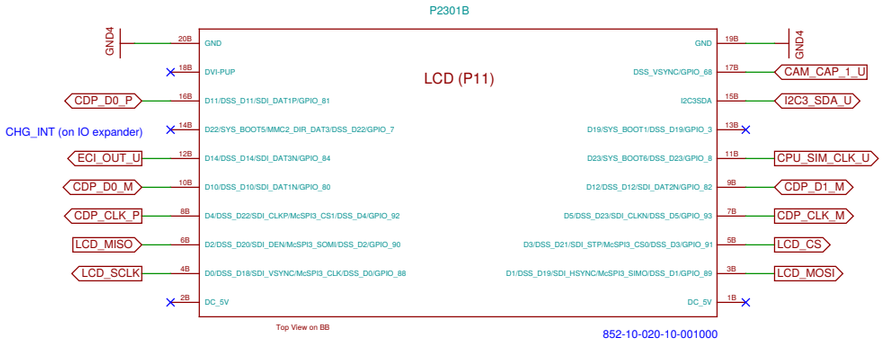
ADC multiplexer



Sheet: /BB-xM Adapter (CPU)/ File: bbcpu.sch		
Title: BB-xM Adapter (CPU)		
Size: A3	Date: 2016-11-18 15:48:54	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 23/25

TODO: update pin names in footprint

P11 (7.25)

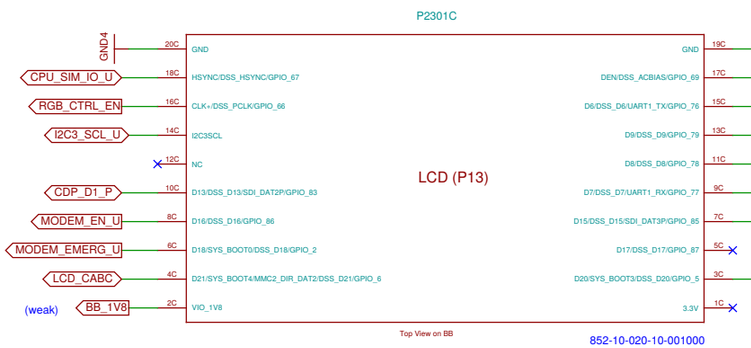


(N900 compatible GPIO)

852-10-020-10-001000

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

P13 (7.25)



(N900 compatible GPIO)

Modem

IR/Hackerbus

IR/Hackerbus

Modem

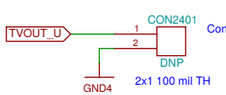
WLAN_EN (on IO expander)

(GPIO reassigned in Neo900)

852-10-020-10-001000

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

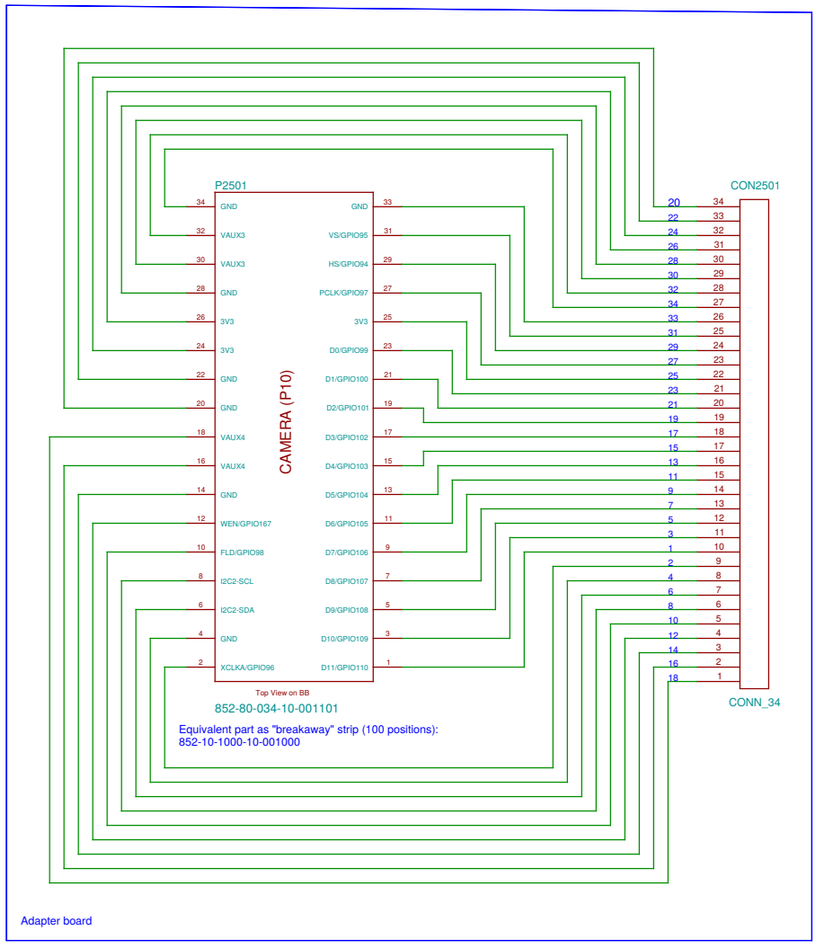
P4 (7.19)

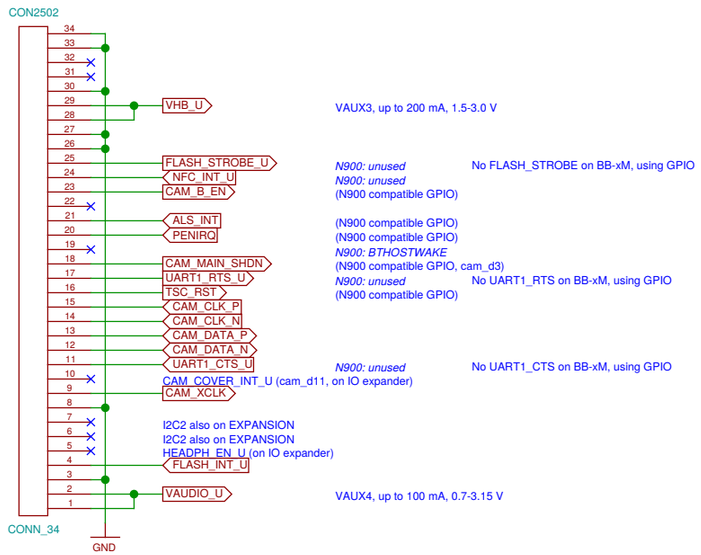


Connect to BB-xM P4.3 (S-Video connector)

Sheet: /BB-xM Adapter (DISP)/		
File: bbdisp.sch		
Title: BB-xM Adapter (DISP)		
Size: A3	Date: 2016-11-18 03:38:20	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 24/25

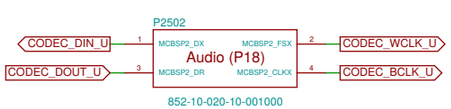
Processor Camera Port Interface (P10, 7.20.3)





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

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	Rev:
Plotted by eeshow e90e812+ 20161120-16:10Z		Id: 25/25