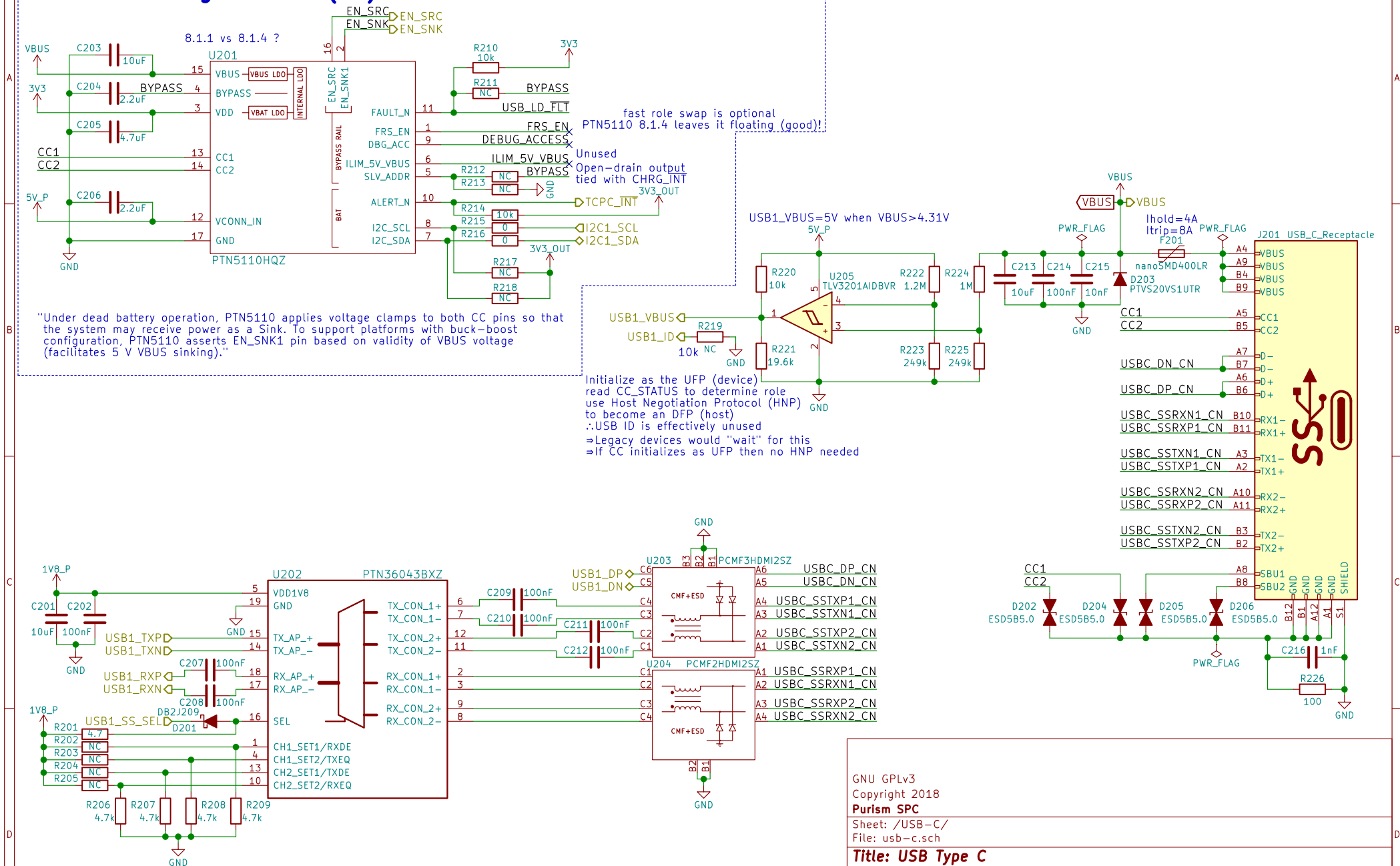


USB-C Config Channel (CC) and PD Role Controller



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Sheet: /USB-C/
File: usb-c.sch

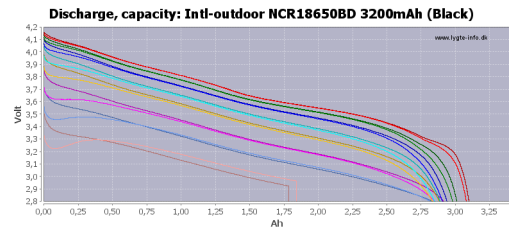
Title: USB Type C

Size: A4	Date: 2018-05-23
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KiCad E.D.A.	kiCad 4.0.6
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Rev: v0.1.0

Id: 2/23

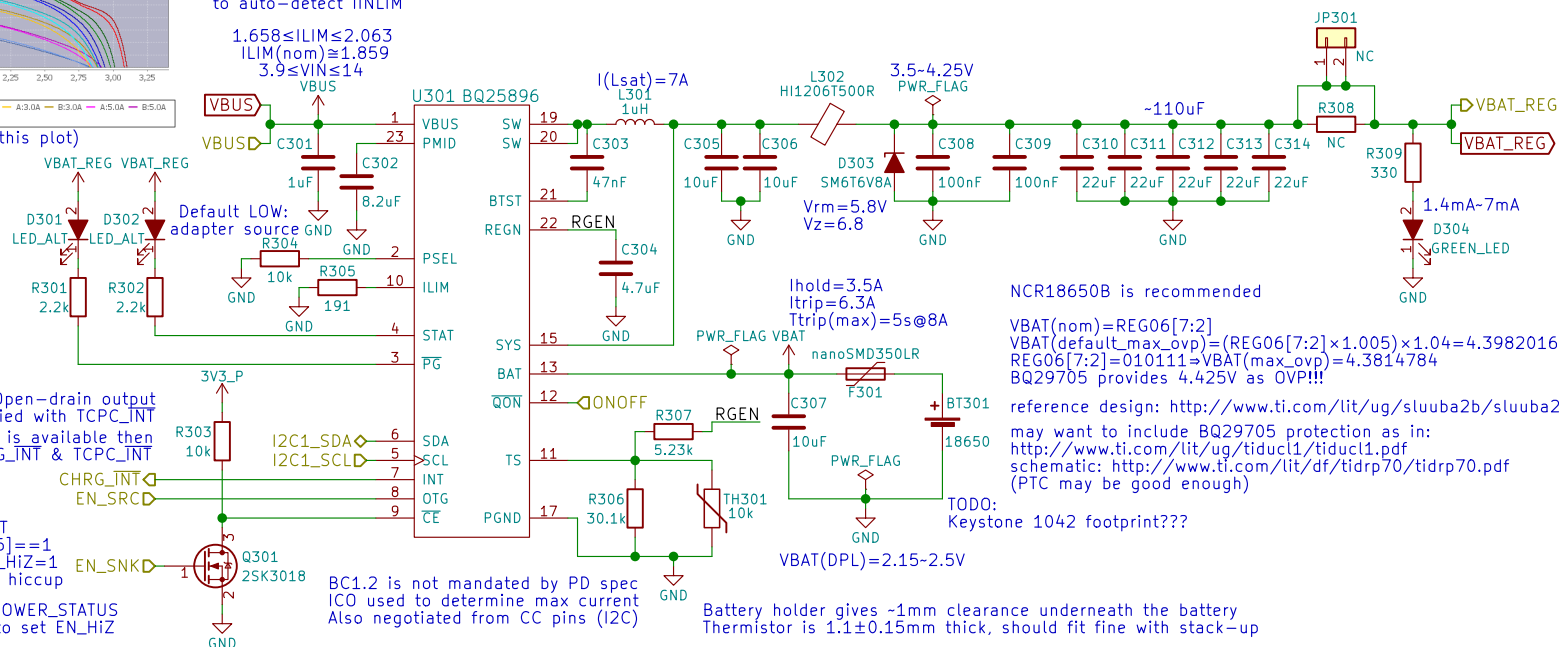


(interpret RSOC% based on this plot)

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

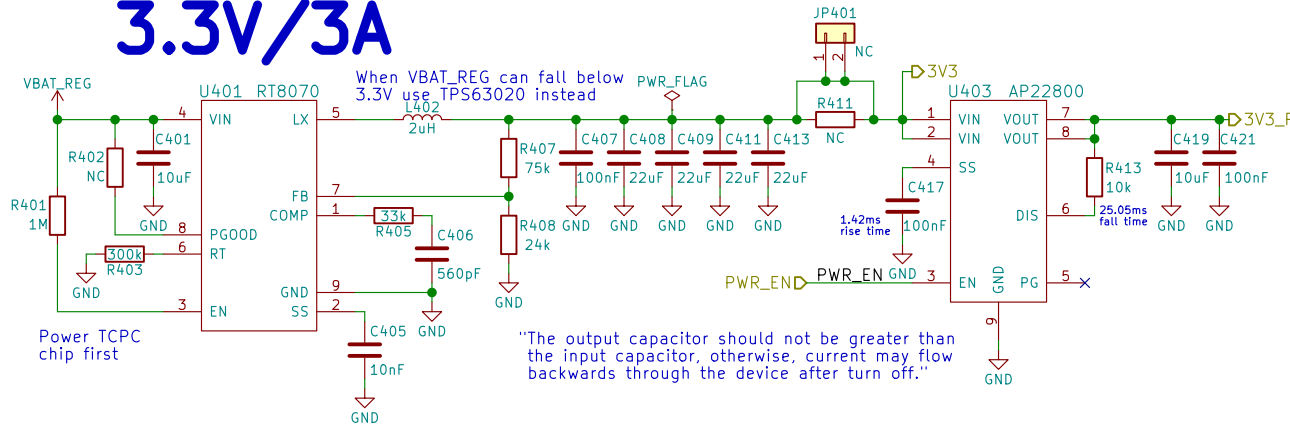
Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.6

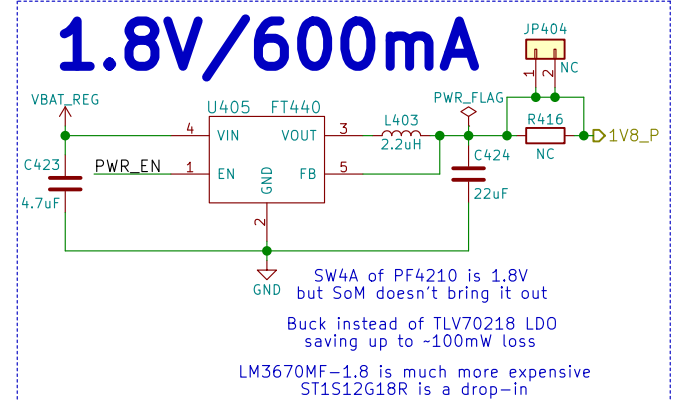
Rev: v0.1.0

Id: 3/23

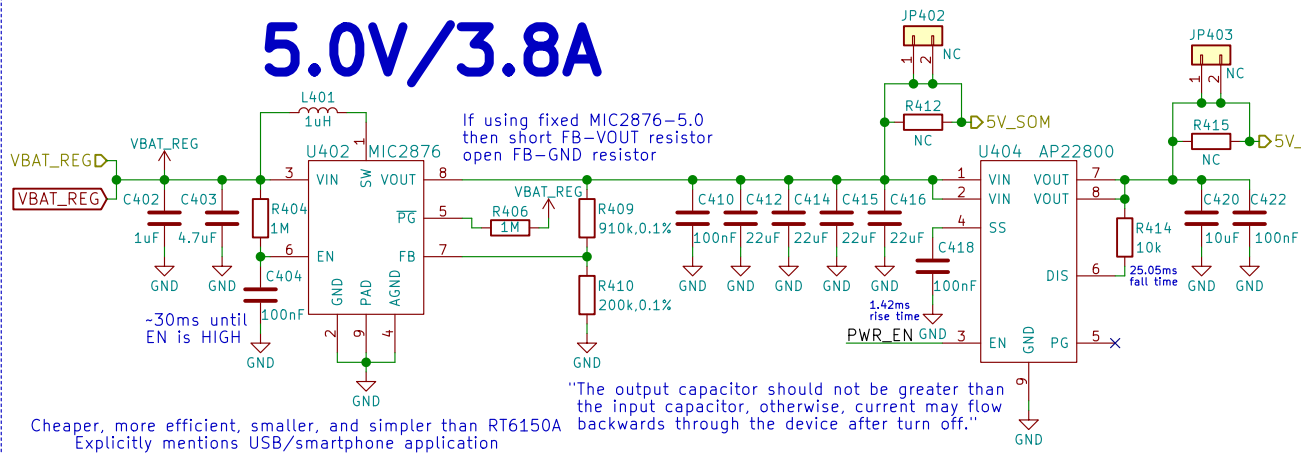
3.3V/3A



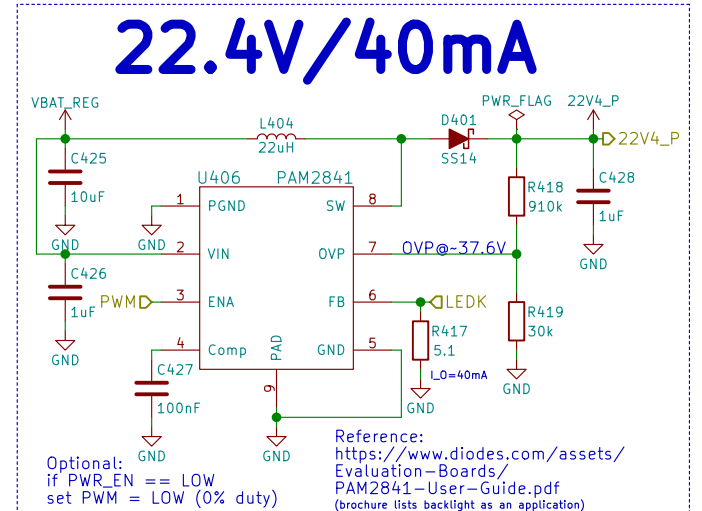
1.8V/600mA



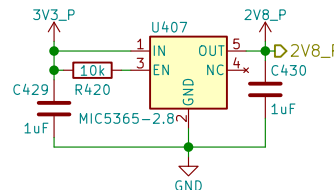
5.0V/3.8A



22.4V/40mA



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



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Sheet: /Power/
File: power.sch

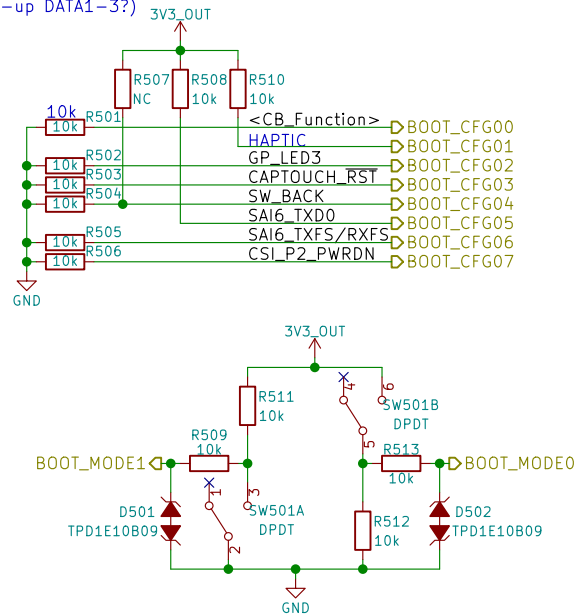
Title: Power

Size: A4 Date: 2018-05-23
KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0
Id: 4/23

BOOT_CFG04: 0 - 1-bit SD bus
1 - 4-bit SD bus (pull-up DATA1-3?)

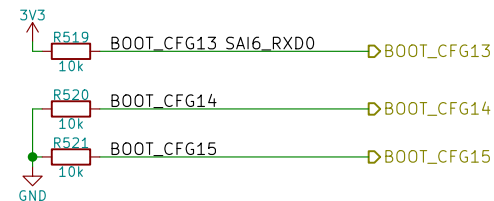
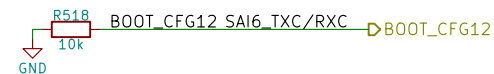
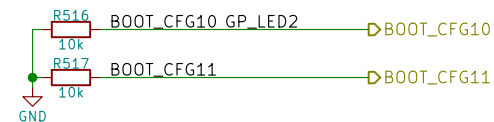
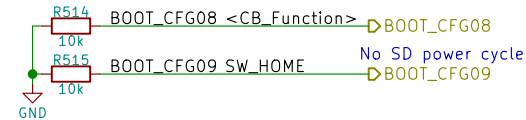
BOOT_CFG05: 1 - 8-bit eMMC bus
0 - 1-bit eMMC bus



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 ¹	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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Sheet: /Boot Config/
File: boot.sch

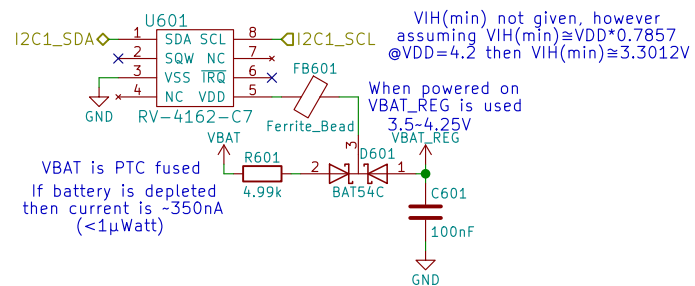
Title: Boot Configuration

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0

Id: 5/23



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Sheet: /RTC/
File: rtc.sch

Title: RTC

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0

Id: 6/23



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Sheet: /UART Debug/
File: uart.sch

Title: UART Debug

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0

Id: 7/23



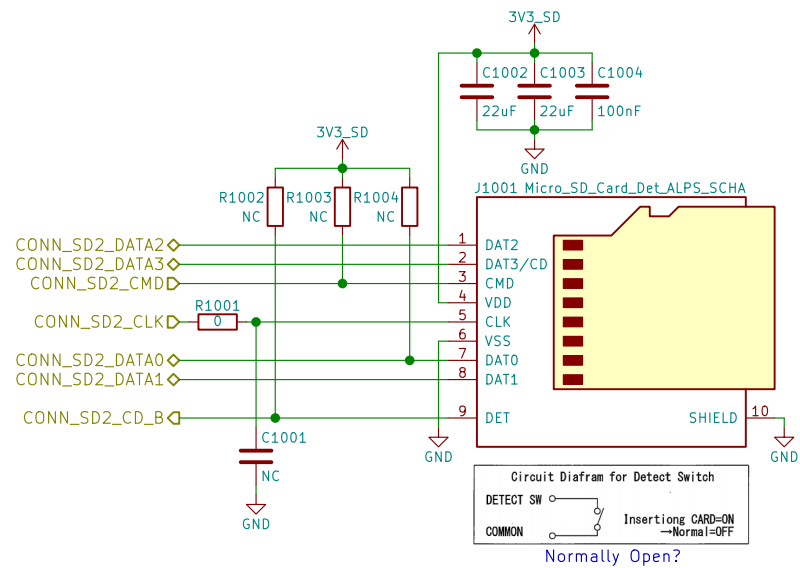
GNU GPLv3
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Purism SPC
Sheet: /JTAG/
File: jtag.sch

Title: JTAG

Size: A4 Date: 2018-05-23
KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0
Id: 8/23

Id: 9/23



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Sheet: /uSD Card/
File: sd.sch

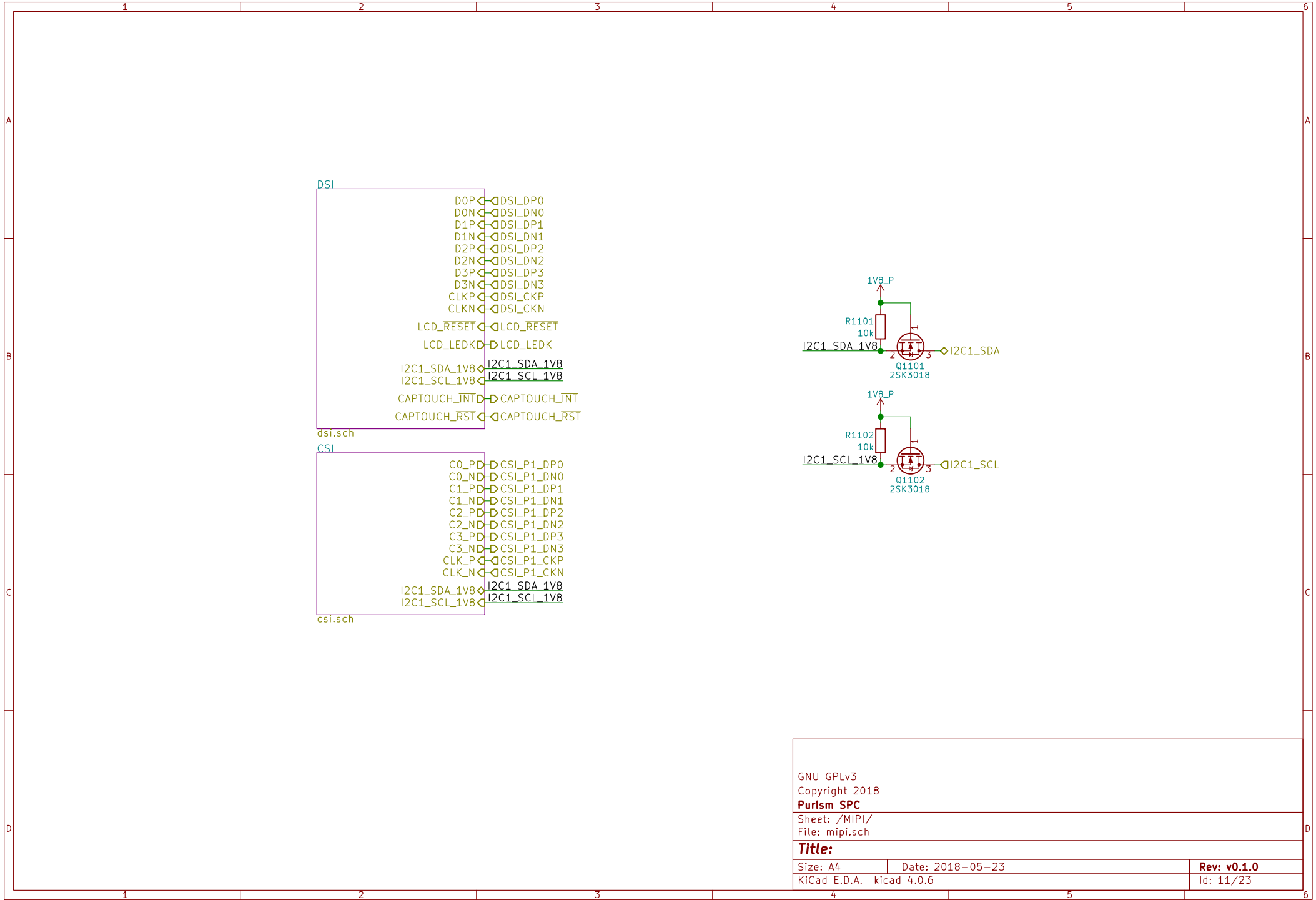
Title: uSD Card

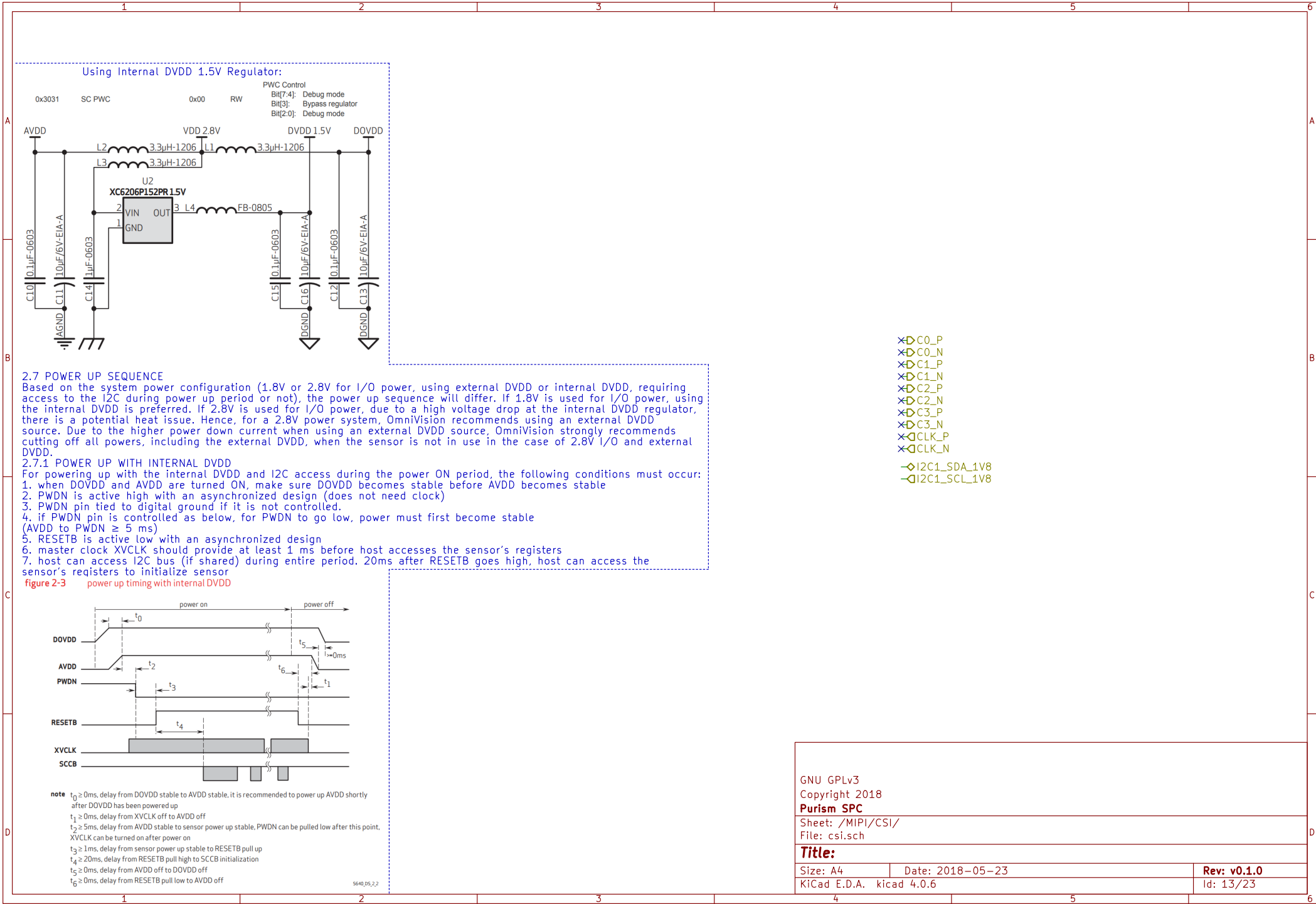
Size: A4 Date: 2018-05-23

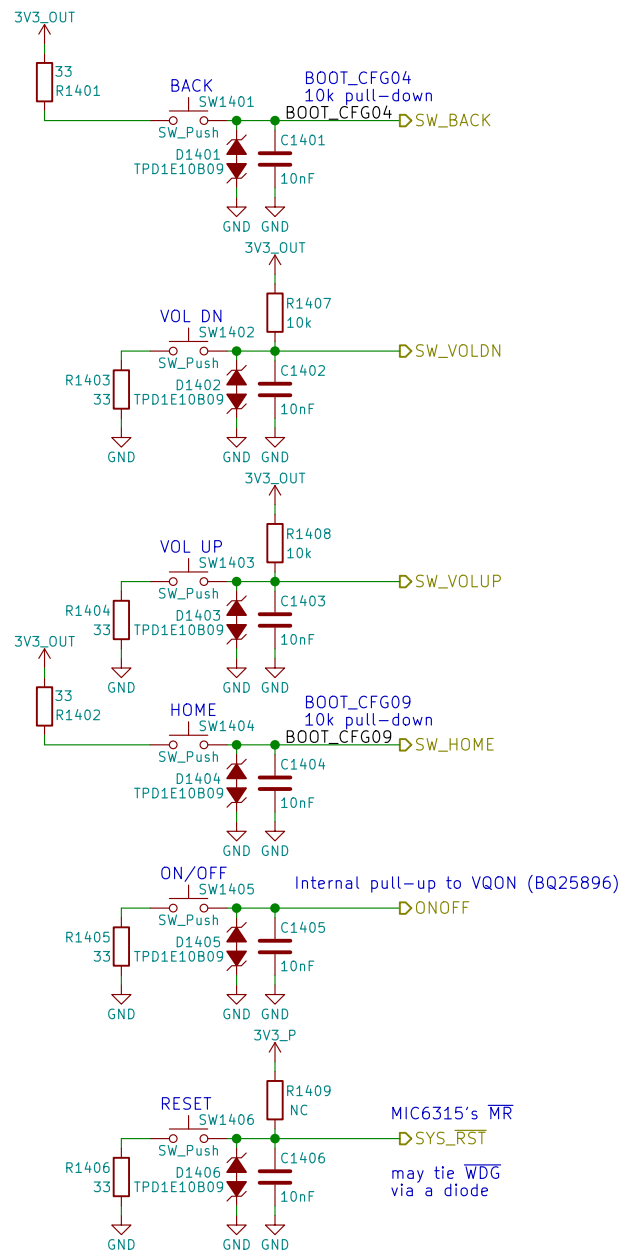
KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0

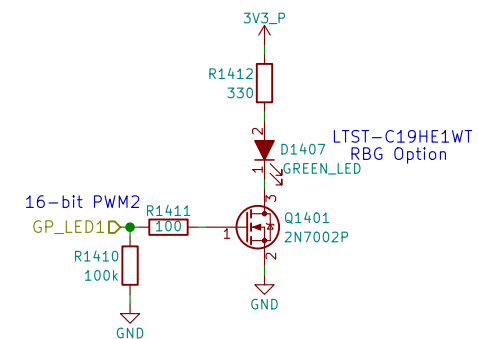
Id: 10/23







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

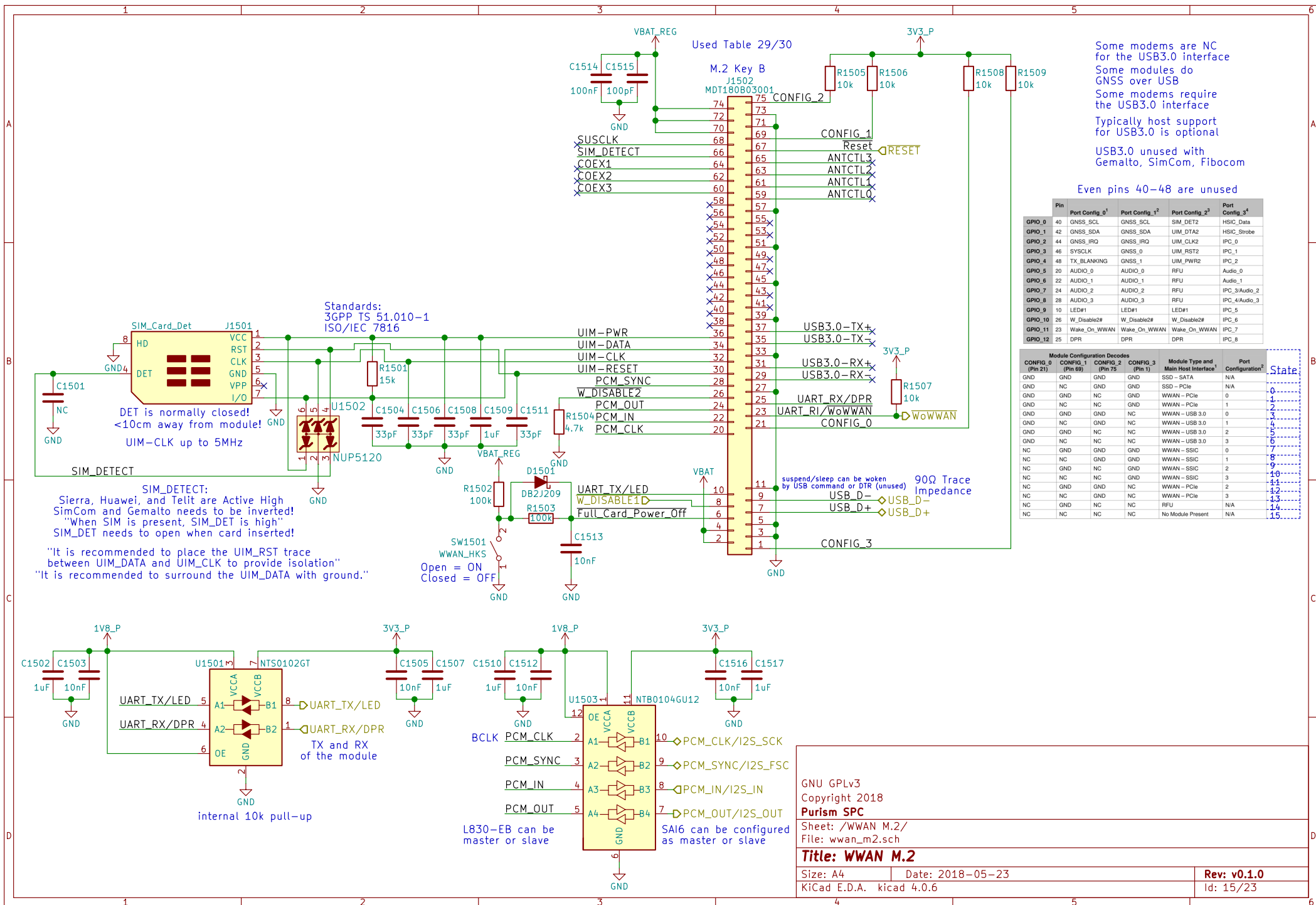
Title: Buttons & LED

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0

Id: 14/23



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Purism SPC

Sheet: /WWAN M.2/
File: wwan_m2.sch

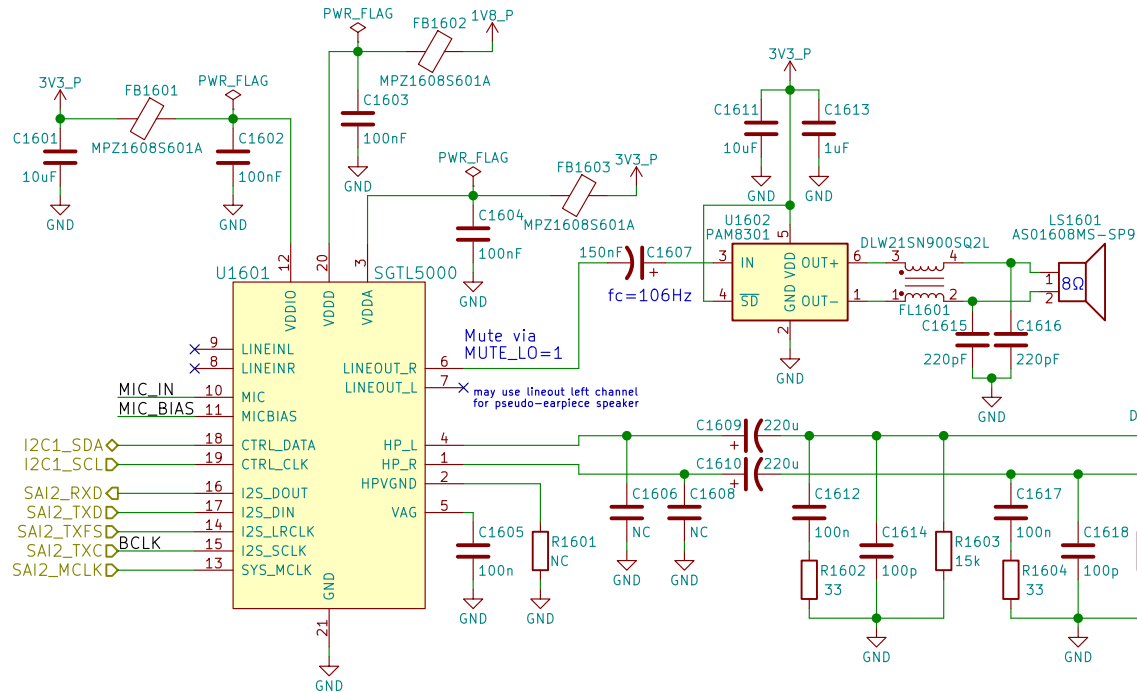
Title: WWAN M.2

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0

Id: 15/23



Reference:
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-\(Ntt6-does-the-same\)](https://electronics.stackexchange.com/questions/31442/how-can-i-switch-this-audio-jack-using-its-own-mechanical-switches-without-crc-(Ntt6-does-the-same))
 +Zener diode to protect against ranges outside of -0.9V to 3.3V

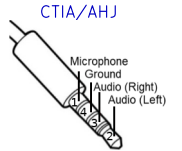
dB specs in datasheet is a unit of power gain (not dBu or VU)
 with respect to the DAC's unattenuated output

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

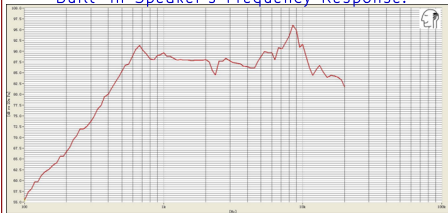
If HP_DET is HIGH for >100ms then HPs are present

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

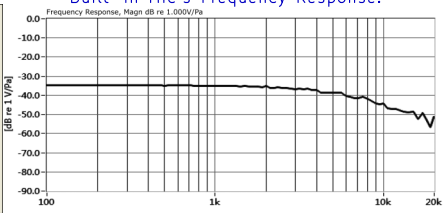
Could use FSA8008 to detect mic



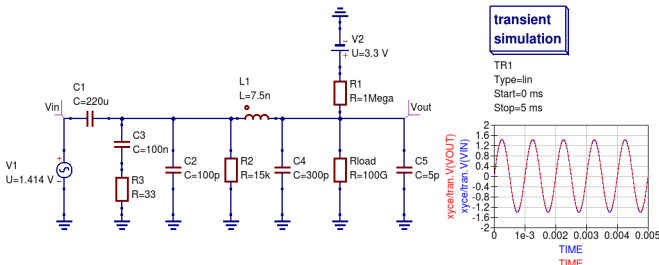
Built-In Speaker's Frequency Response:



Built-In Mic's Frequency Response:

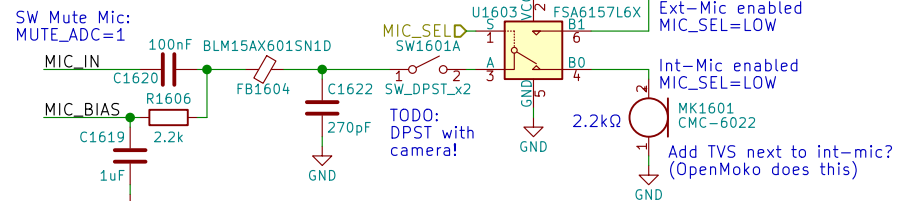
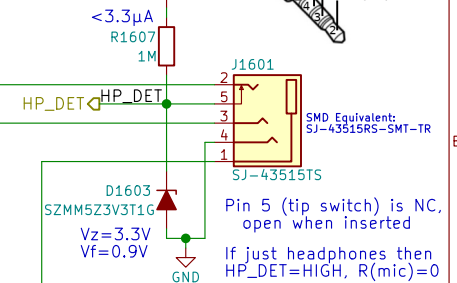


Simulation of HP_DET @ 1kHz output
 without HP jack inserted:



LCR Measurements:

Earbud Microphone: @1kHz	Headset Speaker: @1kHz	Earbud Speaker: @1kHz
$L_s = 3.844mH$ $L_p = 15.757H$ $C_s = 6.583uF$ $C_p = 1612.8pF$ $R_s = 1.5465k\Omega$ $R_p = 1.5478k\Omega$ $\theta = -0.8deg$	$L_s = 244.4uH$ $L_p = 141.99mH$ $C_s = 103.6uF$ $C_p = 178.77nF$ $R_s = 36.860\Omega$ $R_p = 36.860\Omega$ $\theta = -2.3deg$	$L_s = 25.2uH$ $L_p = 311.0mH$ $C_s = 1.0mF$ $C_p = 81.95nF$ $R_s = 17.0300\Omega$ $R_p = 17.0340\Omega$ $\theta = 0.5deg$



-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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Sheet: /Audio/

File: audio.sch

Title: Audio

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0

Id: 16/23

RGMII 10/100/1000 Ethernet

3V3_P FB1701 BLM18PG121SN1D C1703 C1705 1uF 220nF GND C1704 C1706 10uF 220nF GND U1701 VDD33 AVDD33 VDDIO_REG VDDH_REG LX DVDDL 47 PWR_FLAG ENET_2V5 ENET_2V5 C1707 C1708 C1710 220nF 1uF 1uF GND L1701 4.7uH ENET_1V1 C1713 C1716 10uF 10uF GND PWR_FLAG FB1702 BLM18PG121SN1D C1711 C1714 C1717 C1718 220nF 220nF 220nF 220nF GND C1719 C1720 C1721 220nF 220nF 220nF GND LED_ACT R1723 270 FB1703 BLM18PG121SN1D SH1 SH2 P11 P12 P13 P14 YELLOW GREEN D1702 GREEN_LED LED_LINK10_100 R1724 270 LED_LINK1000 R1725 270 GND

ENET_RD0 R1701 10k ENET_2V5 R1702 NC ENET_RD1 R1703 10k ENET_2V5 R1704 NC LED_ACT R1705 10k ENET_RX_CTL R1706 10k ENET_RD2 R1707 10k ENET_RXC R1708 10k ENET_RD3 R1709 10k LED_LINK1000 R1710 10k LED_LINK10_100 R1711 10k GND

ENET_TXC 35 GTX_CLK 36 TXD0 37 TXD1 38 TXD2 39 TXD3 34 TX_EN 33 RX_CLK 31 RXD0 30 RXD1 28 RXD2 27 RXD3 32 RX_DV 46 SIP 45 SIN 43 SOP 42 SON 41 SD 1 MDC 48 MDIO 2 RST 40 WOL_INT 5 INT 22 PPS 25 CLK_25M VDDH_REG LED_LINK10_100 LED_LINK1000 LED_ACT 6 XTLO 7 XTLO 9 RBIAS AR8031 49 GND

ENET_MDIO ENET_RST ENET_WoL ENET_INT J1701 TEST_1P J1702 TEST_1P CLKO_25MHz R1713 820 R1715 560 GND C1701 22pF Y1701 25MHz C1702 22pF R1722 2.37k GND

ETH_TRX0_P TD1+ P9 J1 TX1+ ETH_TRX0_N TD1- P10 J2 TX1- ETH_TRX1_P TD2+ P7 J3 TX2+ ETH_TRX1_N TD2- P8 J6 TX2- ETH_TRX2_P TD3+ P5 J4 TX3+ ETH_TRX2_N TD3- P6 J5 TX3- ETH_TRX3_P TD4+ P3 J7 TX4+ ETH_TRX3_N TD4- P4 J8 TX4- CT P2 NC P1 SH1 SH2 P11 P12 P13 P14 YELLOW GREEN D1702 GREEN_LED

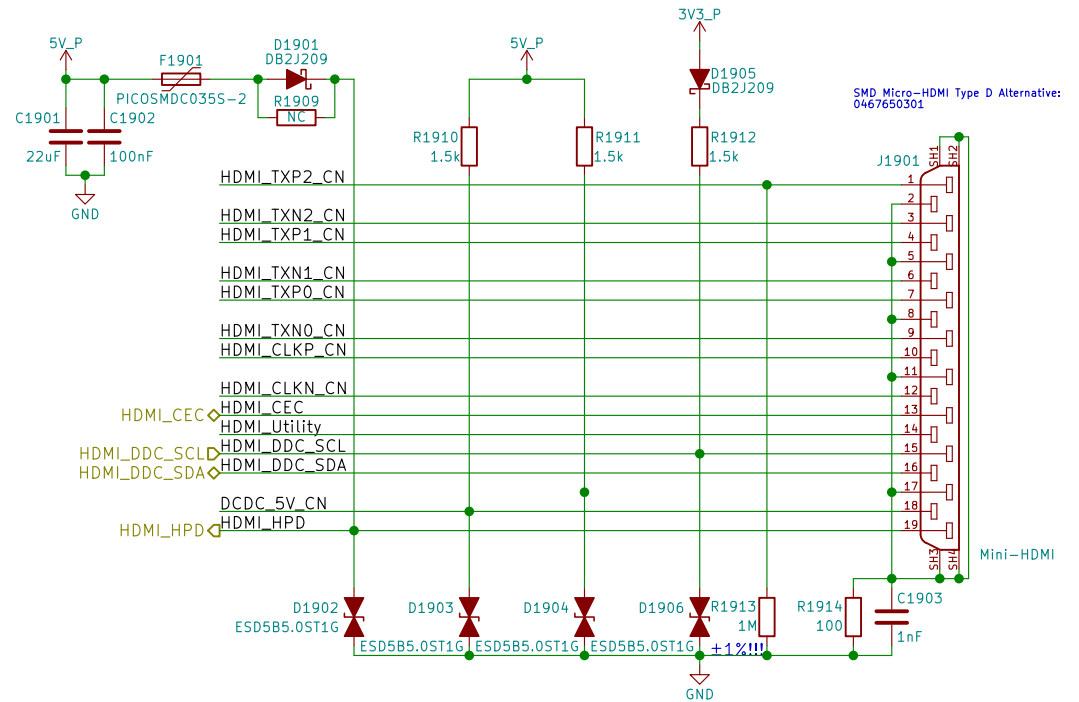
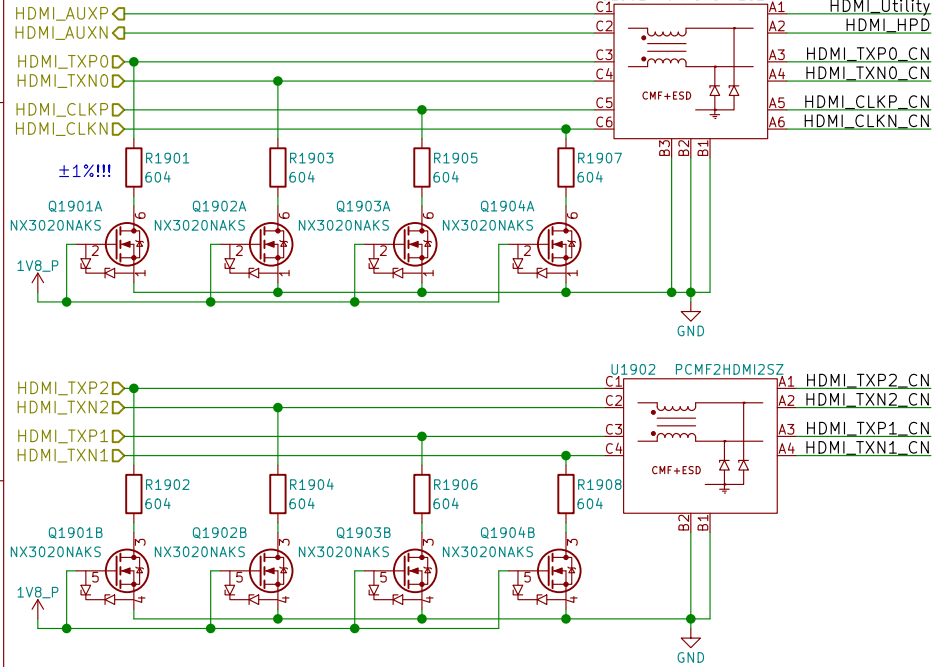
GNU GPLv3
Copyright 2018
Purism SPC
Sheet: /Ethernet/
File: ethernet.sch
Title: Ethernet
Size: A4 Date: 2018-05-23 Rev: v0.1.0
KiCad E.D.A. kicad 4.0.6 Id: 17/23

Id: 17/23

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

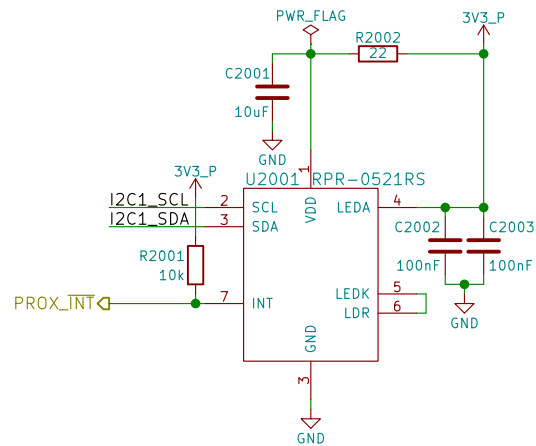
Title: HDMI

Size: A4
KiCad E.D.A. kicad 4.0.6

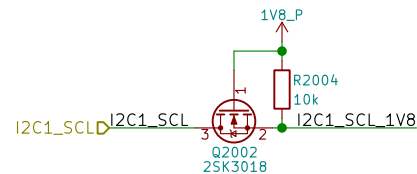
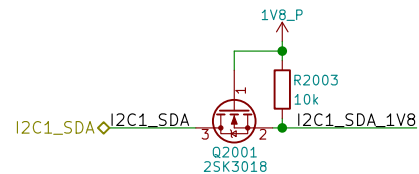
Date: 2018-05-23

Rev: v0.1.0
Id: 19/23

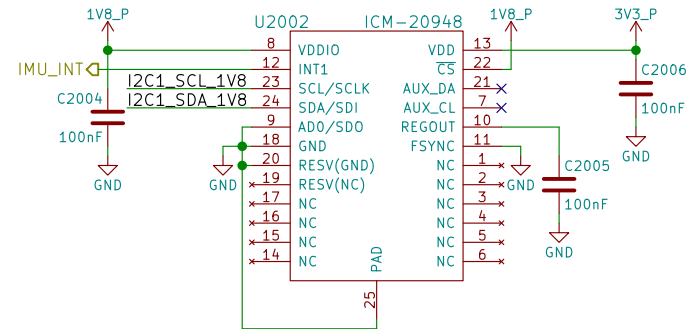
Proximity & Ambient Light



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

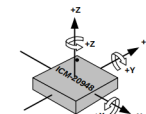


Figure 12. Orientation of Axes of Sensitivity and Polarity of Rotation

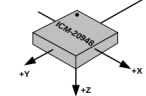


Figure 13. Orientation of Axes of Sensitivity for Magnetometer

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Purism SPC

Sheet: /Sensors/
 File: sensors.sch

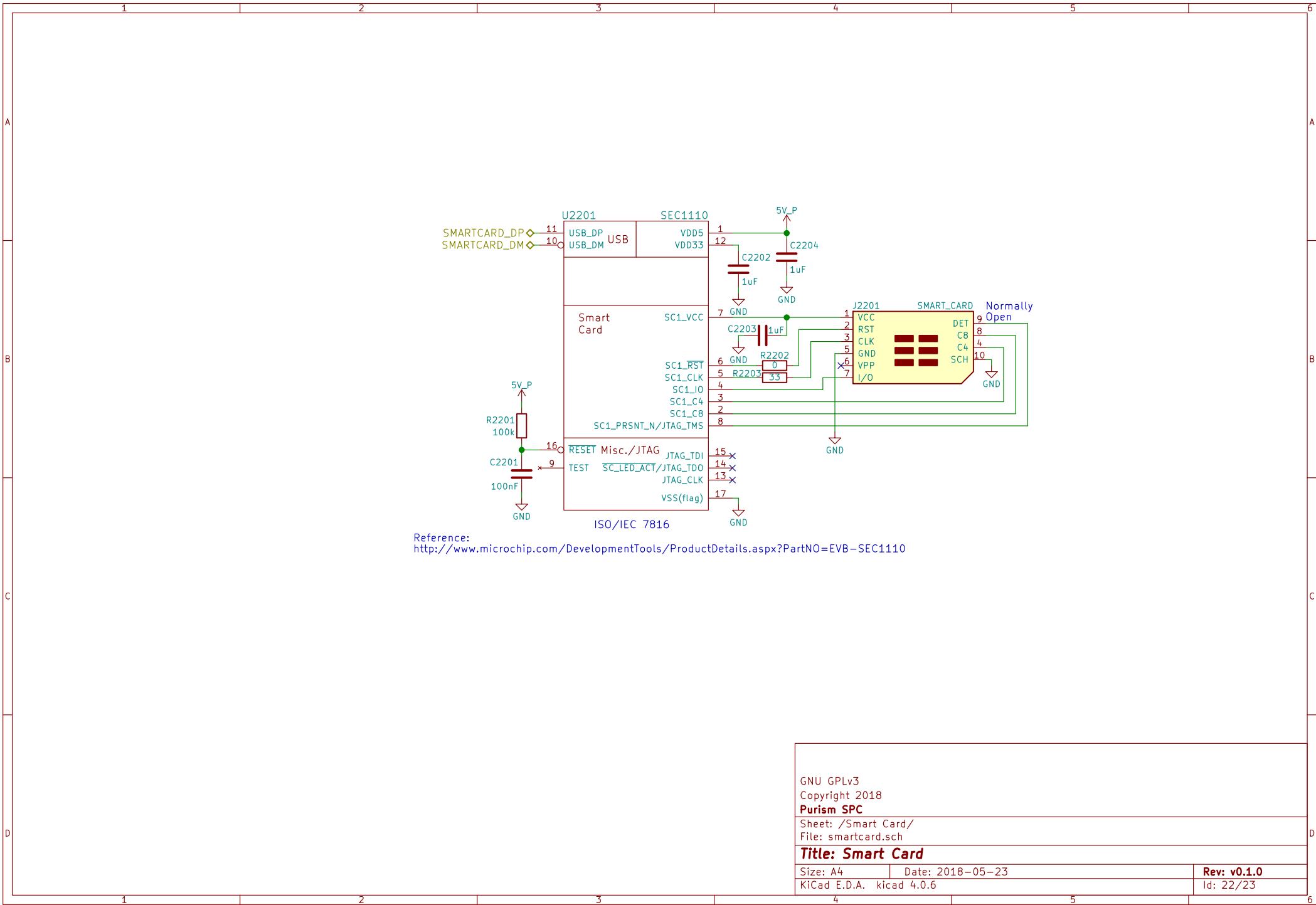
Title: Sensors

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.6

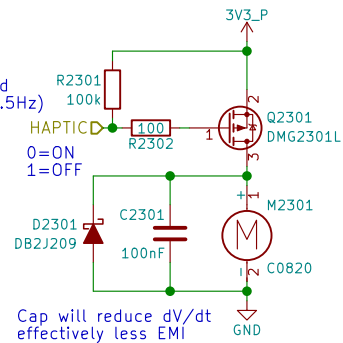
Rev: v0.1.0

Id: 20/23



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)!

Cap will reduce dV/dt
 effectively less EMI

Motor Connector:
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

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Purism SPC

Sheet: /Haptic Motor/
 File: haptic.sch

Title: Haptic/Vibration Motor

Size: A4 Date: 2018-05-23

KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0

Id: 23/23