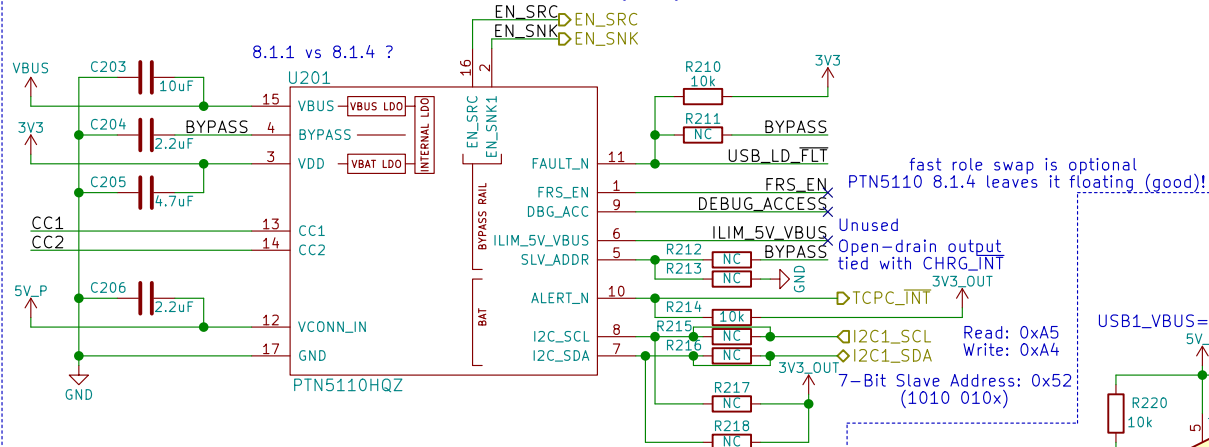
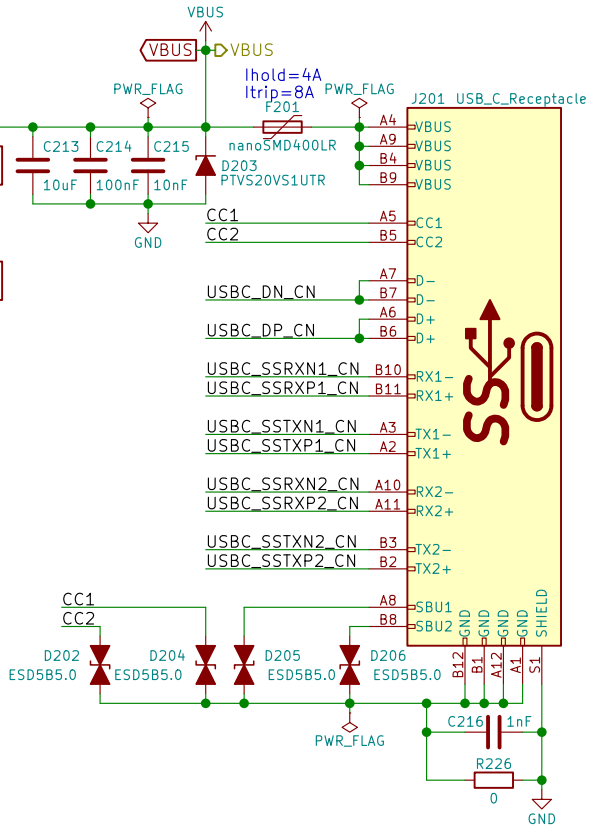
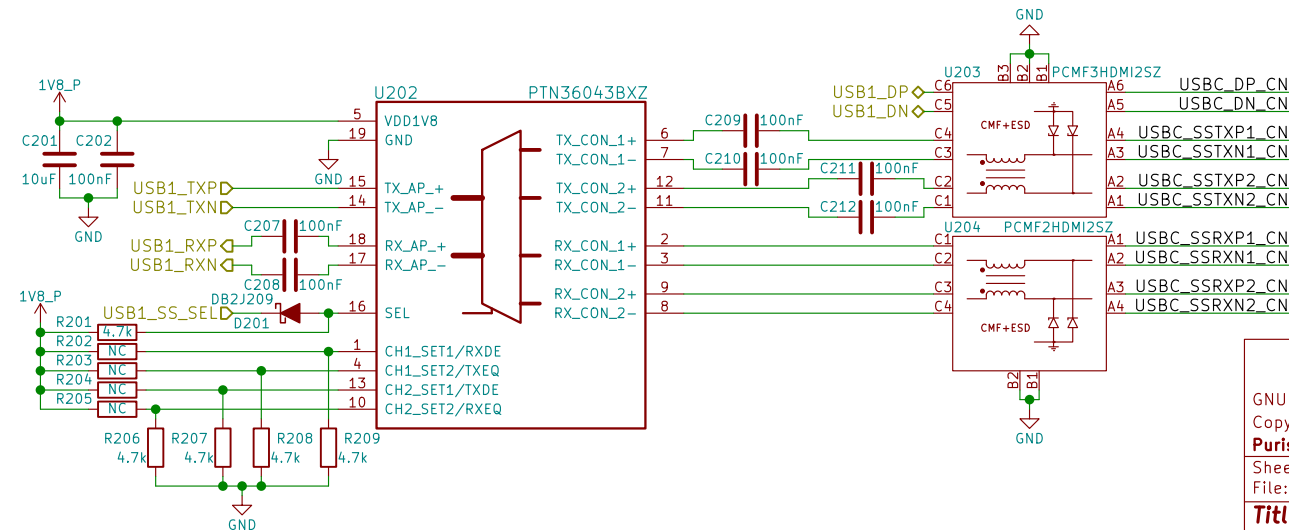


USB-C TCPC – Config Channel (CC) and PD Role Controller



"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

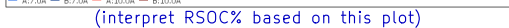
Size: A4

Date: 2018-06-06

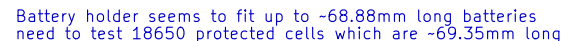
KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 2/24



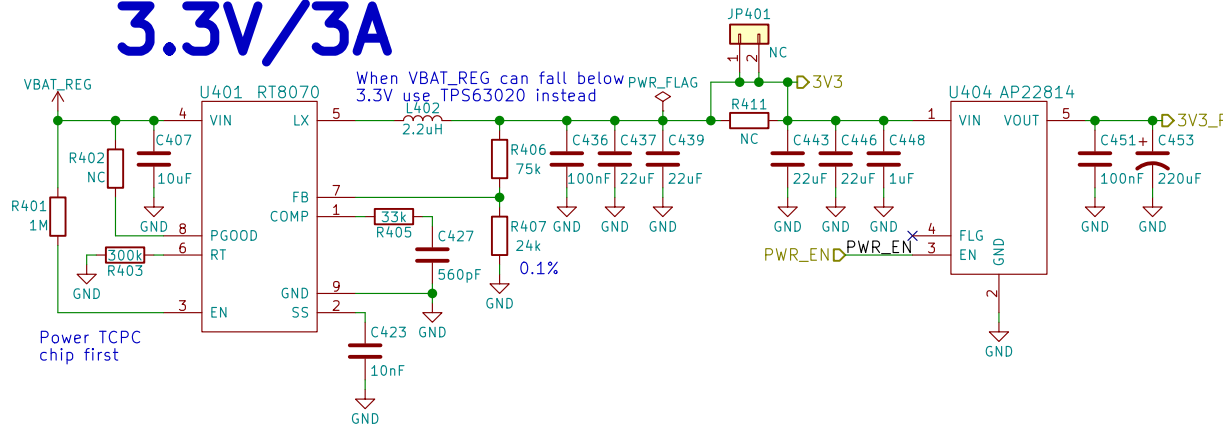
Drawing ~333.33mA,
or consuming <1.2W,
should give close to
10 hours going from
100% to 0% charge

$$\begin{aligned} 1.658 \leq I_{LIM} \leq 2.063 \\ I_{LIM(nom)} \cong 1.859A \\ 3.9 \leq V_{IN} \leq 14 \end{aligned}$$
$$I(L_{sat}) = 7A$$


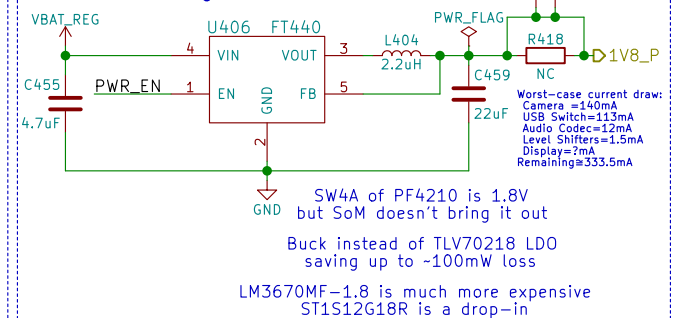
VBAT(ovp_default)=REG06[7:2]=4.208V (reduce to 4.192V [010110])
Worst Case:
VBAT(default_max_ovp)=(REG06[7:2]×1.005)×1.04=4.3982016V
BQ29705 provides 4.425V as OVP!
ICHG(default)=REG[6:0]=2048mA (reduce to -1.6A [0011001])
reference design: <http://www.ti.com/lit/ug/sluuba2b/sluuba2b.pdf>
may want to include BQ29705 protection as in:
<http://www.ti.com/lit/ug/tiduc11/tiduc11.pdf>
schematic: <http://www.ti.com/lit/df/tidrp70/tidrp70.pdf>
(PTC may be good enough)

Rev: v0.1.0
Id: 3/24

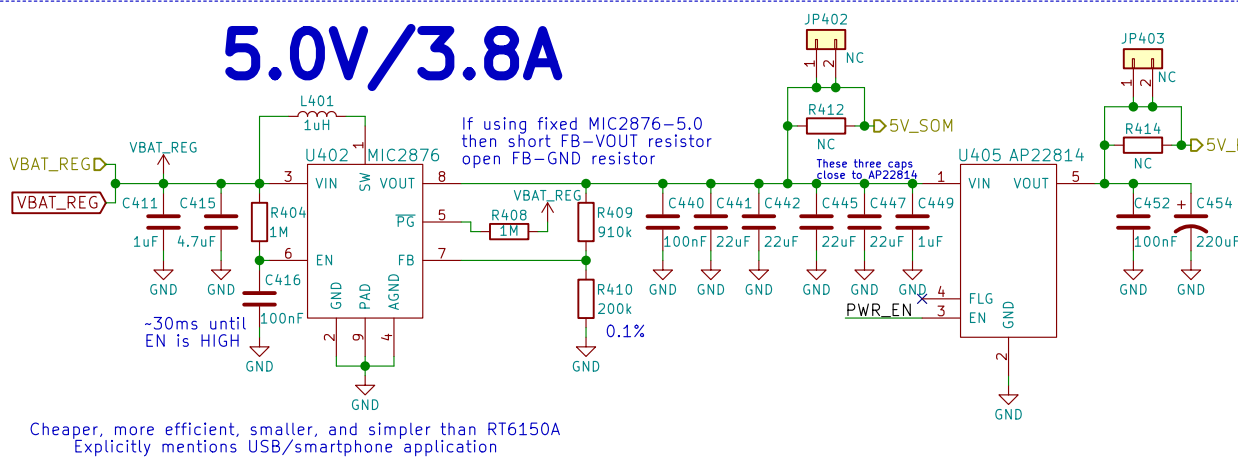
3.3V/3A



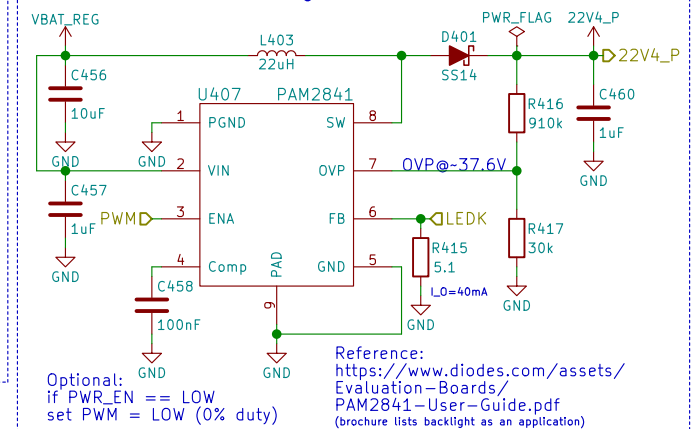
1.8V/600mA



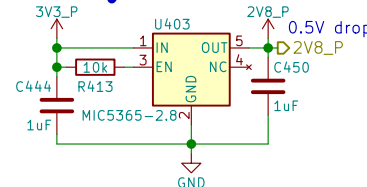
5.0V/3.8A



22.4V/40mA



2.8V/150mA



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Sheet: /Power/
File: power.sch

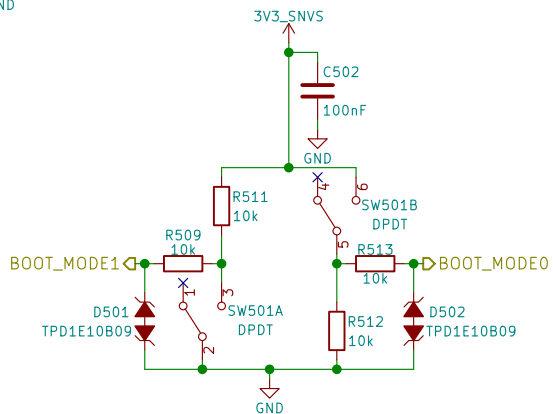
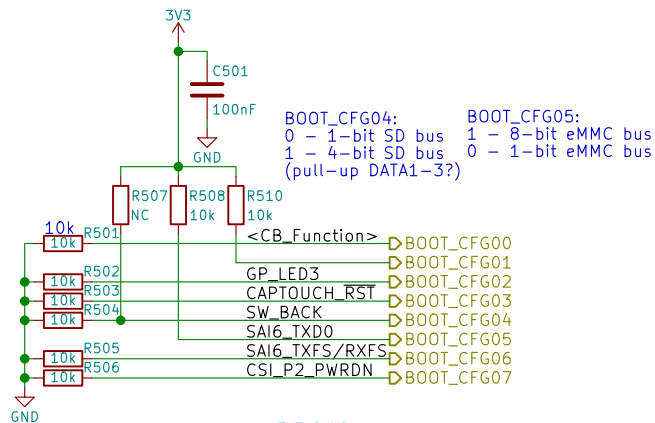
Title: Power

Size: A4
KiCad E.D.A. kicad 4.0.7

Date: 2018-06-06

Rev: v0.1.0

Id: 4/24



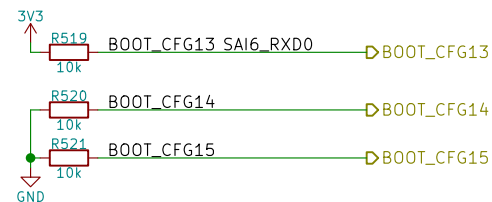
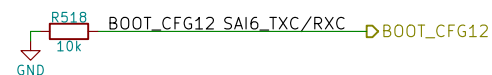
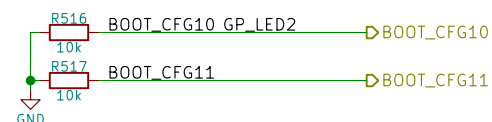
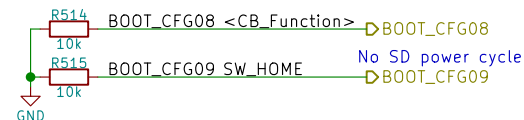
2->1: eMMC
2->3: USB (Serial Downloader)

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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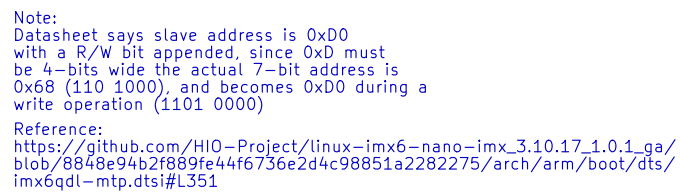
Purism SPC

Sheet: /Boot Config/
File: boot.sch

Title: Boot Configuration

Size: A4 Date: 2018-06-06
KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0
Id: 5/24



Id: 6/24

Id: 7/24



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Sheet: /JTAG/
File: jtag.sch

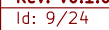
Title: JTAG

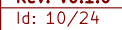
Size: A4 Date: 2018-06-06

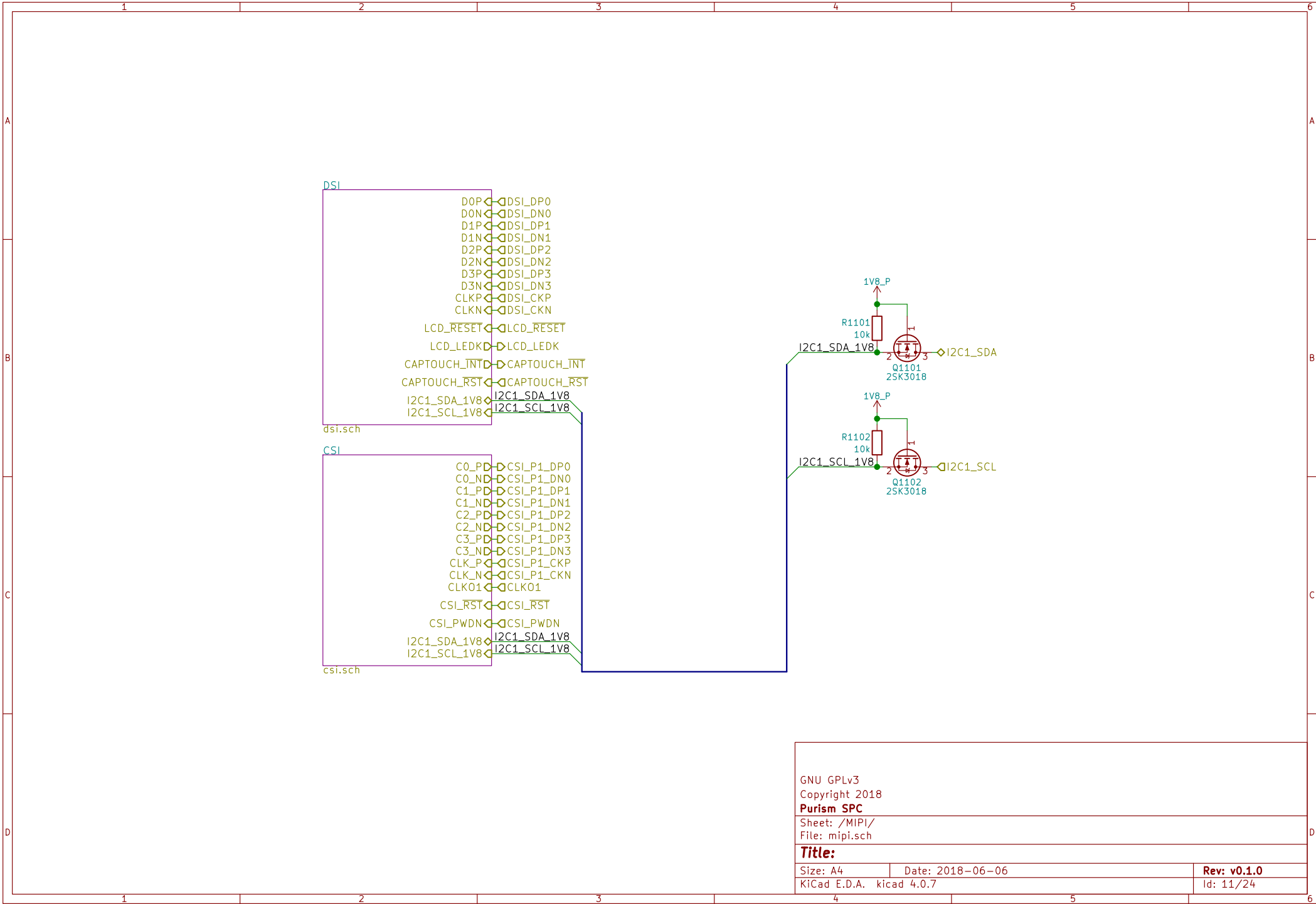
KiCad E.D.A. kicad 4.0.7

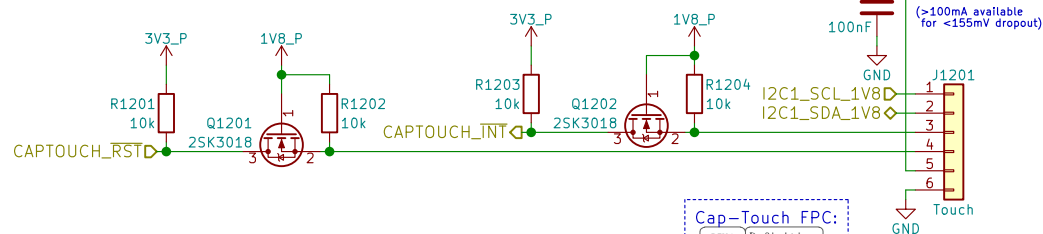
Rev: v0.1.0

Id: 8/24





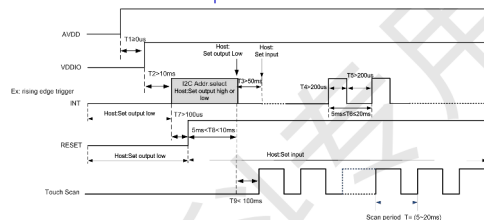




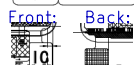
The upper 7 bits are the address, and bit 0 is used to select read or write. GT5688 has two slave device addresses to choose from:

INT	7-Bit Address	8-Bit Write Address	8-Bit Read Address
LOW	0x5D	0xBA	0xBB
HIGH	0x14	0x28	0x29

Every time you power on or reset, you need to use the INT pin to set the I2C address:

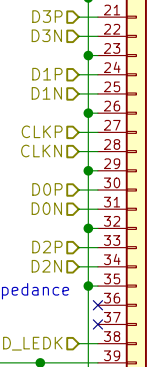
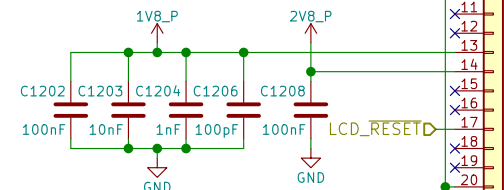


Pin#	Definition
1	SCL
2	SDA
3	INT
4	RESET
5	VDD2, R5
6	GND

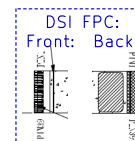
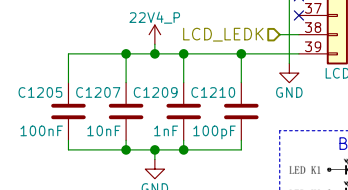


LCD PN:
Shenzhen Jinghong Electronics Co., Ltd.
JH057N00900

Note:
No power-up sequence is given in the spec sheet



100Ω Differential Impedance



Backlight Array:



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Purism SPC

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

Title: MIPI DSI

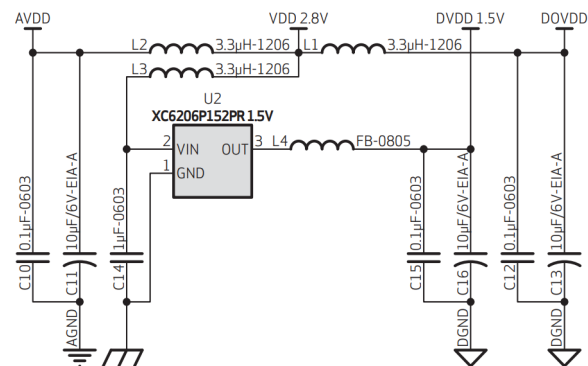
Size: A4 Date: 2018-06-06

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 12/24

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:

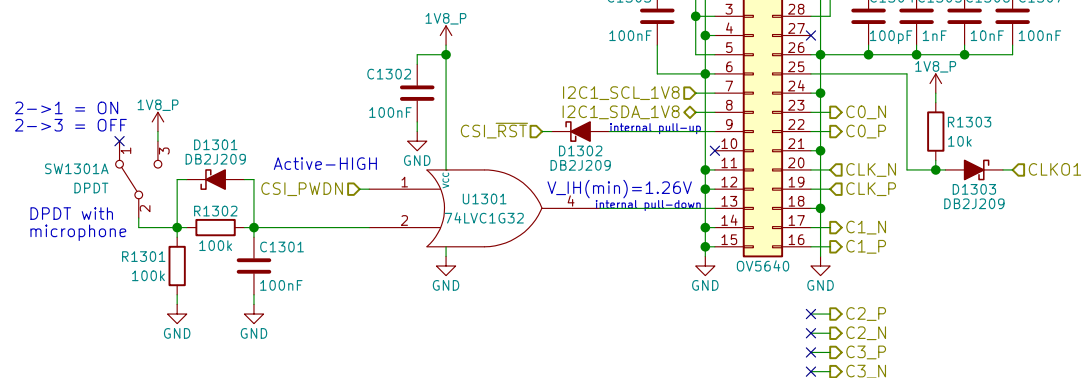
1. when DOVDD and AVDD are turned ON, make sure DOVDD becomes stable before AVDD becomes stable
2. PWDN is active high with an asynchronous design (does not need clock)
3. PWDN pin tied to digital ground if it is not controlled.
4. if PWDN pin is controlled as below, for PWDN to go low, power must first become stable (AVDD to PWDN ≥ 5 ms)
5. RESETB is active low with an asynchronous 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

5640_05_2-2



Camera PN:
Truly C08725-B5SA-E
7-bit Slave Address: 0x78
(1111 000x)
Read: 0xF1
Write 0xF0

OV5640 CMOS Image Sensor Datasheet:
https://cdn.sparkfun.com/datasheets/Sensors/LightImaging/OV5640_datasheet.pdf

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Purism SPC

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

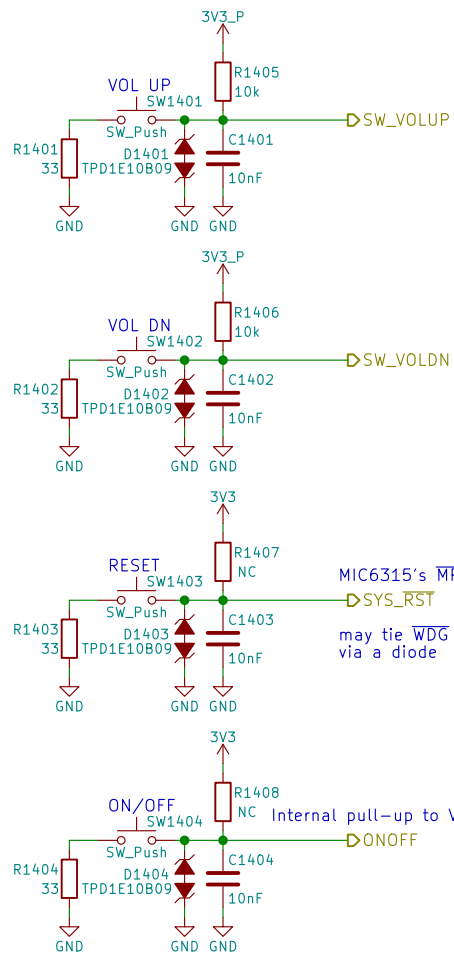
Title:

Size: A4 Date: 2018-06-06

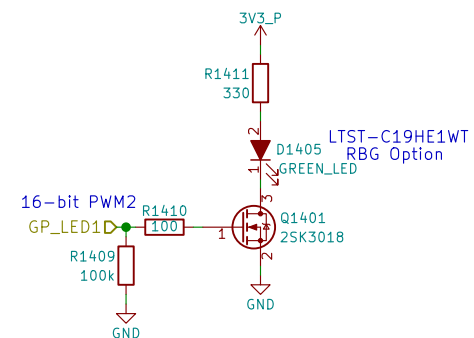
KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 13/24



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

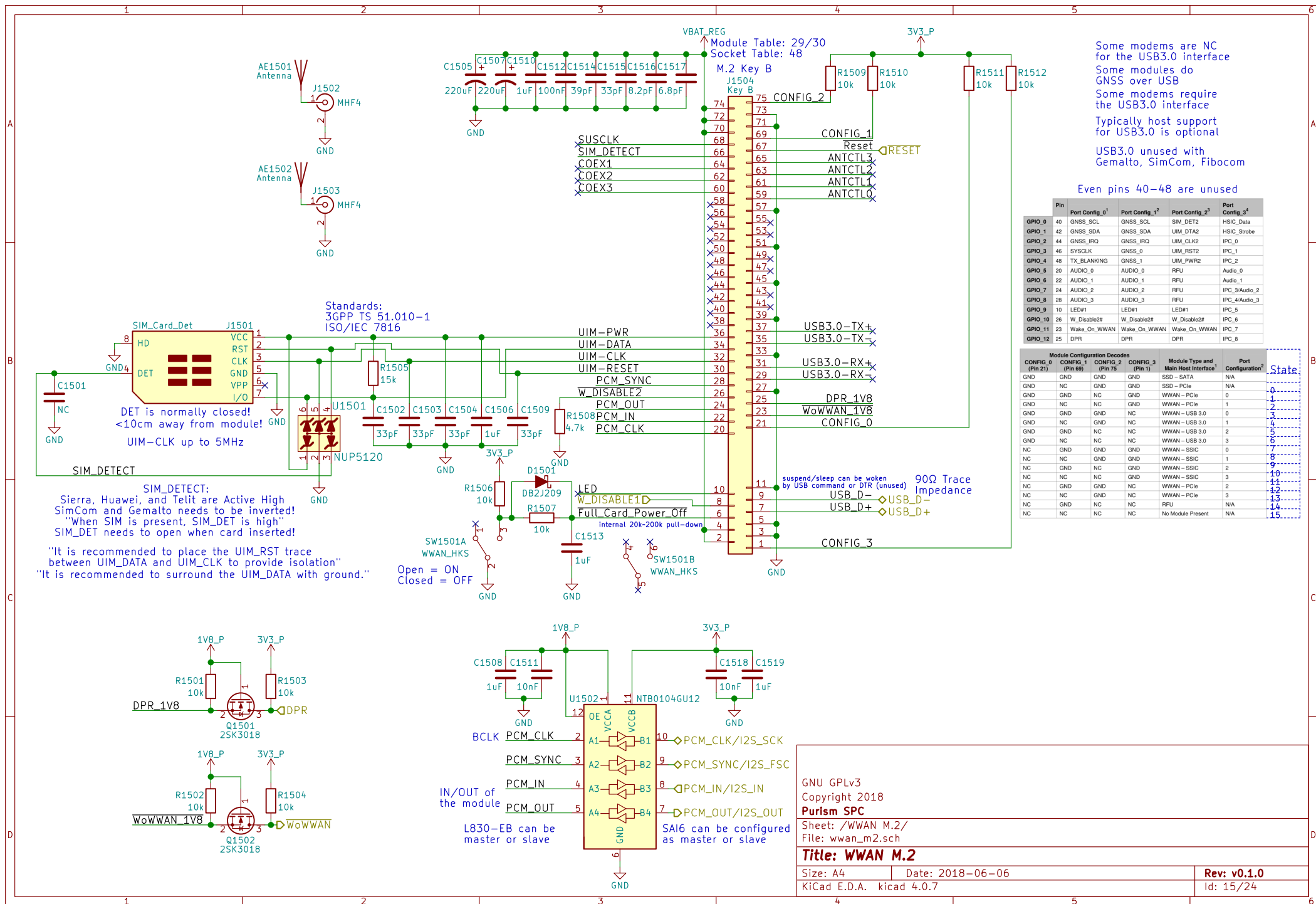
Title: Buttons & LED

Size: A4 Date: 2018-06-06

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 14/24



Some modems are NC for the USB3.0 interface
Some modules do GNSS over USB
Some modems require the USB3.0 interface
Typically host support for USB3.0 is optional
USB3.0 unused with Gemalto, SimCom, Fibocom

Even pins 40-48 are unused

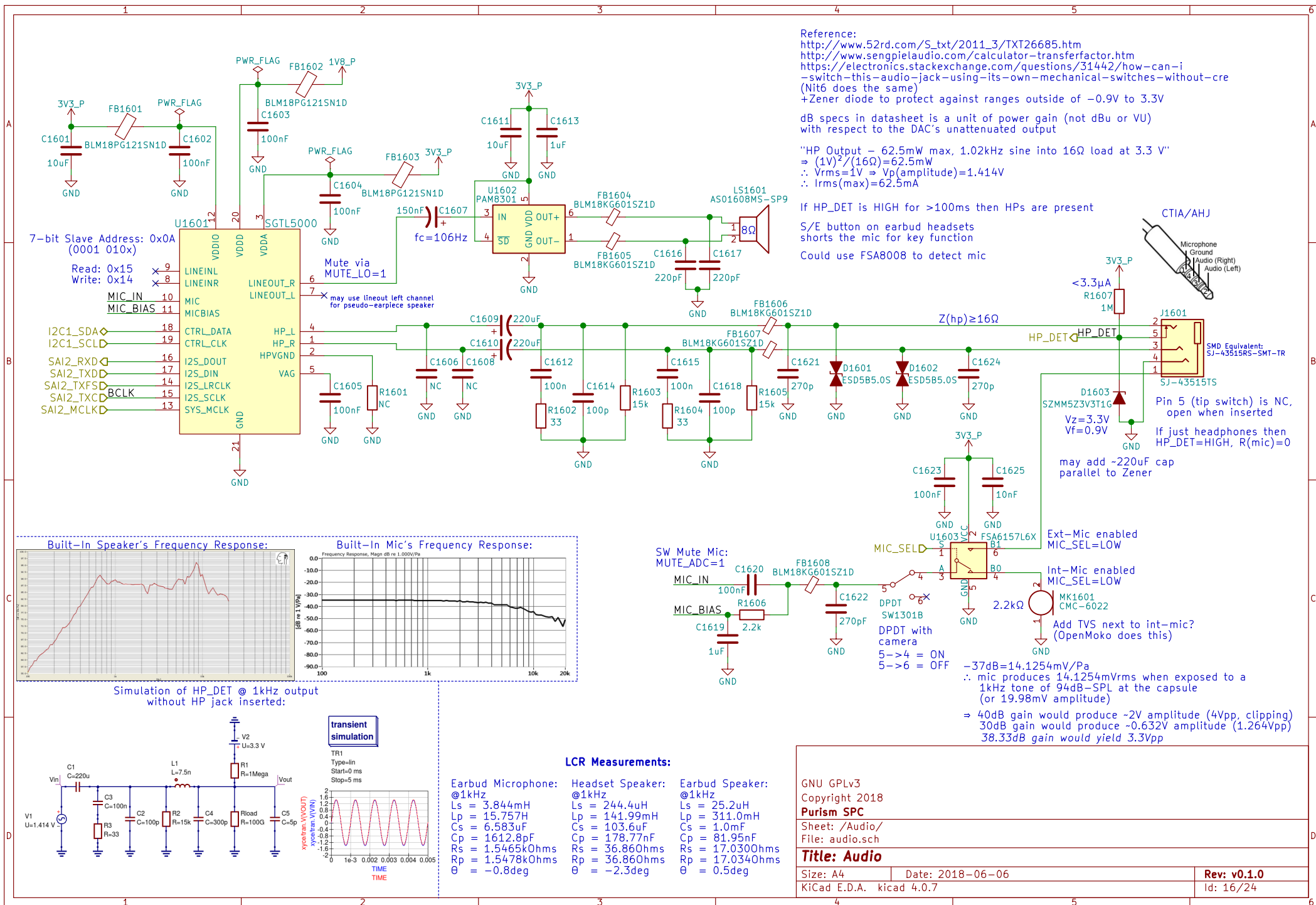
Pin	Port Config_0 ¹	Port Config_1 ²	Port Config_2 ³	Port Config_3 ⁴
GPIO_0	40 GNSS_SCL	GNSS_SCL	SIM_DET2	HSIC_Data
GPIO_1	42 GNSS_SDA	GNSS_SDA	UIM_DTA2	HSIC_Strobe
GPIO_2	44 GNSS_IRQ	GNSS_IRQ	UIM_CLK2	IPC_0
GPIO_3	46 SYSLK	GNSS_0	UIM_RST2	IPC_1
GPIO_4	48 TX_BLANKING	GNSS_1	UIM_PWR2	IPC_2
GPIO_5	20 AUDIO_0	AUDIO_0	RFU	Audio_0
GPIO_6	22 AUDIO_1	AUDIO_1	RFU	Audio_1
GPIO_7	24 AUDIO_2	AUDIO_2	RFU	IPC_3/Audio_2
GPIO_8	28 AUDIO_3	AUDIO_3	RFU	IPC_4/Audio_3
GPIO_9	10 LED#1	LED#1	LED#1	IPC_5
GPIO_10	26 W_Disable2#	W_Disable2#	W_Disable2#	IPC_6
GPIO_11	23 Wake_On_WWAN	Wake_On_WWAN	Wake_On_WWAN	IPC_7
GPIO_12	25 DPR	DPR	DPR	IPC_8

Module Configuration Decodes				Module Type and Main Host Interface ¹	Port Configuration ²	State
CONFIG_0 (Pin 21)	CONFIG_1 (Pin 69)	CONFIG_2 (Pin 75)	CONFIG_3 (Pin 1)			
GND	GND	GND	GND	SSD - SATA	N/A	
GND	NC	GND	GND	SSD - PCIe	N/A	0
GND	GND	NC	GND	WWAN - PCIe	0	1
GND	NC	NC	GND	WWAN - PCIe	1	2
GND	GND	GND	NC	WWAN - USB 3.0	0	3
GND	NC	GND	NC	WWAN - USB 3.0	1	4
GND	GND	NC	NC	WWAN - USB 3.0	2	5
GND	NC	NC	NC	WWAN - USB 3.0	3	6
NC	GND	GND	GND	WWAN - SSIC	0	7
NC	NC	GND	GND	WWAN - SSIC	1	8
NC	GND	NC	GND	WWAN - SSIC	2	9
NC	NC	NC	GND	WWAN - SSIC	3	10
NC	GND	GND	NC	WWAN - PCIe	2	11
NC	NC	GND	NC	WWAN - PCIe	3	12
NC	GND	NC	NC	RFU	N/A	13
NC	NC	NC	NC	No Module Present	N/A	15

GNU GPLv3
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Purism SPC
Sheet: /WWAN M.2/
File: wwan_m2.sch

Title: WWAN M.2

Size: A4 Date: 2018-06-06 Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7 Id: 15/24



RGMII 10/100/1000 Ethernet

3V3_P FB1701 BLM18PG121SN1D C1703 C1705 1uF 220nF GND C1704 C1706 10uF 220nF GND U1701 4 16 29 10 3 VDD33 AVDD33 VDDIO_REG VDDH_REG LX DVDDL 47 8 44 13 19 AVDDL1 AVDDL2 AVDDL3 AVDDL4 PWR_FLAG ENET_2V5 ENET_2V5 C1707 C1708 C1710 220nF 1uF 1uF GND L1701 4.7uH ENET_1V1 C1713 C1716 10uF 10uF GND 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 GREEN LED_LINK10_100 R1724 270 LED_LINK1000 R1725 270 GND

ENET_RD0 R1701 10k ENET_2V5 R1702 NC R1703 10k ENET_2V5 R1704 NC R1705 10k LED_ACT R1706 10k ENET_RX_CTL R1707 10k ENET_RD2 R1708 10k ENET_RXC R1709 10k ENET_RD3 R1710 10k LED_LINK1000 R1711 10k LED_LINK10_100 R1712 10k 3V3_P R1714 10k ENET_2V5 R1716 10k R1717 10k R1718 10k ENET_1V1 R1721 2.37k R1719 NC R1720 NC ENET_MDIO ENET_RST ENET_WoL ENET_INT J1701 TEST_1P J1702 TEST_1P CLK02 R1713 NC R1715 NC GND C1701 22pF Y1701 25MHz C1702 22pF R1722 2.37k 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_CLK_25M 25 VDDH_REG LED_LINK10_100 26 LED_LINK1000 24 LED_LINK1000 23 LED_ACT 6 XTLO 7 XTLO 9 RBIAS AR8031 49 GND

ETH_TRX0_P TD1+ 2 J1703 TX1+ J1 TX1+ ETH_TRX0_N TD1- 3 TX1- J2 TX1- ETH_TRX1_P TD2+ 4 TX2+ J3 TX2+ ETH_TRX1_N TD2- 5 TX2- J6 TX2- ETH_TRX2_P TD3+ 6 TX3+ J4 TX3+ ETH_TRX2_N TD3- 7 TX3- J5 TX3- ETH_TRX3_P TD4+ 8 TX4+ J7 TX4+ ETH_TRX3_N TD4- 9 TX4- J8 TX4- VCC 1 GND 10 SH1 SH2 GREEN LED_LINK1000 LED_LINK1000 LED_ACT

100Ω diff-pairs!

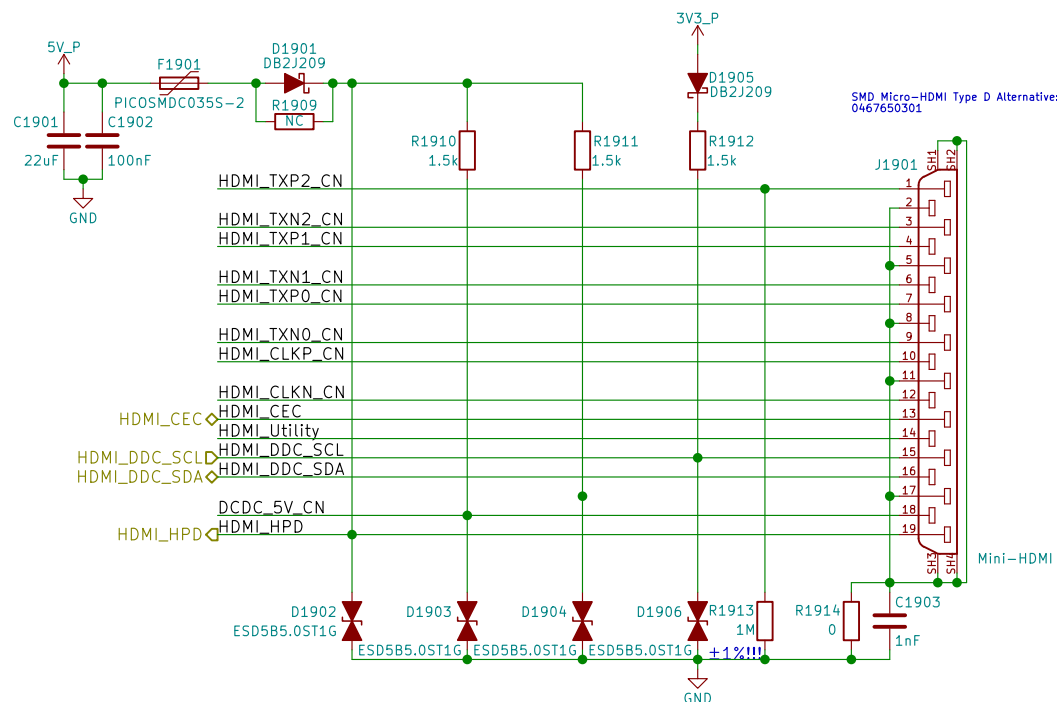
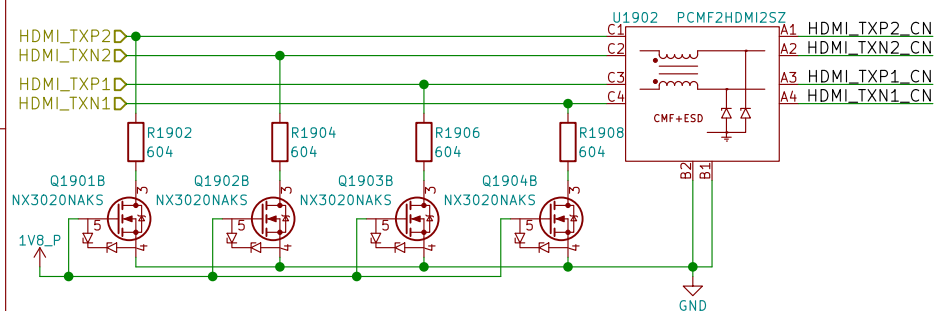
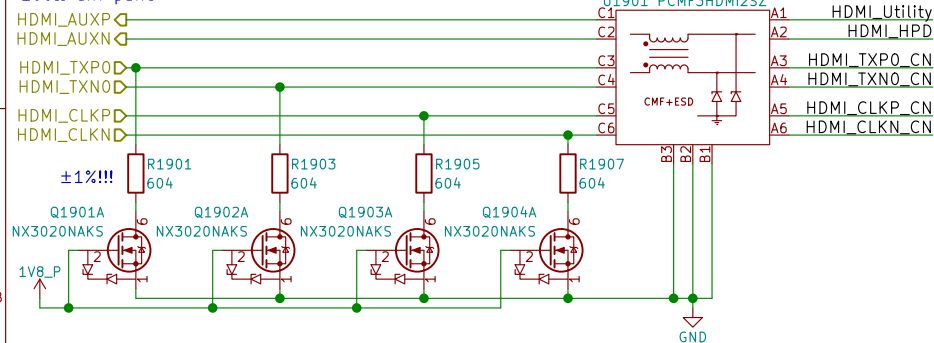
GNU GPLv3
Copyright 2018
Purism SPC
Sheet: /Ethernet/
File: ethernet.sch
Title: Ethernet
Size: A4 Date: 2018-06-06 Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7 Id: 17/24

Id: 17/24

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: 2018-06-06
----------	------------------

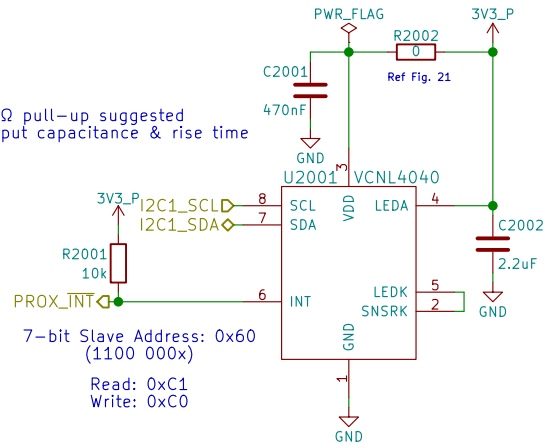
Size: A1	Date:
KiCad E.D.A.	kicad 4.0.7

Rev: v0.1.0

Id: 19/24

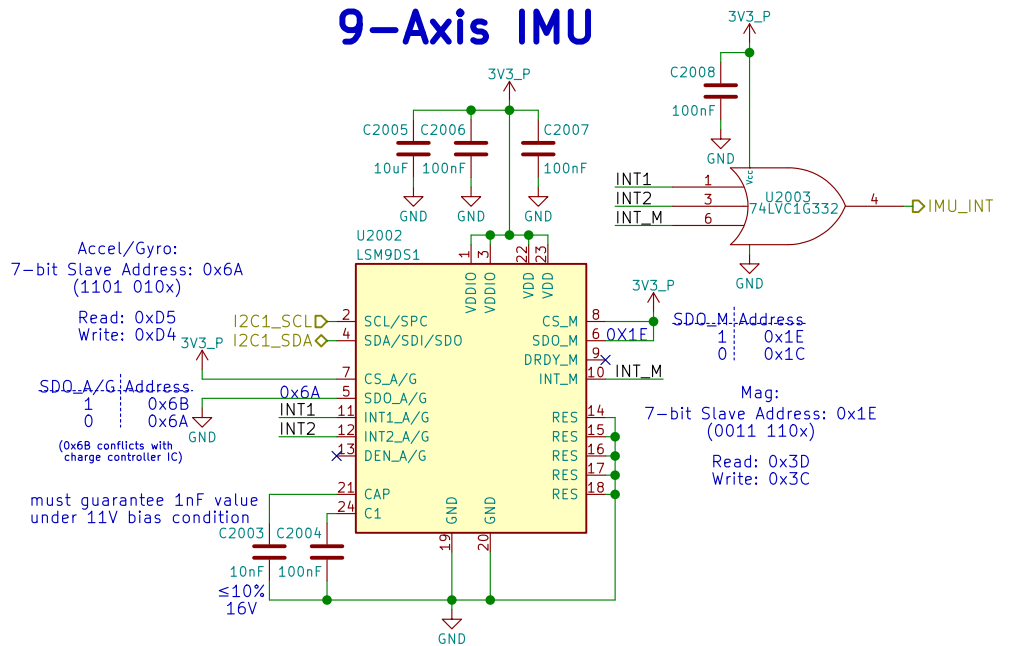
Proximity & Ambient Light

Note:
I2C 2.2kΩ pull-up suggested
check input capacitance & rise time



Reference:
<https://www.vishay.com/docs/84307/designingvcnl4040.pdf>
<http://www.vishay.com/docs/84931/vcni4040sensorboardfiles.pdf>

9-Axis IMU



Reference:
<http://www.st.com/en/evaluation-tools/steval-mki159v1.html>

Table 19. Accelerometer and gyroscope SAD+Read/Write patterns

Command	SAD[6:1]	SAD[0] = SA0	R/W	SAD+R/W
Read	110101	0	1	11010101 (D5h)
Write	110101	0	0	11010100 (D4h)
Read	110101	1	1	11010111 (D7h)
Write	110101	1	0	11010110 (D6h)

Table 20. Magnetic sensor SAD+Read/Write patterns

Command	SAD[6:2]	SAD[1] = SDO/SA1	SAD[0]	R/W	SAD+R/W
Read	00111	0	0	1	00111001 (39h)
Write	00111	0	0	0	00111000 (38h)
Read	00111	1	0	1	00111101 (3Dh)
Write	00111	1	0	0	00111100 (3Ch)

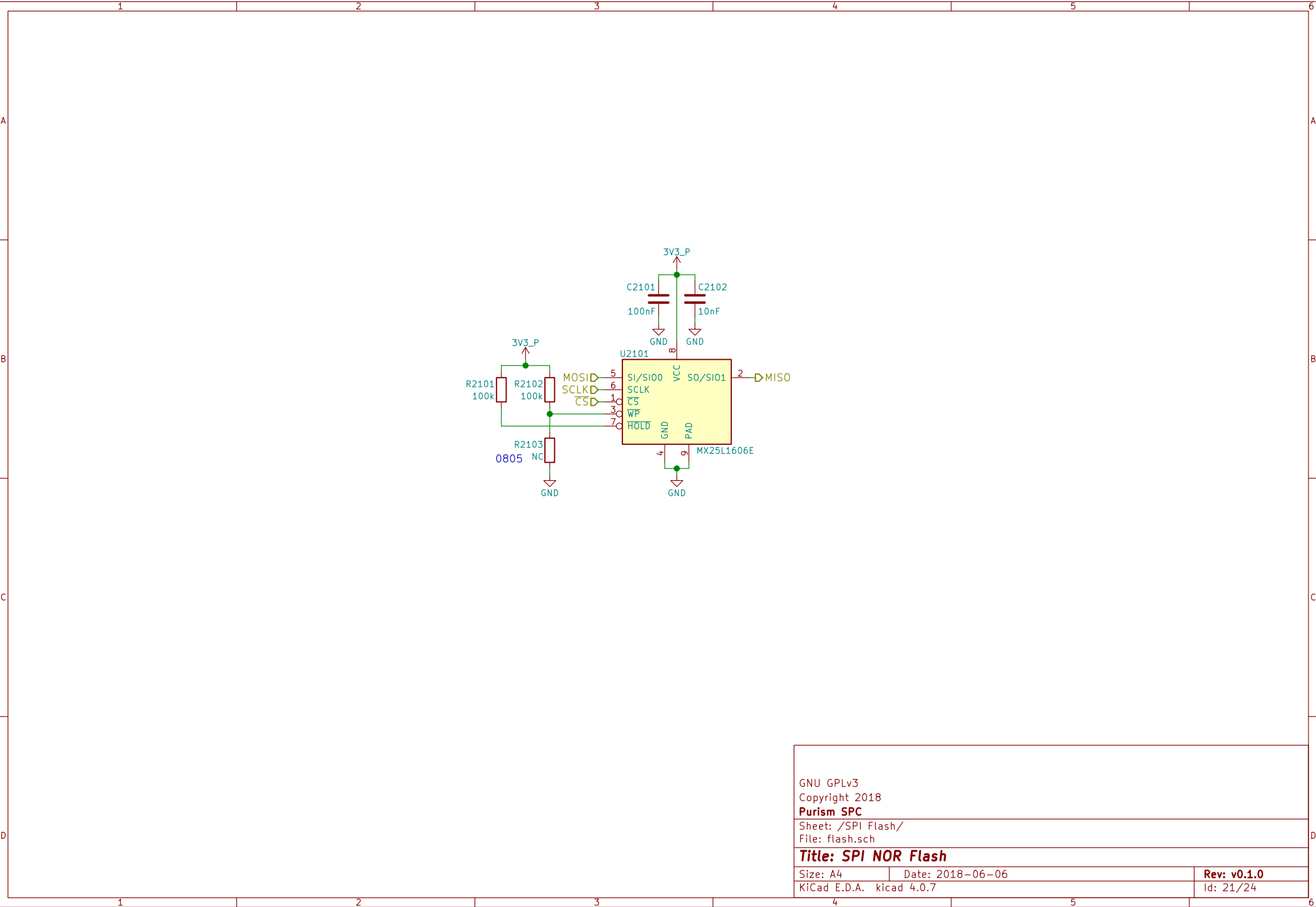
GNU GPLv3
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Purism SPC

Sheet: /Sensors/
File: sensors.sch

Title: Sensors

Size: A4
KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0
Id: 20/24



GNU GPLv3

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Purism SPC

Sheet: /SPI Flash/

File: flash.sch

Title: SPI NOR Flash

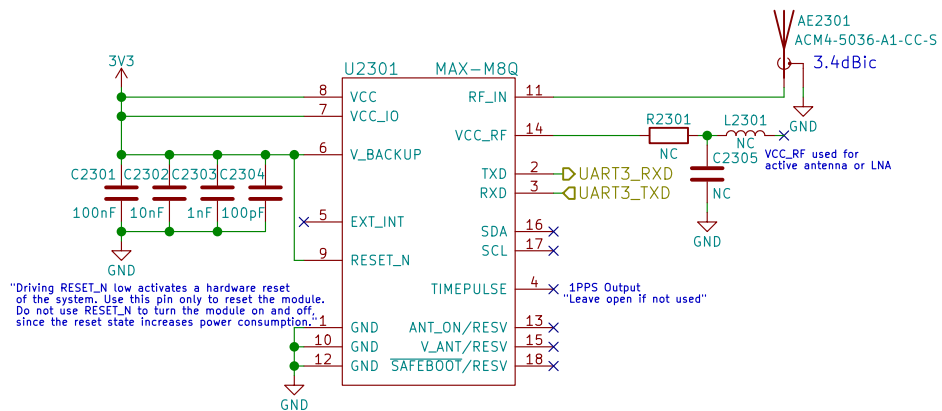
Size: A4

Date: 2018-06-06

Rev: v0.1.0

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Id: 21/24



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Purism SPC

Sheet: /GNSS/

File: gnss.sch

Title: GNSS

Size: A4 Date: 2018-06-06

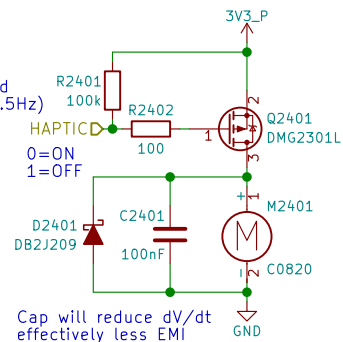
KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 23/24

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 Boom Precision
 connector installed (by request)!

Cheaper Motor Connector:
https://lcsc.com/product-detail/1-25T-Connectors_1-25T-1-2AW_C10832.html

Motor Source:
https://www.alibaba.com/product-detail/Coin-motor-vibration-dc-motor-cellphone_1994583657.html?spm=a2700.8443308.0.0.5aa13e5f1wxHgs
 Motor Datasheet:
<https://cloud.puri.sm/s/z8JR6DJ4KrJYzoW>

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Purism SPC

Sheet: /Haptic Motor/
 File: haptic.sch

Title: Haptic/Vibration Motor

Size: A4 Date: 2018-06-06

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Rev: v0.1.0

Id: 24/24