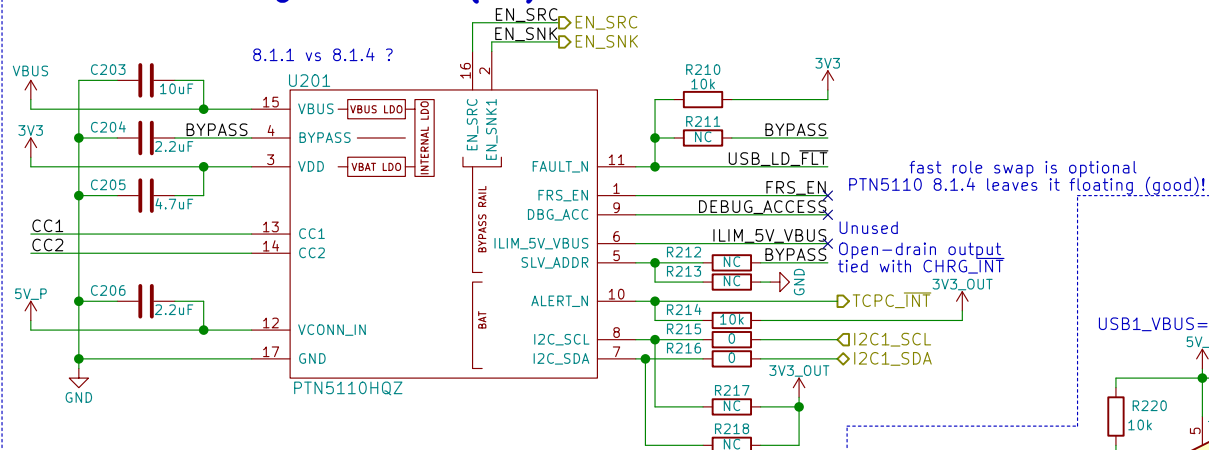
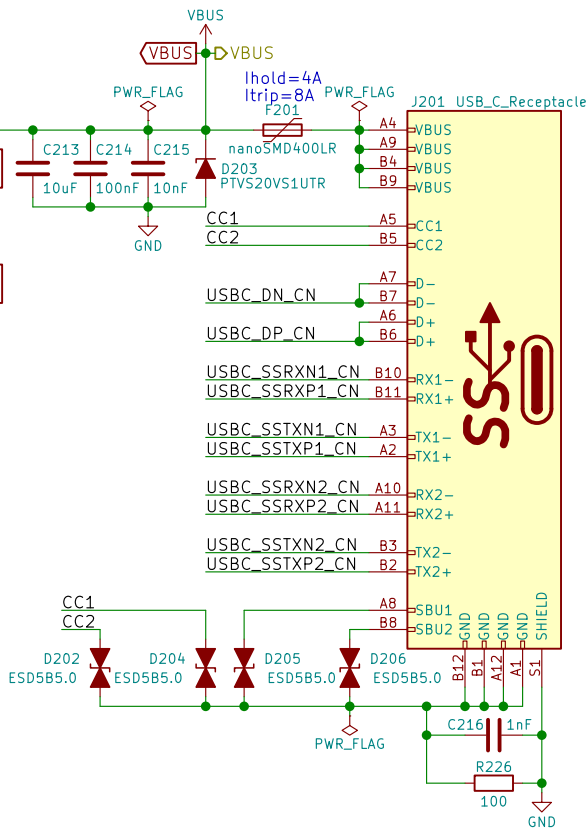
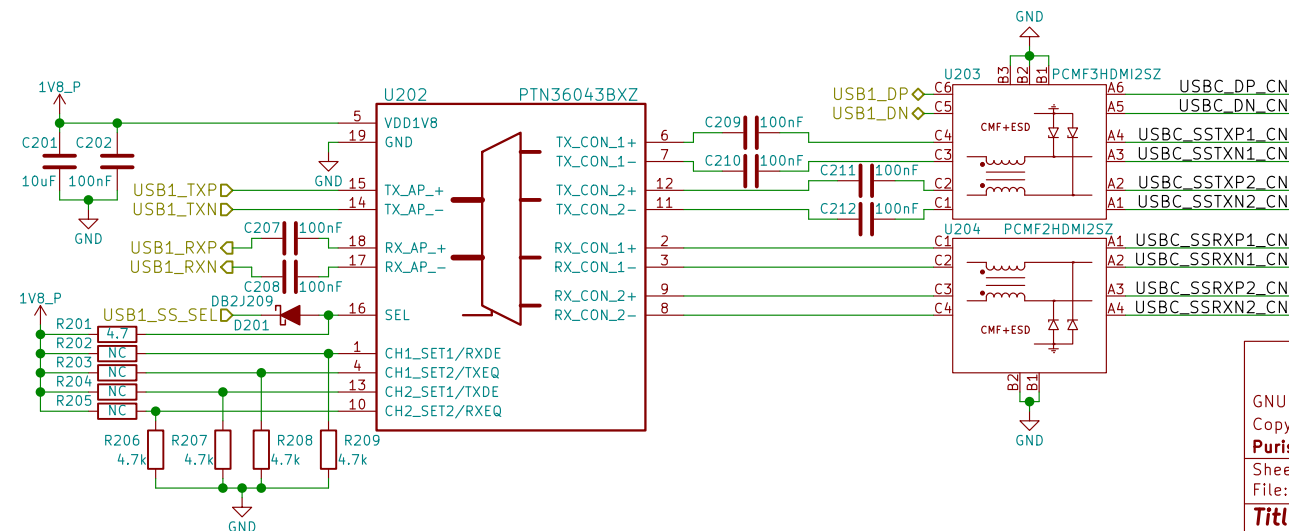


# USB-C Config Channel (CC) and PD Role Controller



"Under dead battery operation, PTN5110 applies voltage clamps to both CC pins so that the system may receive power as a Sink. To support platforms with buck-boost configuration, PTN5110 asserts EN\_SNK1 pin based on validity of VBUS voltage (facilitates 5 V VBUS sinking)."

Initialize as the UFP (device)  
read CC\_STATUS to determine role  
use Host Negotiation Protocol (HNP)  
to become an DFP (host)  
∴ USB ID is effectively unused  
⇒ Legacy devices would "wait" for this  
⇒ If CC initializes as UFP then no HNP needed



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Purism SPC

Sheet: /USB-C/

File: usb-c.sch

Title: USB Type C

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 2/23

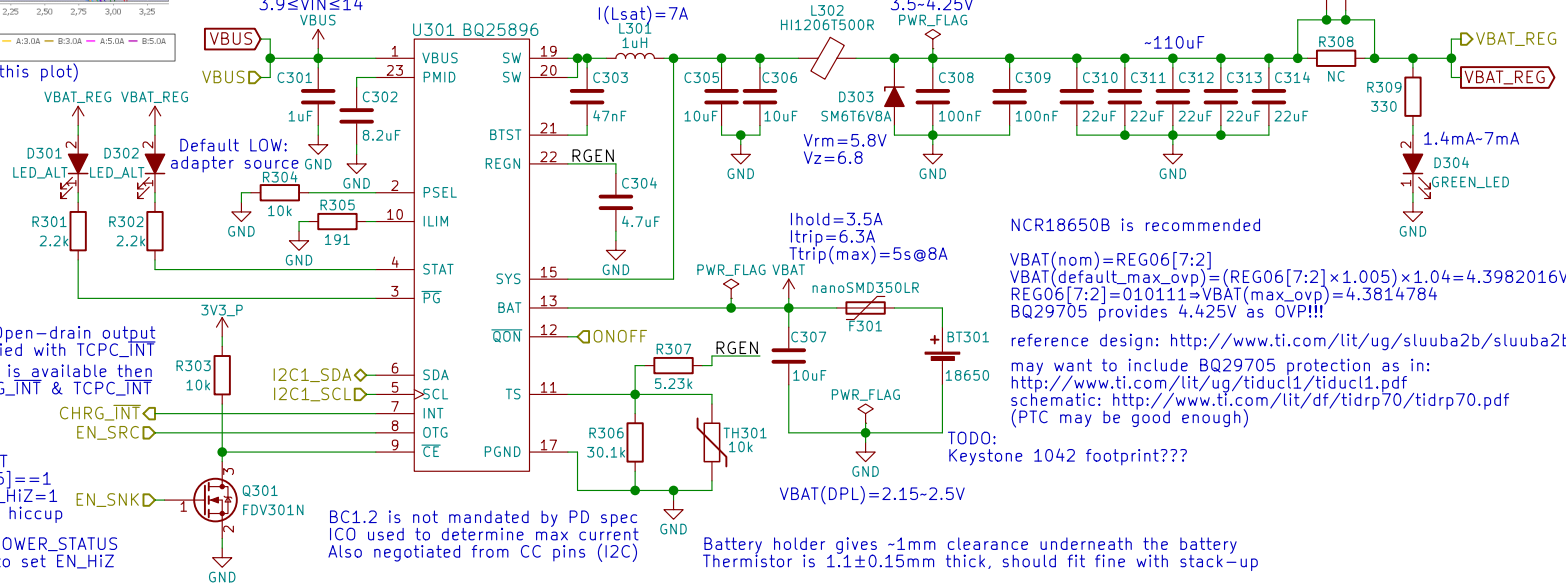


(interpret RSOC% based on this plot)

use AUTO\_DPDM\_EN  
to auto-detect IINLIM

$1.658 \leq I_{LIM} \leq 2.063$   
 $I_{LIM}(nom) \approx 1.859$   
 $3.9 \leq V_{IN} \leq 14$

# Battery Charge Controller



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Purism SPC

Sheet: /Battery/

File: battery.sch

Title: Battery

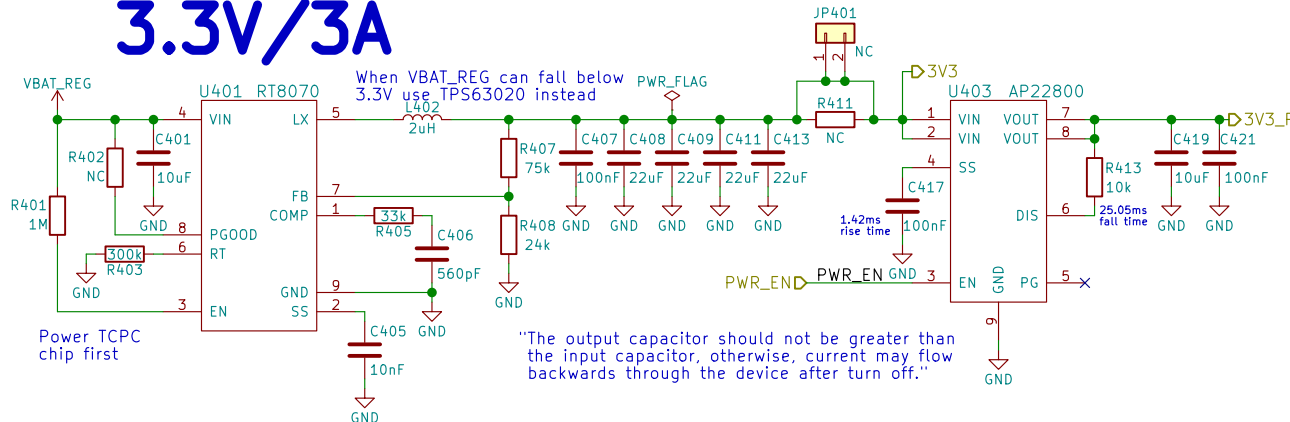
Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.7

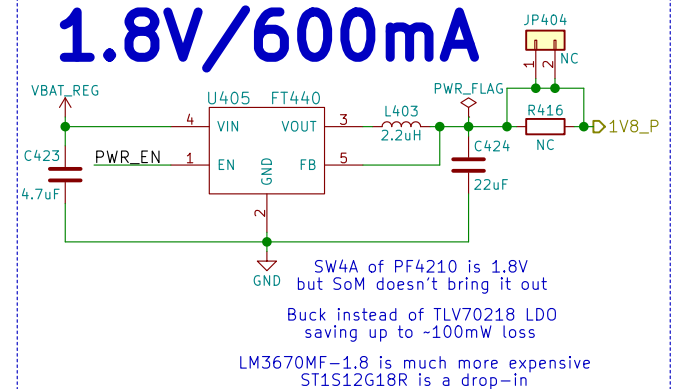
Rev: v0.1.0

Id: 3/23

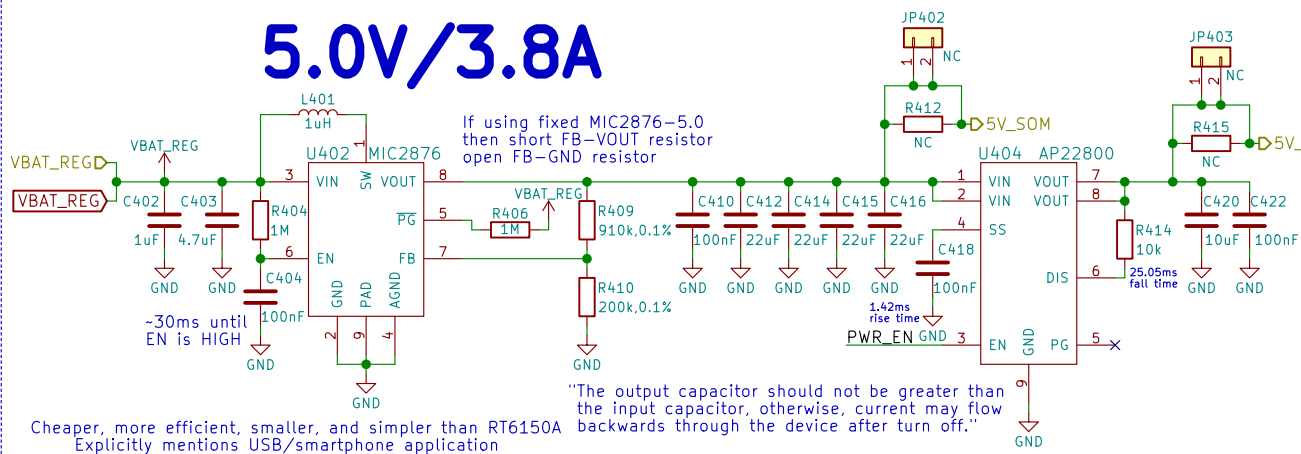
## 3.3V/3A



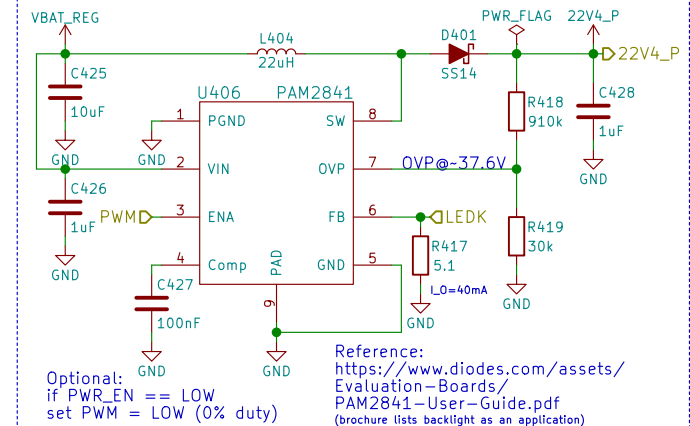
## 1.8V/600mA



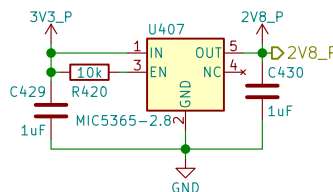
## 5.0V/3.8A



## 22.4V/40mA



TODO:  
add parallel 100nF bulk caps!  
& spread all over the power plane



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**Purism SPC**

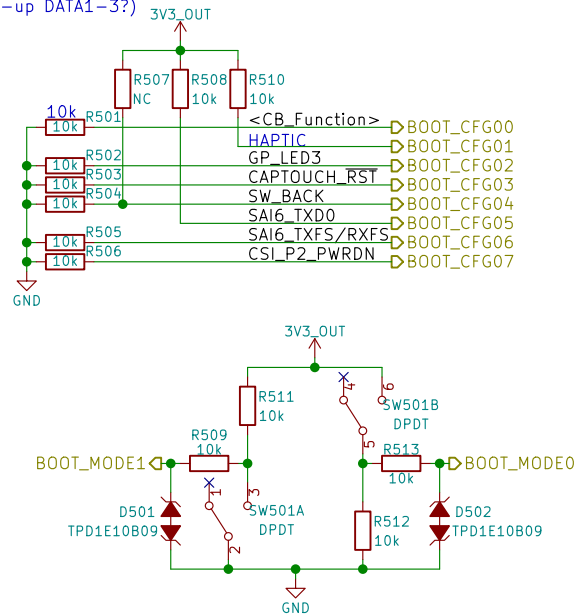
Sheet: /Power/  
File: power.sch

### Title: Power

Size: A4 Date: 2018-05-23  
KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0  
Id: 4/23

BOOT\_CFG04:      BOOT\_CFG05:  
0 - 1-bit SD bus    1 - 8-bit eMMC bus  
1 - 4-bit SD bus    0 - 1-bit eMMC bus  
(pull-up DATA1-3?)

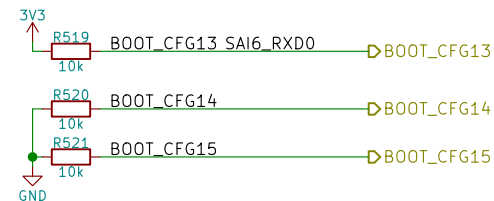
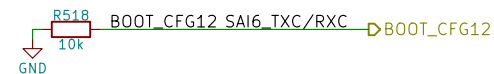
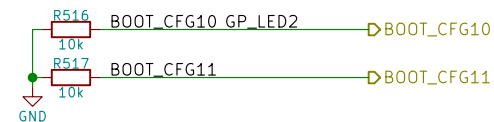
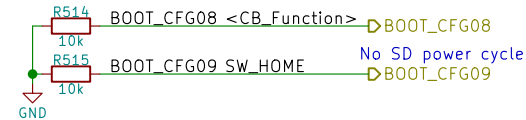


2->1: eMMC  
2->3: USB (Serial Downloader)

BOOT_MODE[1:0]	Boot Type
00	Boot From Fuses
01	Serial Downloader
10	Internal Boot
11	Reserved

Only eMMC

BOOT_CFG[14:12]		Boot device			
001		SD/eSD			
010		MMC/eMMC			
011		NAND			
Fuse	Config	Definition	GPIO <sup>1</sup>	Shipped value	Settings
BOOT_CFG[11:10]	OEM	USDHC port selection	Yes	00	00 - USDHC-1 01 - USDHC-2 10 - USDHC-3 else - reserved



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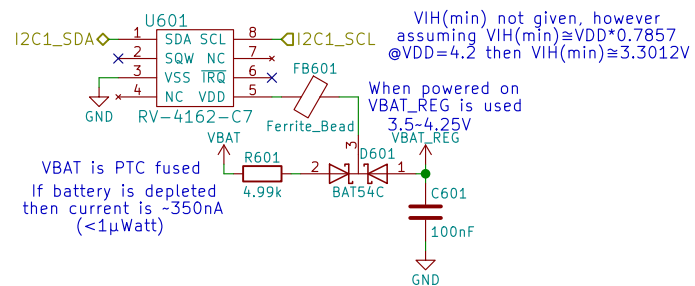
**Purism SPC**

Sheet: /Boot Config/  
File: boot.sch

**Title: Boot Configuration**

Size: A4      Date: 2018-05-23  
KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**  
Id: 5/23



GNU GPLv3  
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**Purism SPC**

Sheet: /RTC/

File: rtc.sch

**Title: RTC**

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**

Id: 6/23



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**Purism SPC**

Sheet: /UART Debug/  
File: uart.sch

**Title: UART Debug**

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**

Id: 7/23



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**Purism SPC**  
Sheet: /JTAG/  
File: jtag.sch

**Title: JTAG**

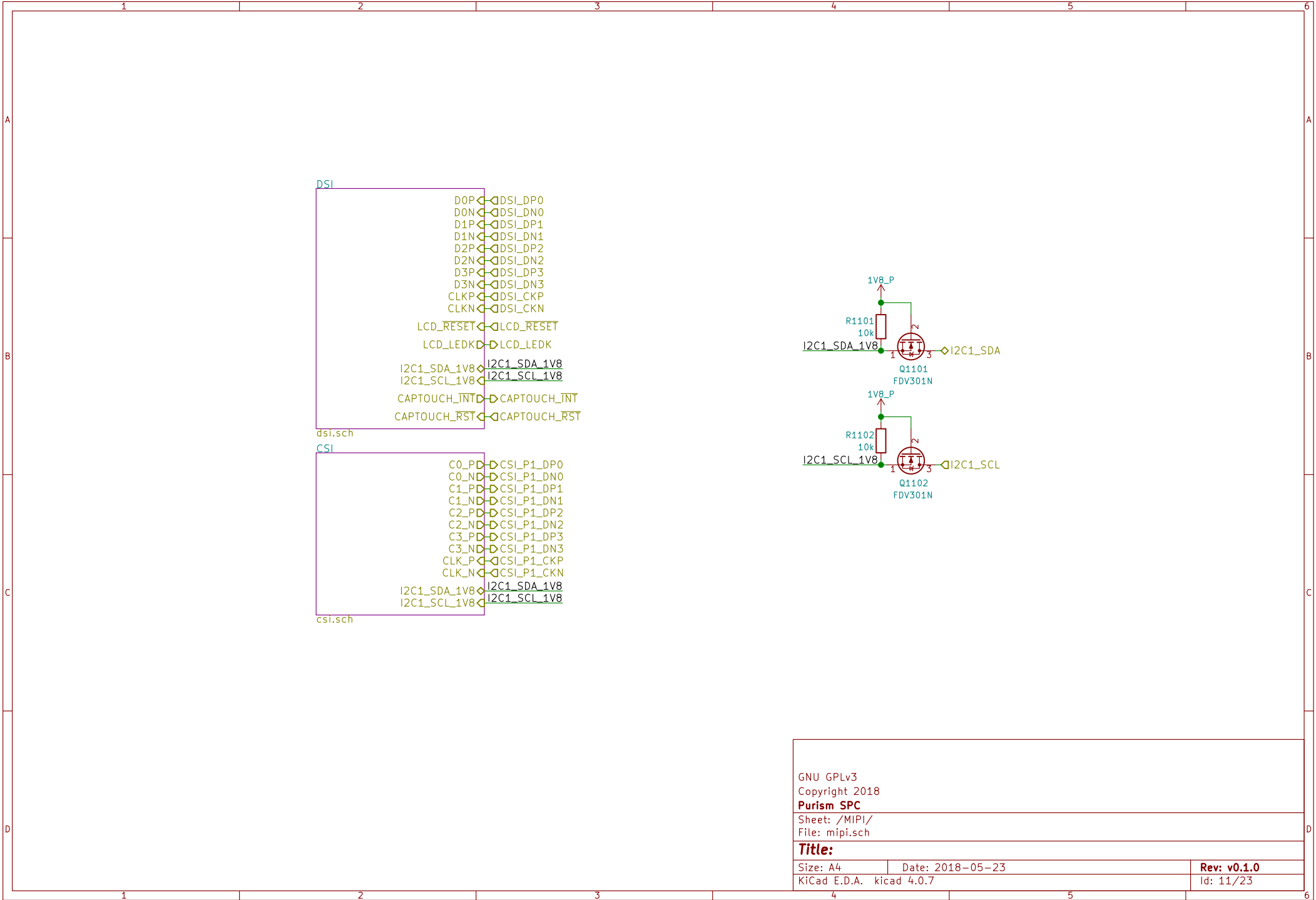
Size: A4  
Date: 2018-05-23  
KiCad E.D.A. kicad 4.0.7

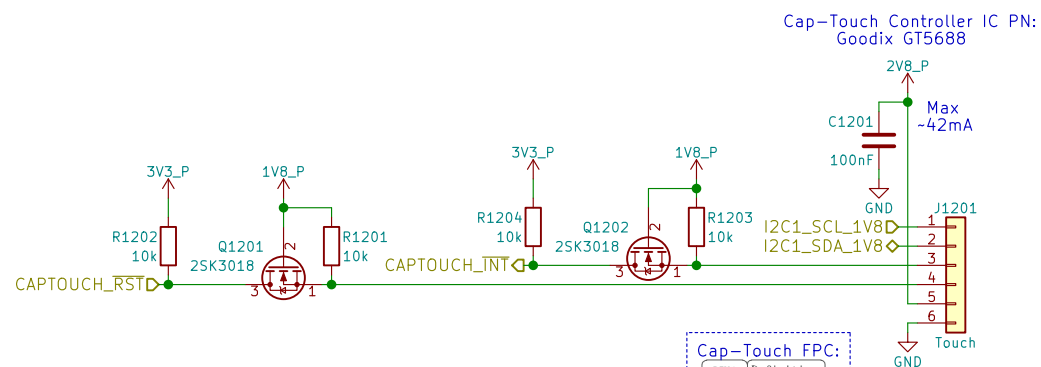
**Rev: v0.1.0**  
Id: 8/23



Id: 9/23

Id: 10/23





Cap-Touch FPC:

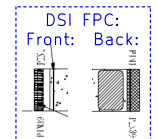
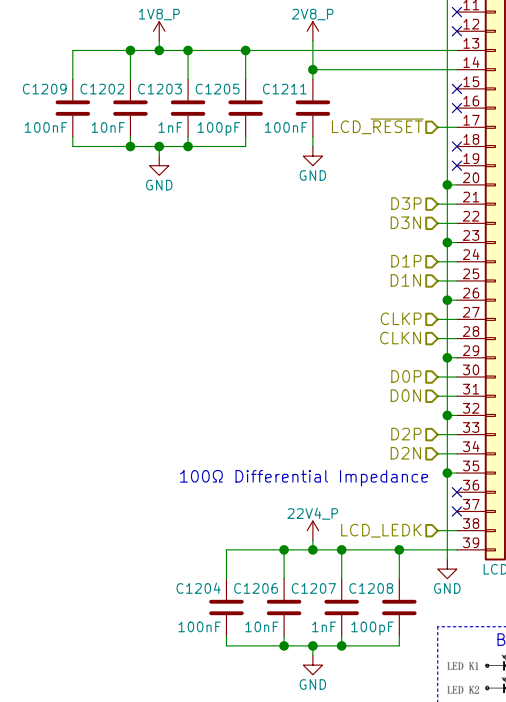
Pin#	Definition
1	SCL
2	SDA
3	INT
4	RESET
5	VDD2.85
6	GND

Front: Back:

TODO:  
Verify if INT and RESET are active-LOW

LCD PN:  
Shenzhen Jinghong Electronics Co., Ltd.  
JH057N00900

TODO:  
ensure power sequence is satisfied  
based on the display used  
TODO: low power state signal??



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**Purism SPC**

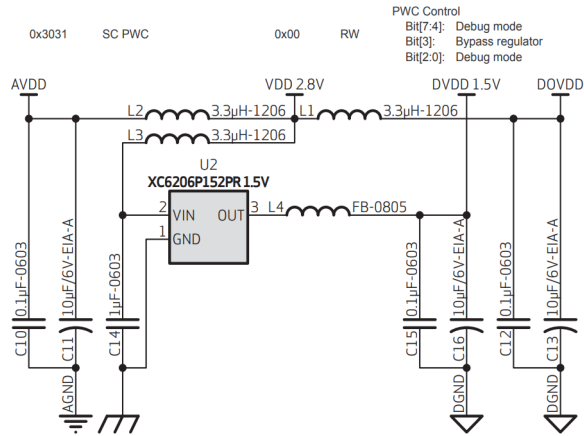
Sheet: /MIPI/DSI/  
File: dsi.sch

**Title: MIPI DSI**

Size: A4 Date: 2018-05-23  
KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**  
Id: 12/23

### Using Internal DVDD 1.5V Regulator:



### 2.7 POWER UP SEQUENCE

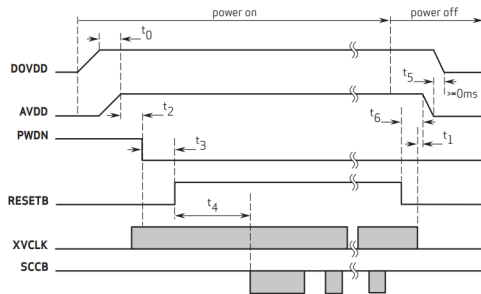
Based on the system power configuration (1.8V or 2.8V for I/O power, using external DVDD or internal DVDD, requiring access to the I2C during power up period or not), the power up sequence will differ. If 1.8V is used for I/O power, using the internal DVDD is preferred. If 2.8V is used for I/O power, due to a high voltage drop at the internal DVDD regulator, there is a potential heat issue. Hence, for a 2.8V power system, OmniVision recommends using an external DVDD source. Due to the higher power down current when using an external DVDD source, OmniVision strongly recommends cutting off all powers, including the external DVDD, when the sensor is not in use in the case of 2.8V I/O and external DVDD.

#### 2.7.1 POWER UP WITH INTERNAL DVDD

For powering up with the internal DVDD and I2C access during the power ON period, the following conditions must occur:

1. when DOVDD and AVDD are turned ON, make sure DOVDD becomes stable before AVDD becomes stable
2. PWDN is active high with an asynchronized design (does not need clock)
3. PWDN pin tied to digital ground if it is not controlled.
4. if PWDN pin is controlled as below, for PWDN to go low, power must first become stable (AVDD to PWDN  $\geq 5$  ms)
5. RESETB is active low with an asynchronized design
6. master clock XVCLK should provide at least 1 ms before host accesses the sensor's registers
7. host can access I2C bus (if shared) during entire period. 20ms after RESETB goes high, host can access the sensor's registers to initialize sensor

figure 2-3 power up timing with internal DVDD



- note  $t_0 \geq 0$ ms, delay from DOVDD stable to AVDD stable, it is recommended to power up AVDD shortly after DOVDD has been powered up
- $t_1 \geq 0$ ms, delay from XVCLK off to AVDD off
- $t_2 \geq 5$ ms, delay from AVDD stable to sensor power up stable, PWDN can be pulled low after this point. XVCLK can be turned on after power on
- $t_3 \geq 1$ ms, delay from sensor power up stable to RESETB pull up
- $t_4 \geq 20$ ms, delay from RESETB pull high to SCCB initialization
- $t_5 \geq 0$ ms, delay from AVDD off to DOVDD off
- $t_6 \geq 0$ ms, delay from RESETB pull low to AVDD off

✕D C0\_P  
✕D C0\_N  
✕D C1\_P  
✕D C1\_N  
✕D C2\_P  
✕D C2\_N  
✕D C3\_P  
✕D C3\_N  
✕D CLK\_P  
✕D CLK\_N  
◇ I2C1\_SDA\_1V8  
◇ I2C1\_SCL\_1V8

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**Purism SPC**

Sheet: /MIPI/CSI/  
File: csi.sch

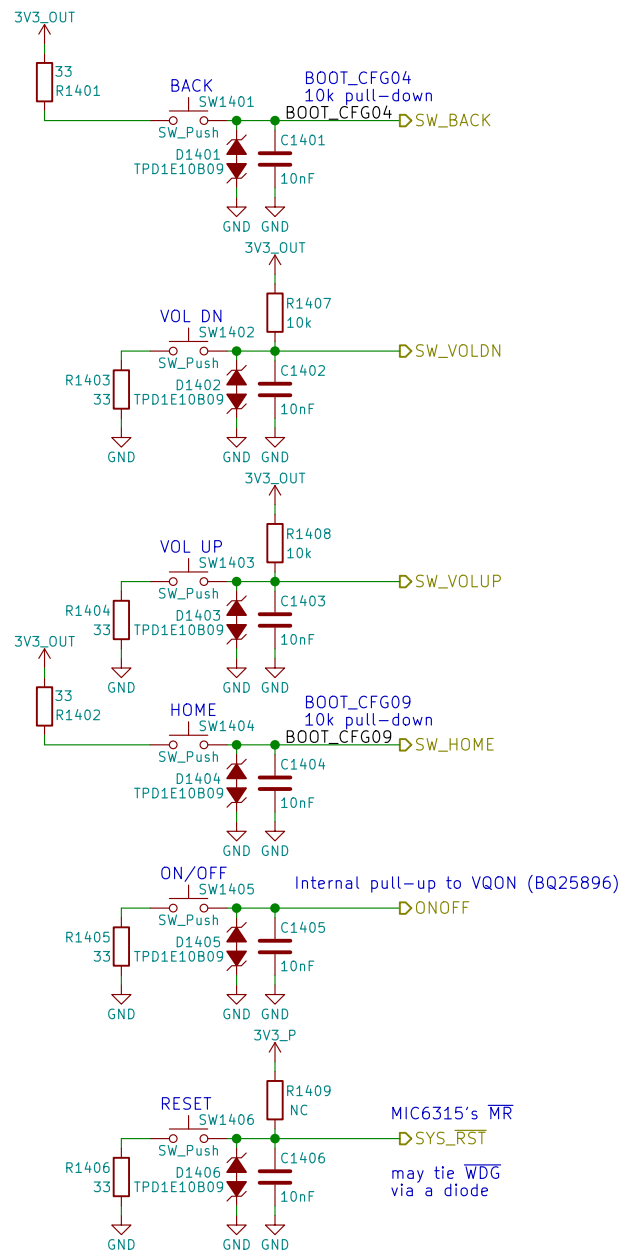
**Title:**

Size: A4 Date: 2018-05-23

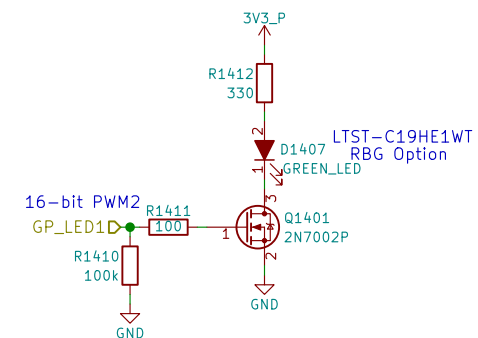
KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**

Id: 13/23



Use PWM2\_PWMSAR to set the compare value (duty cycle)  
 Use PWM2\_PWMCR[15:4] to set the PRESCALER (frequency)  
 Use PWM2\_PWMPR to set the top of the counter (frequency)



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**Purism SPC**

Sheet: /Buttons & LED/  
 File: buttons\_led.sch

**Title: Buttons & LED**

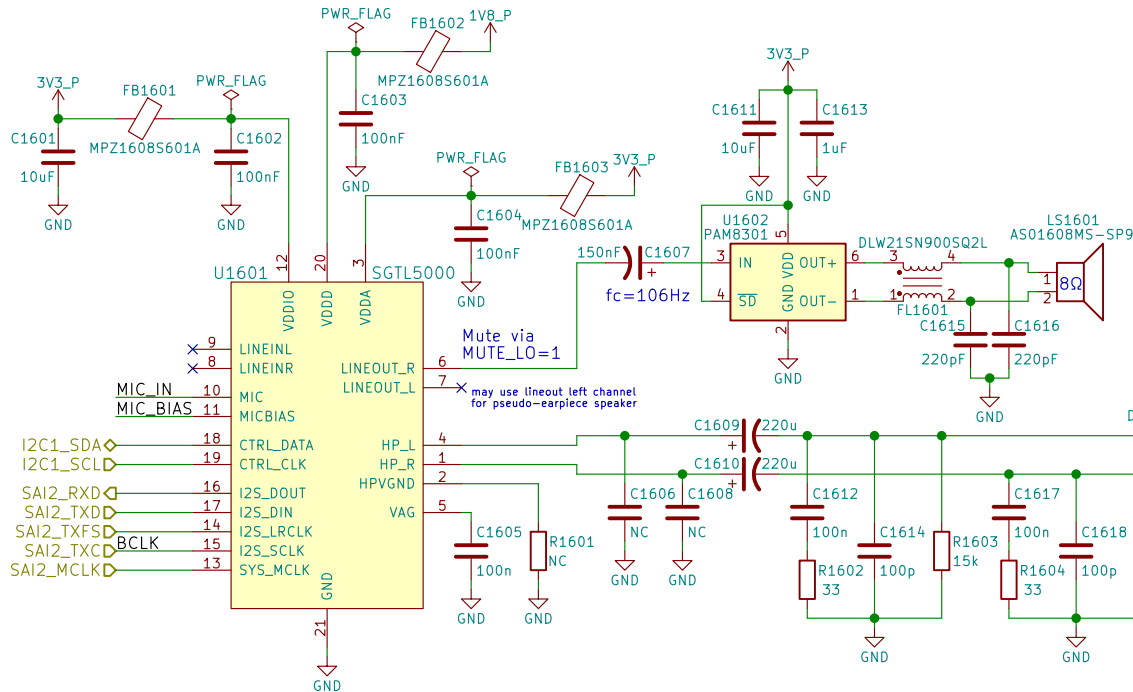
Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**

Id: 14/23





Reference:  
[http://www.52rd.com/S\\_txt/2011\\_3/TXT26685.htm](http://www.52rd.com/S_txt/2011_3/TXT26685.htm)  
<http://www.sengpielaudio.com/calculator-transferfactor.htm>  
<https://electronics.stackexchange.com/questions/31442/how-can-i-switch-this-audio-jack-using-its-own-mechanical-switches-without-crc>  
 (Nitt6 does the same)  
 +Zener diode to protect against ranges outside of -0.9V to 3.3V

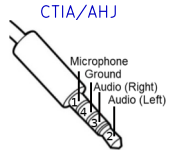
dB specs in datasheet is a unit of power gain (not dBu or VU)  
 with respect to the DAC's unattenuated output

"HP Output - 62.5mW max, 1.02kHz sine into 16Ω load at 3.3 V"  
 $\Rightarrow (1V)^2 / (16\Omega) = 62.5mW$   
 $\therefore V_{rms} = 1V \Rightarrow V_p(\text{amplitude}) = 1.414V$   
 $\therefore I_{rms}(\text{max}) = 62.5mA$

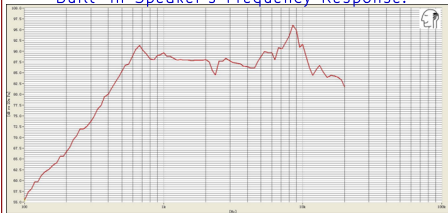
If HP\_DET is HIGH for >100ms then HPs are present

S/E button on earbud headsets  
 shorts the mic key function

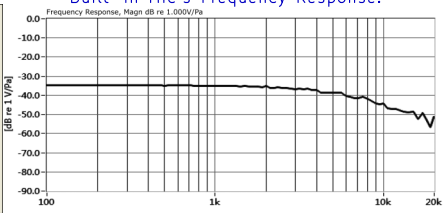
Could use FSA8008 to detect mic



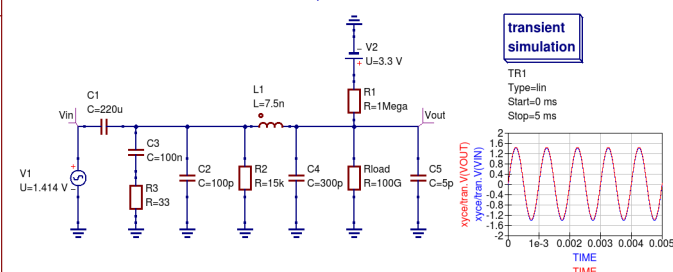
Built-In Speaker's Frequency Response:



Built-In Mic's Frequency Response:

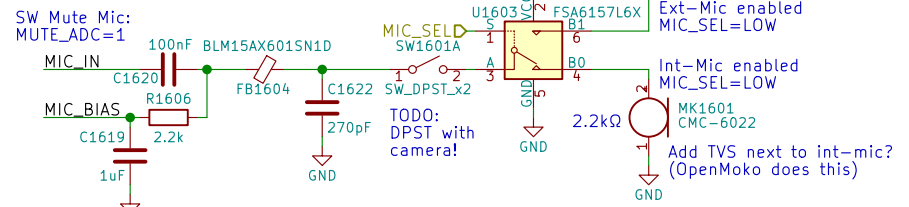
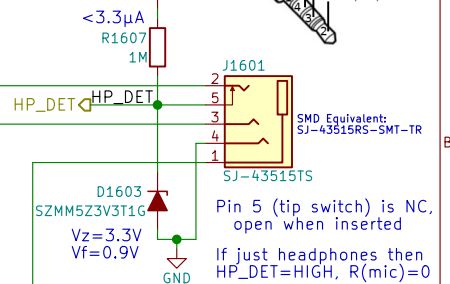


Simulation of HP\_DET @ 1kHz output  
 without HP jack inserted:



#### LCR Measurements:

Earbud Microphone: @1kHz	Headset Speaker: @1kHz	Earbud Speaker: @1kHz
LS = 3.844mH	LS = 244.4uH	LS = 25.2uH
LP = 15.757H	LP = 141.99mH	LP = 311.0mH
CS = 6.583uF	CS = 103.6uF	CS = 1.0mF
CP = 1612.8pF	CP = 178.77nF	CP = 81.95nF
RS = 1.5465kOhms	RS = 36.86Ohms	RS = 17.030Ohms
RP = 1.5478kOhms	RP = 36.86Ohms	RP = 17.034Ohms
θ = -0.8deg	θ = -2.3deg	θ = 0.5deg



-37dB=14.1254mV/Pa  
 $\therefore$  mic produces 14.1254mVrms when exposed to a  
 1kHz tone of 94dB-SPL at the capsule  
 (or 19.98mV amplitude)  
 $\Rightarrow$  40dB gain would produce -2V amplitude (4Vpp, clipping)  
 30dB gain would produce -0.632V amplitude (1.264Vpp)  
 38.33dB gain would yield 3.3Vpp

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**Purism SPC**

Sheet: /Audio/  
 File: audio.sch

**Title: Audio**

Size: A4 Date: 2018-05-23

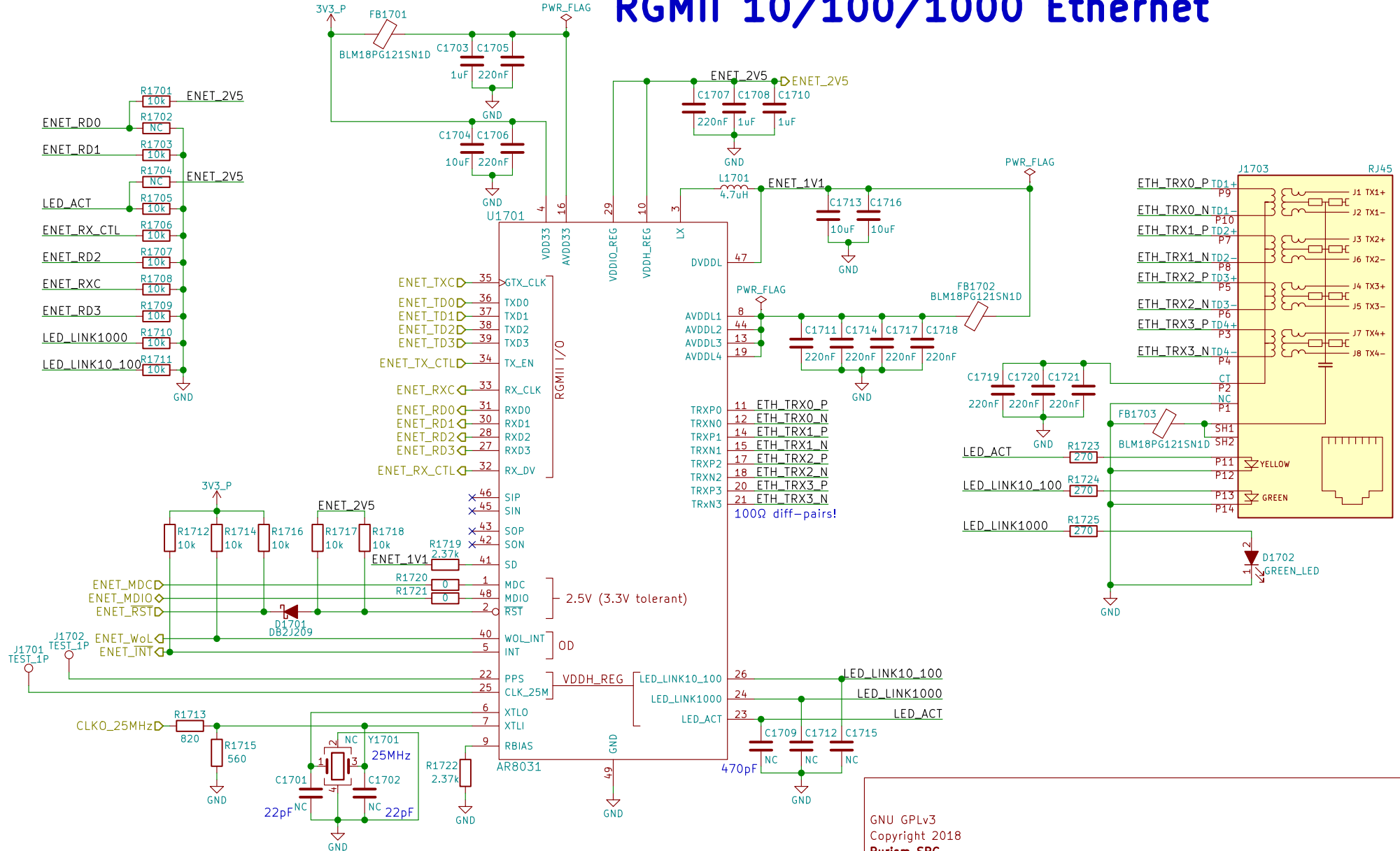
KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**

Id: 16/23



# RGMII 10/100/1000 Ethernet



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**Purism SPC**

Sheet: /Ethernet/

File: ethernet.sch

**Title: Ethernet**

Size: A4

Date: 2018-05-23

KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**

Id: 17/23



USB\_WLAN\_DP

USB\_WLAN\_DN

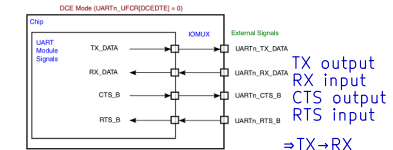
[illegible]

WIFI\_RSTD DB2J209 VIH=2.31V  
W\_DISABLE1 D1802

RedPine RS9116  
has 100k pull-up to  
3.3V making SDIO\_RST  
~2.55V when HIGH

3V3\_

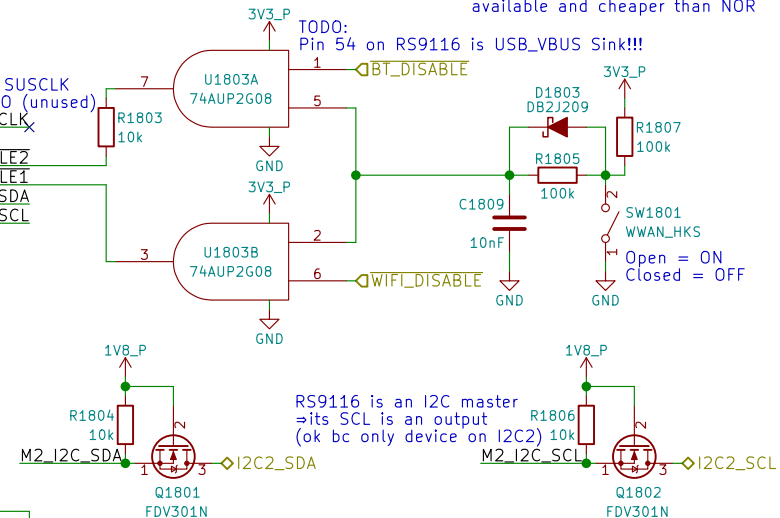
UARTn\_UFCR[DCEDTE]=0 on POR



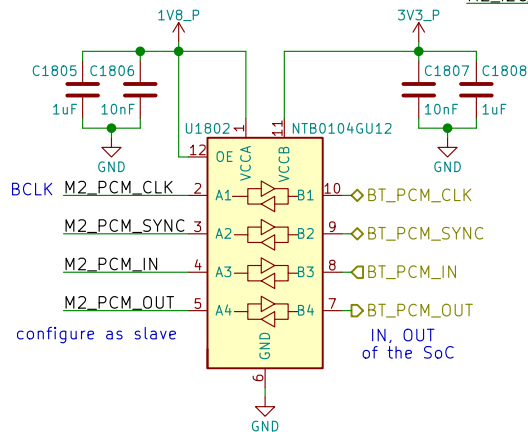
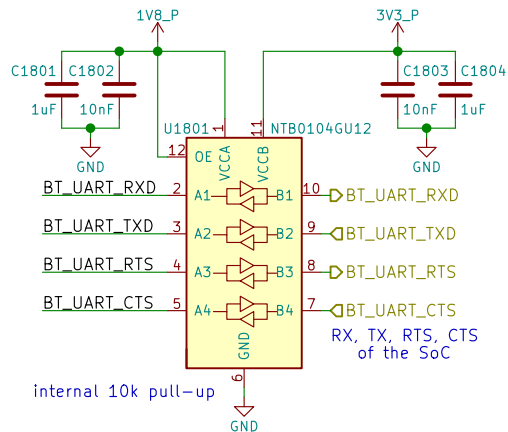
⇒ TX → RX  
RX ← TX  
CTS → CTS  
RTS ← RTS

Note:  
Dual 2-input AND much more  
available and cheaper than NOR

Pin 54 on RS9116 is USB\_VBUS Sink!!!



RS9116 is an I2C master  
⇒ its SCL is an output  
(ok bc only device on I2C)



### Purism SPC

**Title: WLAN+BT M.2**

Size: A4	Date: 3
----------	---------

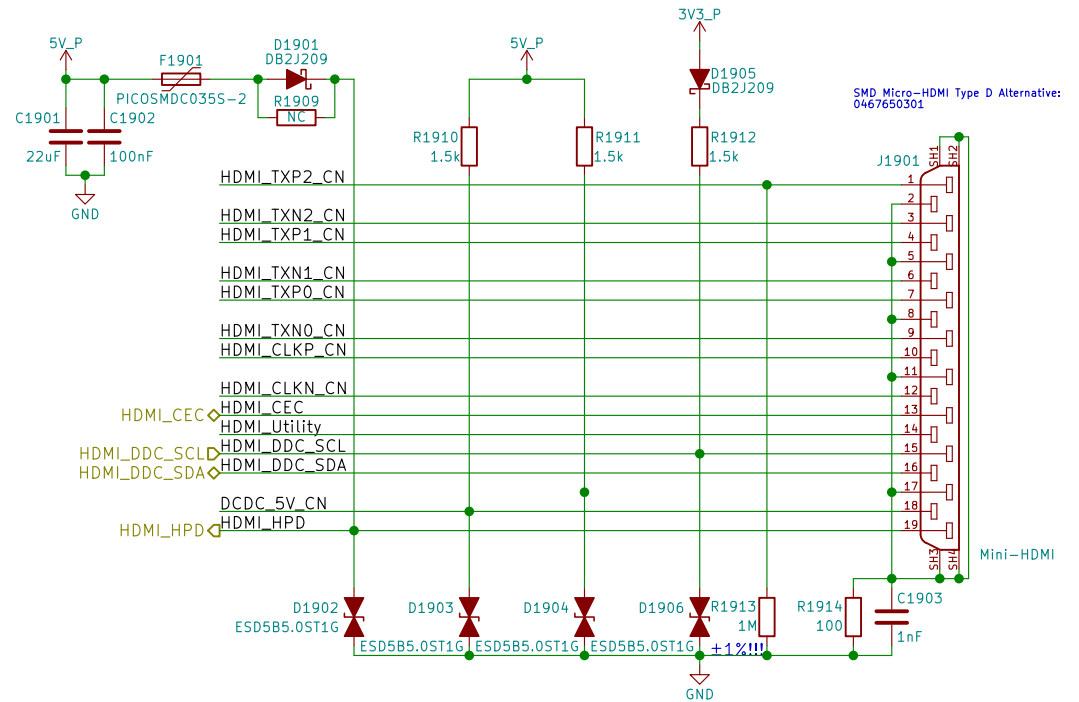
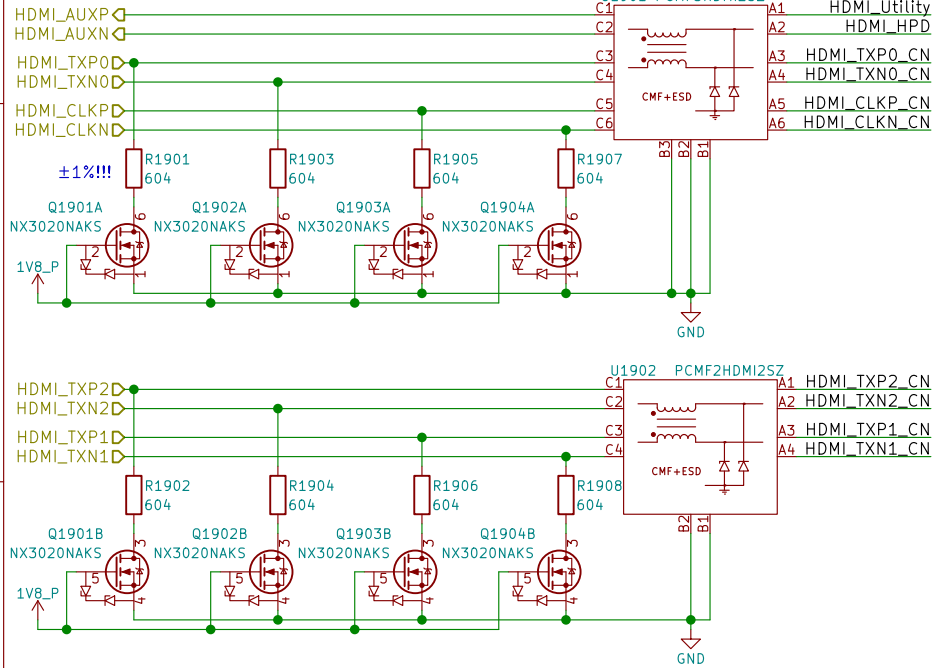
Rev: v0.1.0

Id: 18/23

HD3SS460 can be used for DP over USB-C

Layout Note:  
May need swap some signals  
due to micro-HDMI pinout diff  
depending on pin location/routing

100Ω diff pairs



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**Purism SPC**

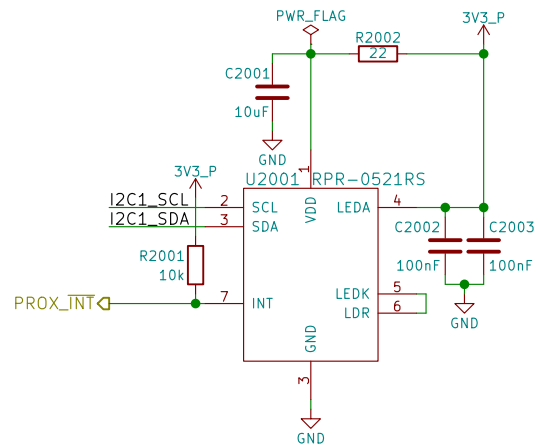
Sheet: /HDMI/  
File: hdmi.sch

**Title: HDMI**

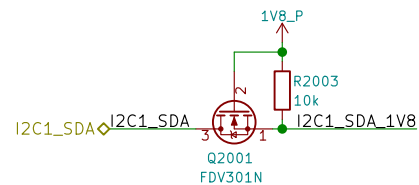
Size: A4 Date: 2018-05-23  
KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**  
Id: 19/23

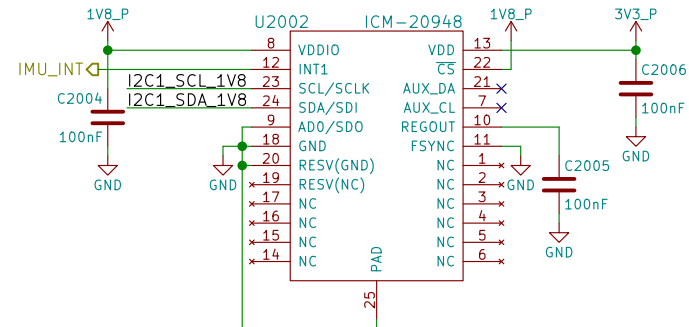
## Proximity & Ambient Light



Reference:  
<http://www.rohm.com/web/global/sensor-shield-support/ps-als-sensor>



## 9-Axis IMU



Reference:  
<https://store.invensense.com/datasheets/invensense/AN-IVS-0001EVB-00%20v1%202.pdf>

AD0 sets the slave address's LSB (110100X)

INT1\_ACTL sets if IMU\_INT is active-high or active-low

"FSYNC - Connect to GND if unused"

I2C's VIH=1.8V

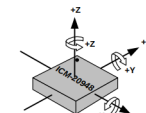


Figure 12. Orientation of Axes of Sensitivity and Polarity of Rotation

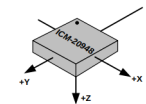


Figure 13. Orientation of Axes of Sensitivity for Magnetometer

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**Purism SPC**

Sheet: /Sensors/  
 File: sensors.sch

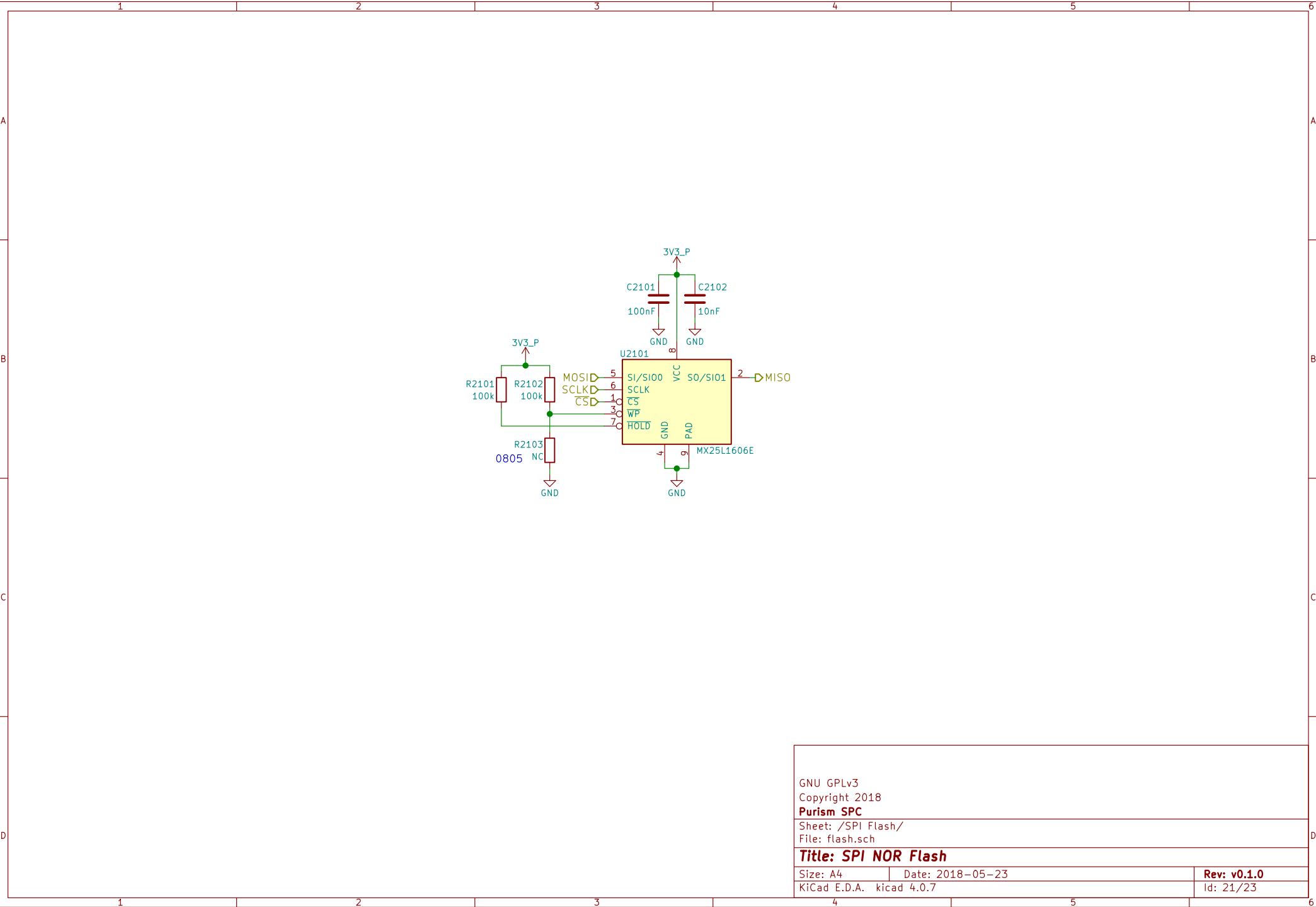
**Title: Sensors**

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.7

**Rev: v0.1.0**

Id: 20/23



GNU GPLv3

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**Purism SPC**

Sheet: /SPI Flash/

File: flash.sch

**Title: SPI NOR Flash**

Size: A4

Date: 2018-05-23

**Rev: v0.1.0**

KiCad E.D.A. kicad 4.0.7

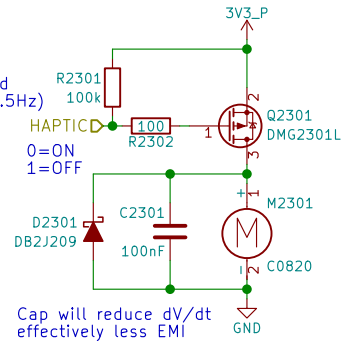
Id: 21/23



Id: 22/23

PWM pins occupied:  
 GPIO1\_I001 - LCD Backlight  
 GPIO1\_I013 - LED  
 GPIO1\_I014 - Ethernet (CLKO\_25MHz)  
 GPIO1\_I015 - CSI (CLKO2)

PWM needed?  
 Only needs to be toggled  
 ON 1 sec, OFF 1 sec (0.5Hz)  
 Can MUX as either  
 GPIO or PWM2  
 swapping with LED



When the motor is off  
 both terminals are at GND

Motor will have wire leads  
 with a 2-pin Molex or JST  
 connector installed (by request)!

Motor Connector:  
[https://lcsc.com/product-detail/1-25T-Connectors\\_1-25T-1-2AW\\_C10832.html](https://lcsc.com/product-detail/1-25T-Connectors_1-25T-1-2AW_C10832.html)  
 Alibaba Alternative Motor:  
[https://www.alibaba.com/product-detail/Coin-motor-vibration-dc-motor-cellphone\\_1994583657.html?spm=a2700.8443308.0.0.5aa13e5f1wxHgs](https://www.alibaba.com/product-detail/Coin-motor-vibration-dc-motor-cellphone_1994583657.html?spm=a2700.8443308.0.0.5aa13e5f1wxHgs)

GNU GPLv3  
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**Purism SPC**

Sheet: /Haptic Motor/  
 File: haptic.sch

**Title: Haptic/Vibration Motor**

Size: A4 Date: 2018-05-23

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