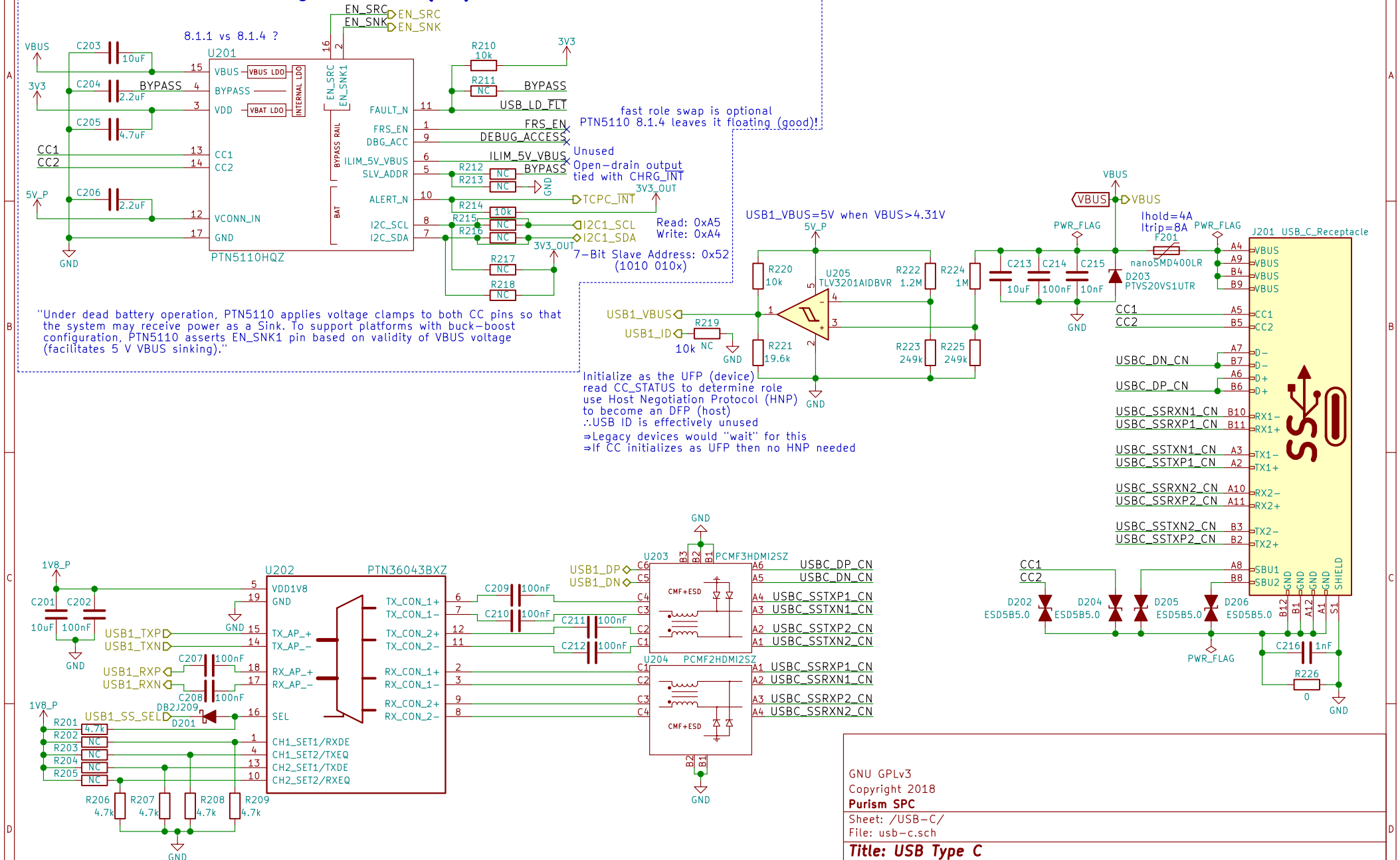


# USB-C TCPC – Config Channel (CC) and PD Role Controller



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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 4.0.6

**Rev: v0.1.0**  
Id: 2/24



(interpret RSOC% based on this plot)

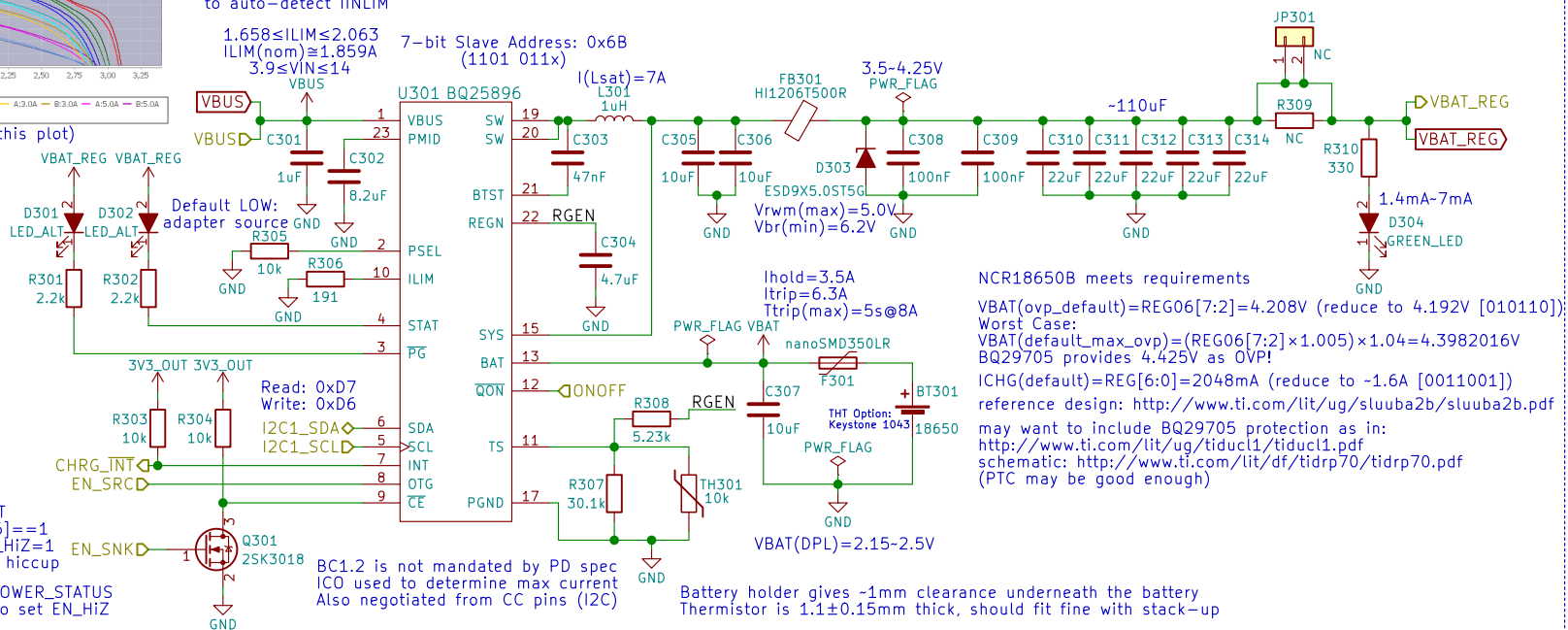
Drawing ~333.33mA, or consuming <1.2W, should give close to 10 hours going from 100% to 0% charge

use AUTO\_DPDM\_EN to auto-detect IINLIM

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

7-bit Slave Address: 0x6B (1101 011x)

# Battery Charge Controller



Reading PTN5110HQ's CC\_STATUS and POWER\_STATUS registers will tell TCPM (i.MX8M) when to set EN\_HI\_Z

Also, reading PTN5110HQ's CC\_STATUS and POWER\_STATUS registers will tell TCPM (i.MX8M) when to set OTG\_CONFIG=1 (this will also happen when PTN5110HQ sets EN\_SRC HIGH)

GNU GPLv3

Copyright 2018

Purism SPC

Sheet: /Battery/

File: battery.sch

Title: Battery

Size: A4

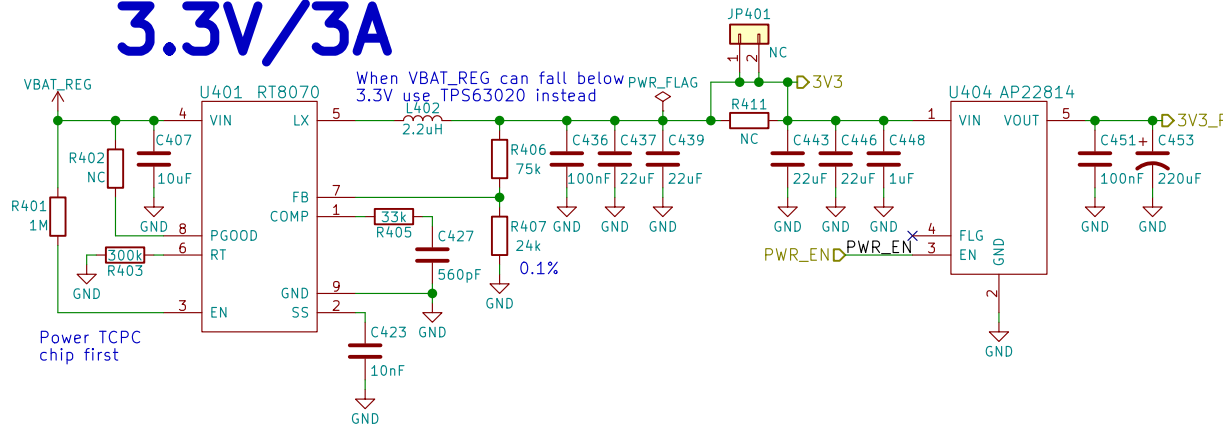
Date: 2018-06-06

KiCad E.D.A. kicad 4.0.6

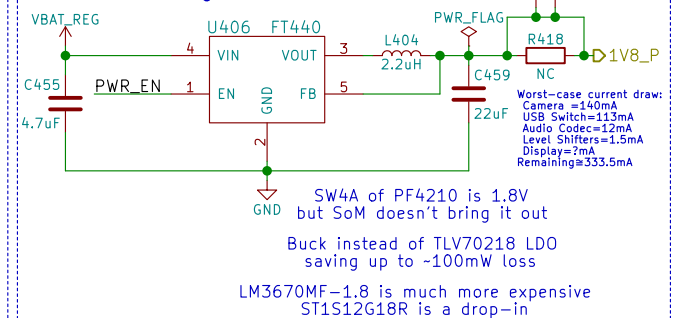
Rev: v0.1.0

Id: 3/24

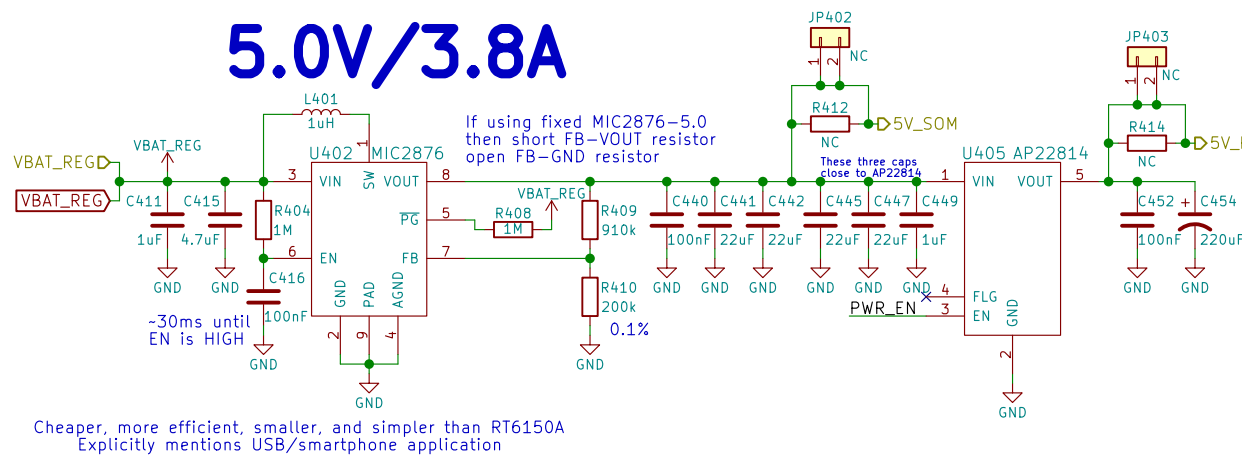
## 3.3V/3A



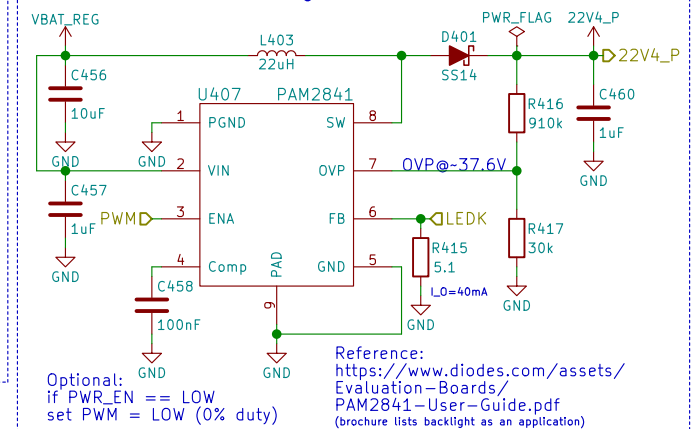
## 1.8V/600mA



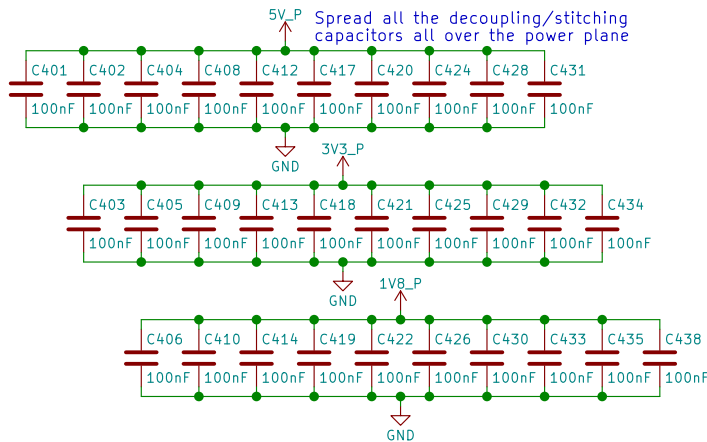
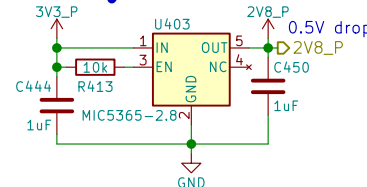
## 5.0V/3.8A



## 22.4V/40mA



## 2.8V/150mA



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**Purism SPC**

Sheet: /Power/  
File: power.sch

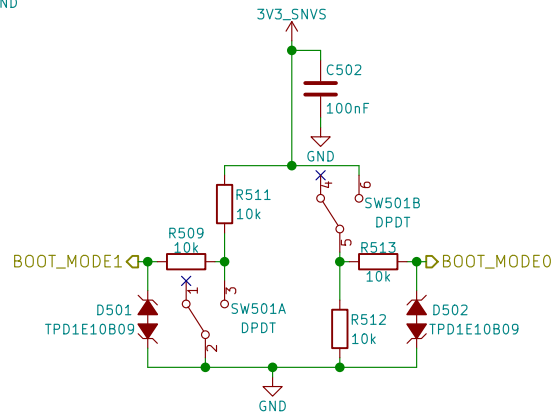
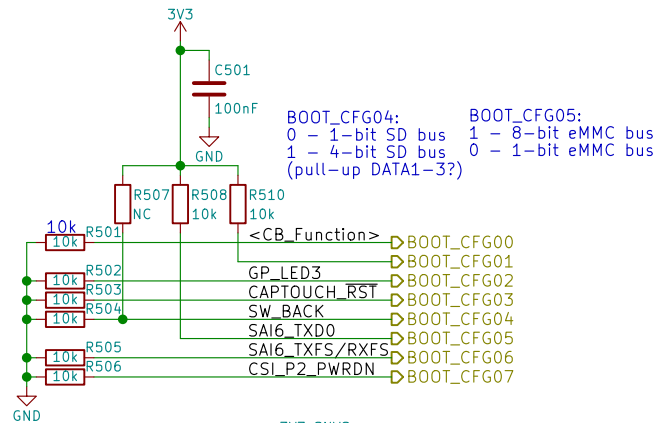
**Title: Power**

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

Date: 2018-06-06

Rev: v0.1.0

Id: 4/24

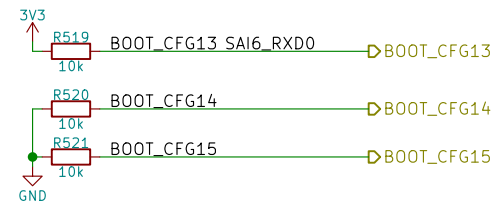
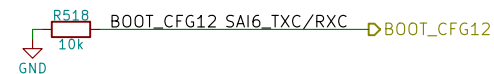
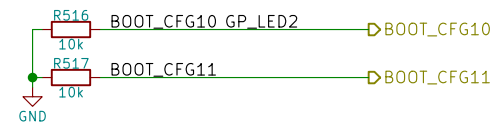
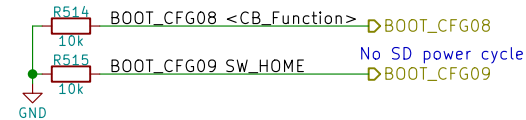


2->1: eMMC 2->3: USB (Serial Downloader)	
BOOT_MODE[1:0]	Boot Type
00	Boot From Fuses
01	Serial Downloader
10	Internal Boot
11	Reserved

Only eMMC

BOOT_CFG[14:12]		Boot device			
001		SD/eSD			
010		MMC/eMMC			
011		NAND			

Fuse	Config	Definition	GPIO <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: 2018-06-06

KiCad E.D.A. kicad 4.0.6

**Rev: v0.1.0**

Id: 5/24





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**Purism SPC**

Sheet: /UART Debug/  
File: uart.sch

**Title: UART Debug**

Size: A4 Date: 2018-06-06

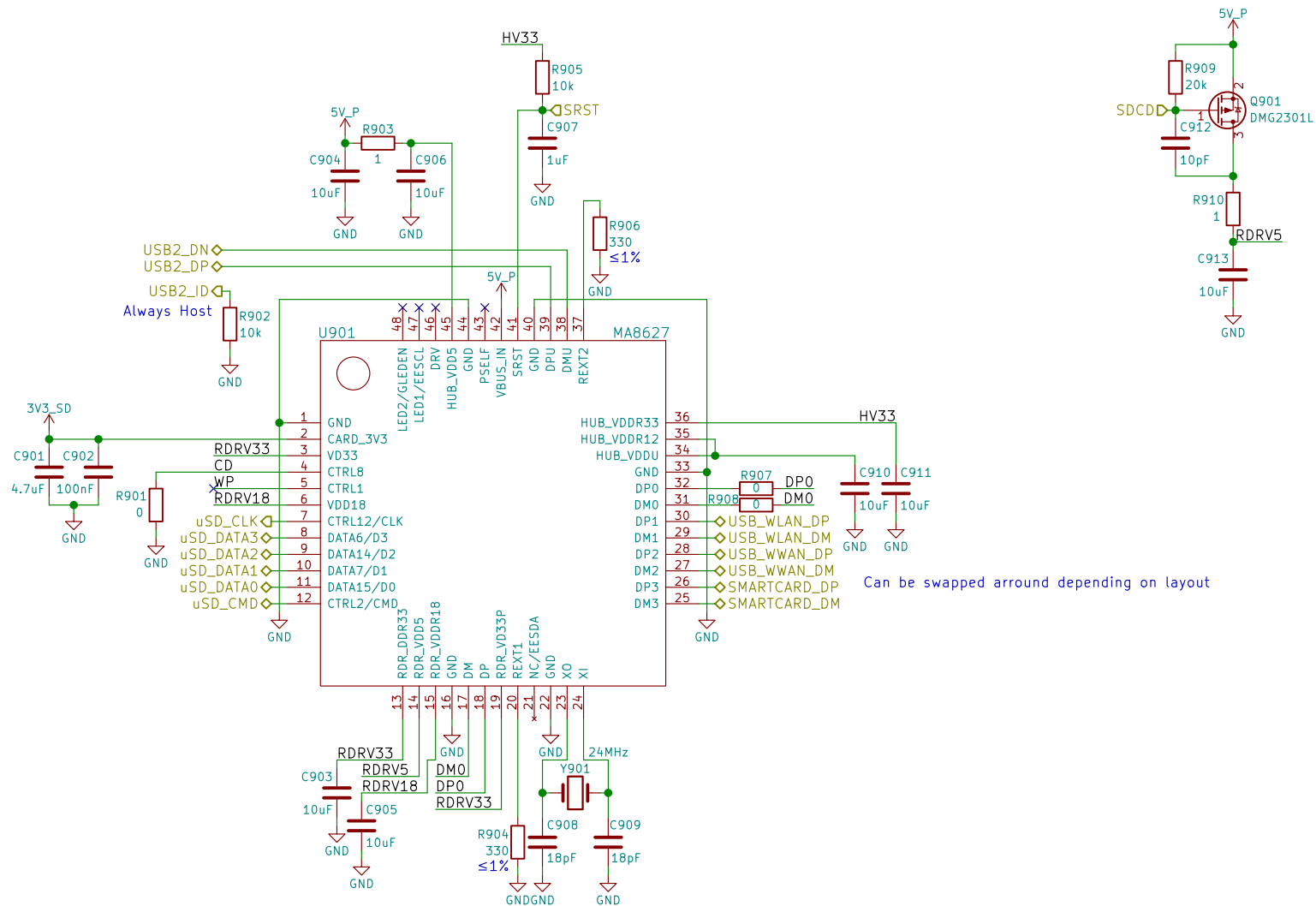
KiCad E.D.A. kicad 4.0.6

**Rev: v0.1.0**

Id: 7/24







GNU GPLv3

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**Purism SPC**

Sheet: /USB Hub + SDIO Bridge/

File: usb\_hub\_sdio.sch

**Title:**

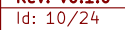
Size: A4

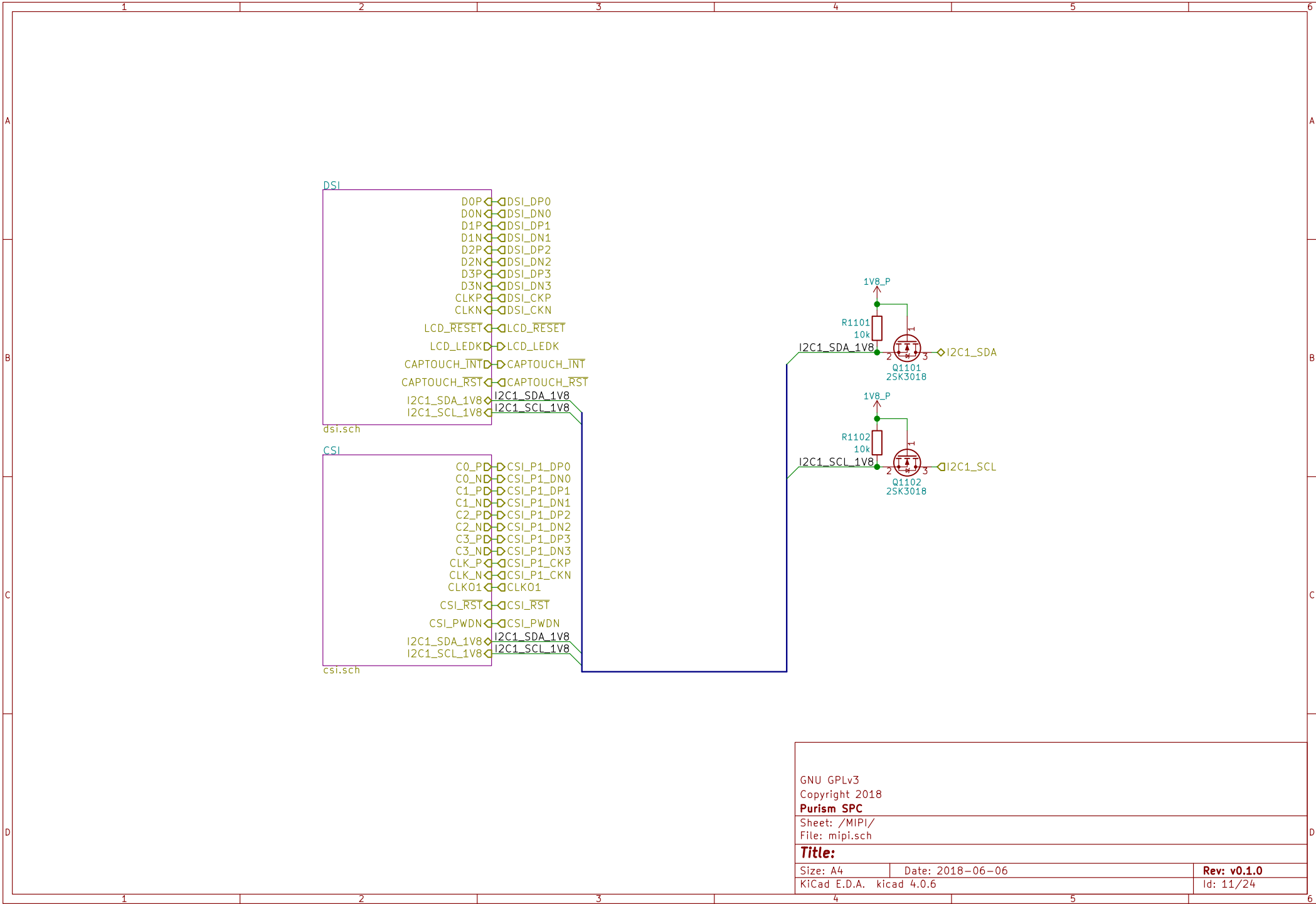
Date: 2018-06-06

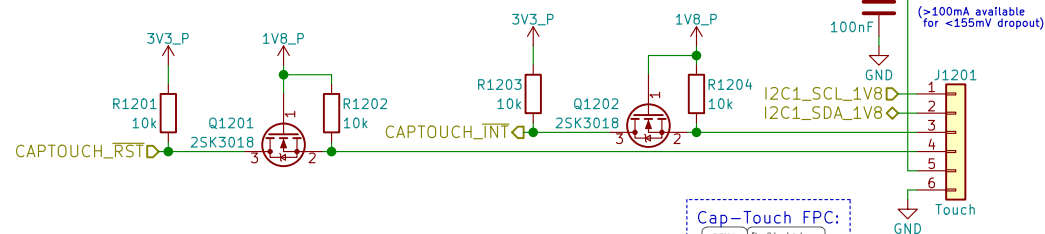
Rev: v0.1.0

KiCad E.D.A. kicad 4.0.6

Id: 9/24



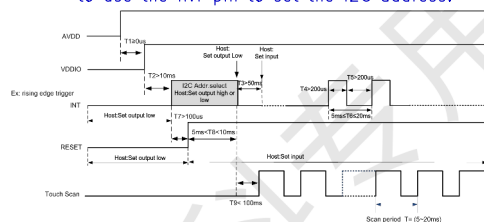




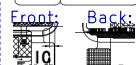
The upper 7 bits are the address, and bit 0 is used to select read or write. GT5688 has two slave device addresses to choose from:

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:

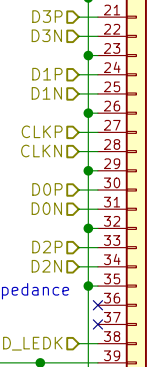
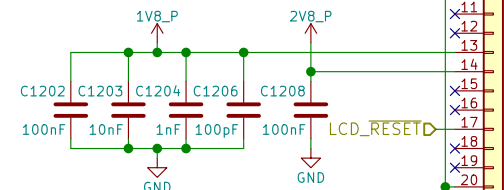


Pin#	Definition
1	SCL
2	SDA
3	INT
4	RESET
5	VDD2_R5
6	GND

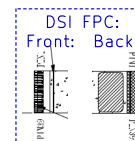
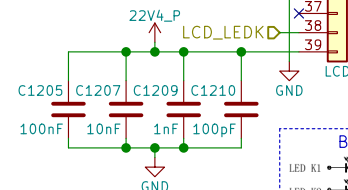


LCD PN:  
Shenzhen Jinghong Electronics Co., Ltd.  
JH057N00900

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



100Ω Differential Impedance



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Purism SPC

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

Title: MIPI DSI

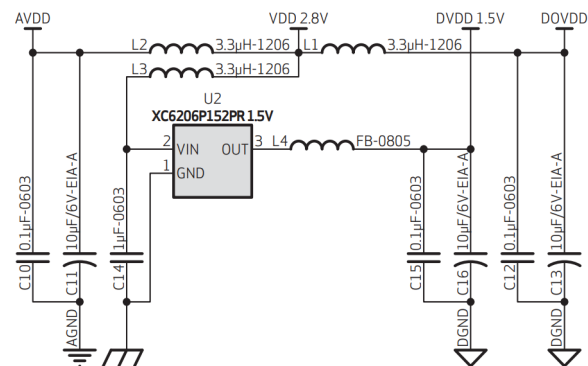
Size: A4 Date: 2018-06-06

KiCad E.D.A. kicad 4.0.6

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:

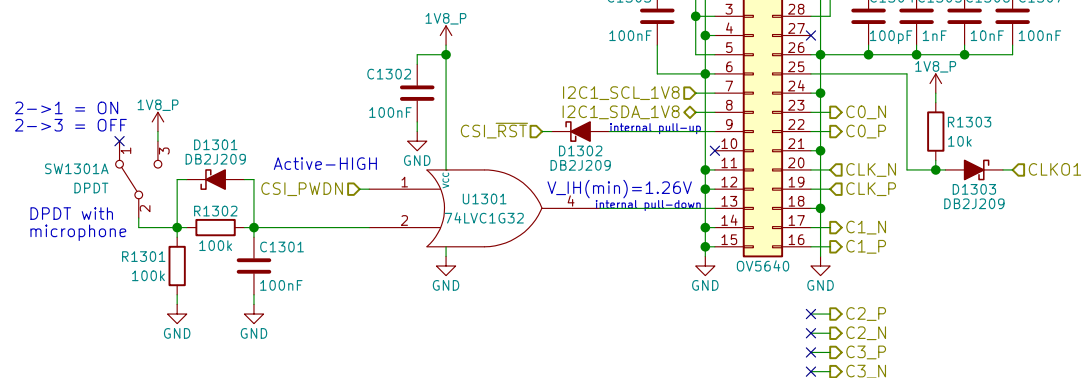
1. when DOVDD and AVDD are turned ON, make sure DOVDD becomes stable before AVDD becomes stable
2. PWDN is active high with an asynchronized design (does not need clock)
3. PWDN pin tied to digital ground if it is not controlled.
4. if PWDN pin is controlled as below, for PWDN to go low, power must first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

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](https://cdn.sparkfun.com/datasheets/Sensors/LightImaging/OV5640_datasheet.pdf)

GNU GPLv3  
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**Purism SPC**

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

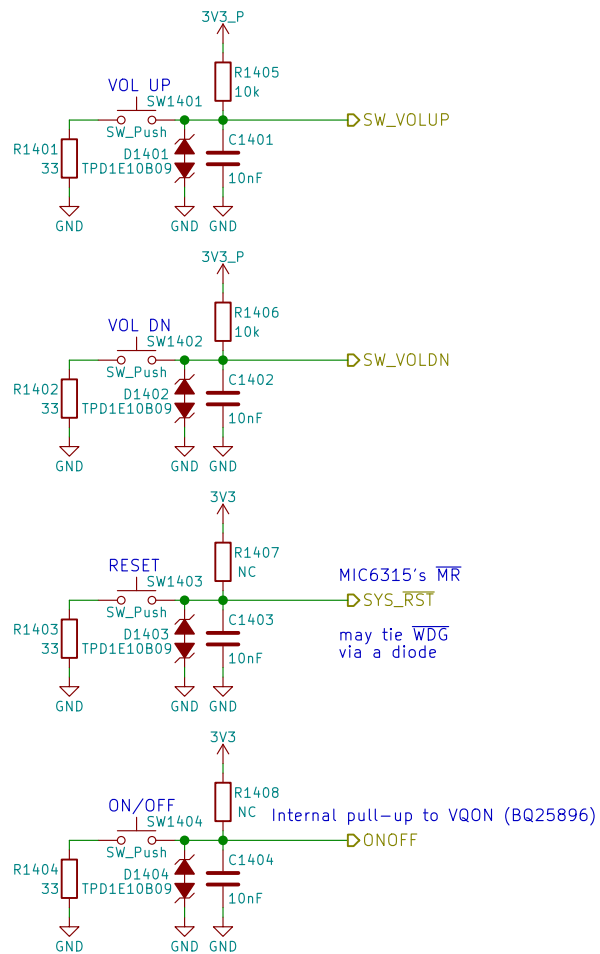
**Title:**

Size: A4 Date: 2018-06-06

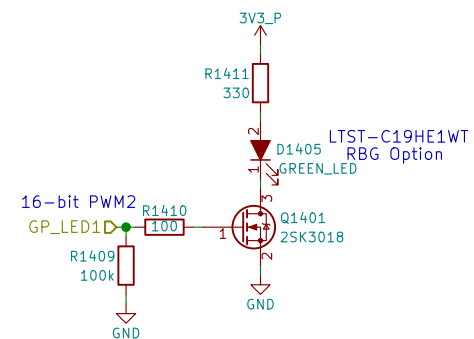
KiCad E.D.A. kicad 4.0.6

**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**

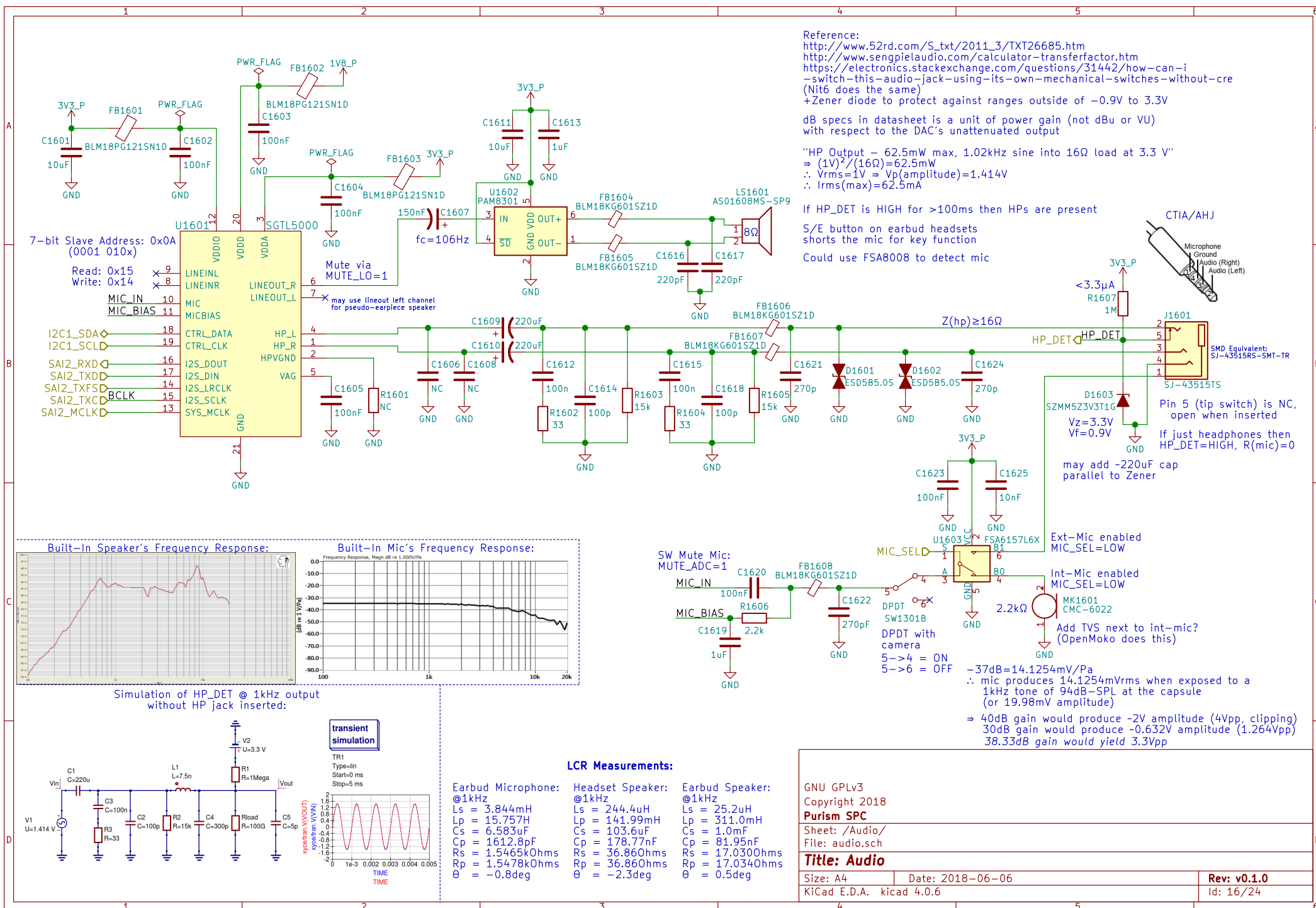
Size: A4 Date: 2018-06-06

KiCad E.D.A. kicad 4.0.6

**Rev: v0.1.0**

Id: 14/24







# RGMII 10/100/1000 Ethernet

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 4.0.6		Id: 17/24

Id: 17/24

RS9116 NC:  
RTS, CTS, BT\_HOST\_WAKE

RS9116 datasheet says  
no WIFI\_WAKE  
but the schematic has it

RedPine RS9116 MB0  
Requires 5V on  
Pin 54 for USB!

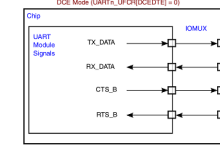
WIFI\_CLK  
WIFI\_CMD  
WIFI\_DATA0  
WIFI\_DATA1  
WIFI\_DATA2  
WIFI\_DATA3  
WIFI\_WAKE

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

Module: Table 23  
Socket: Table 46  
3V3\_P  
M.2 Key E

SoC's IN/OUT

6.2 M.2 Signal Directions  
UARTn\_UFCR[DCEDTE]=0 on POR



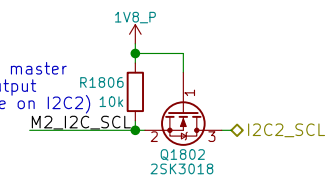
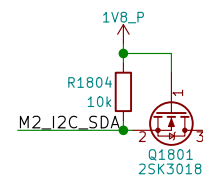
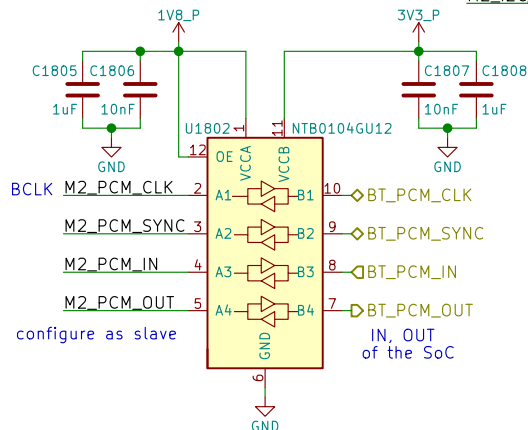
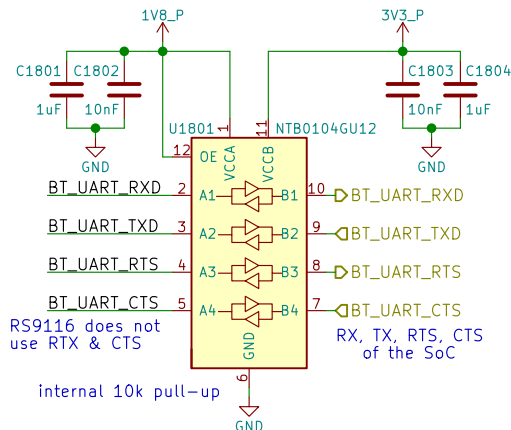
TX output  
RX input  
CTS output  
RTS input  
⇒ TX→RX  
RX→TX  
CTS→CTS  
RTS→RTS

Pin 54 on RS9116 is  
USB\_VBUS Sink

RS9116 SUSCLK  
is a GPIO (unused)  
SUSCLK

W\_DISABLE2  
W\_DISABLE1  
M2\_I2C\_SDA  
M2\_I2C\_SCL

RS9116 is an I2C master  
⇒ its SCL is an output  
(ok bc only device on I2C2)



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Purism SPC

Sheet: /WLAN+BT M.2/  
File: wifi\_bt\_m2.sch

Title: WLAN+BT M.2

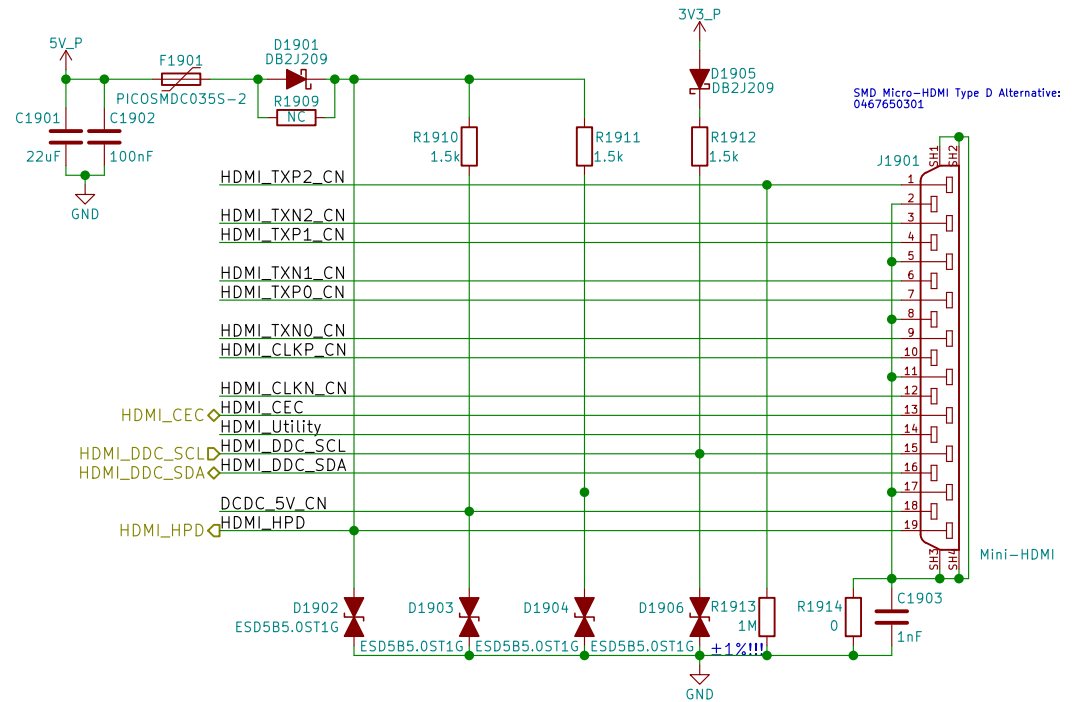
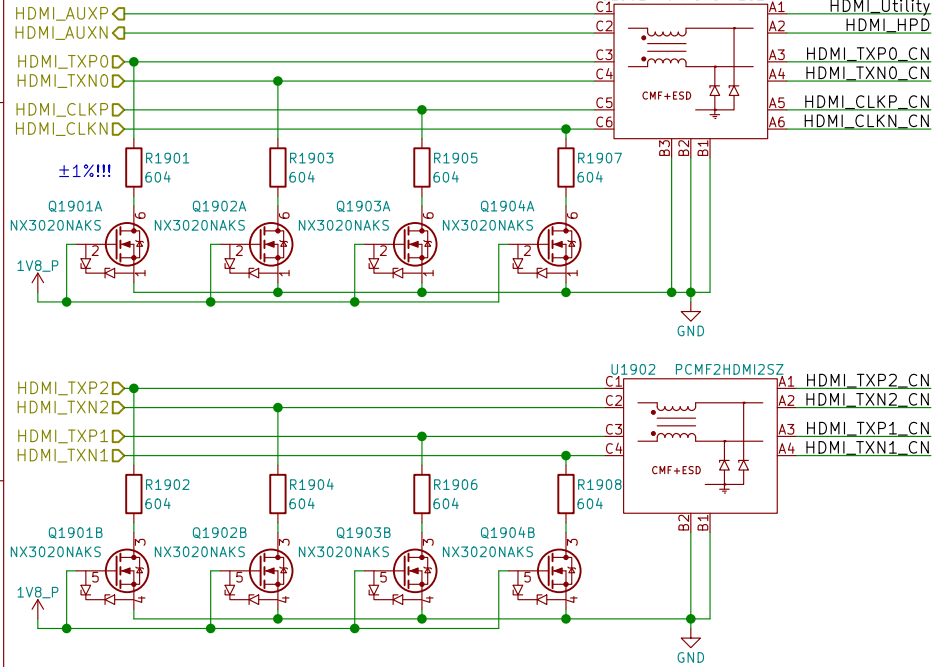
Size: A4 Date: 2018-06-06  
KiCad E.D.A. kicad 4.0.6

Rev: v0.1.0  
Id: 18/24

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

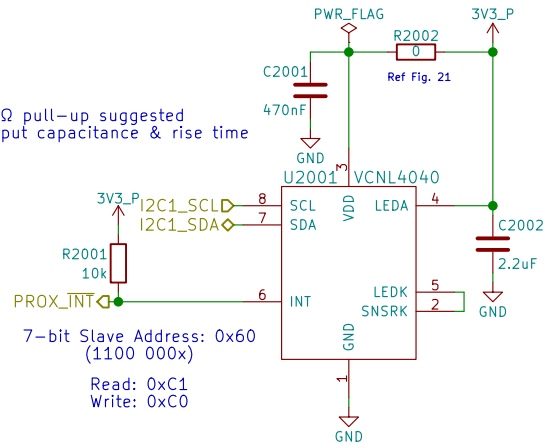
**Title: HDMI**

Size: A4 Date: 2018-06-06  
KiCad E.D.A. kicad 4.0.6

**Rev: v0.1.0**  
Id: 19/24

## Proximity & Ambient Light

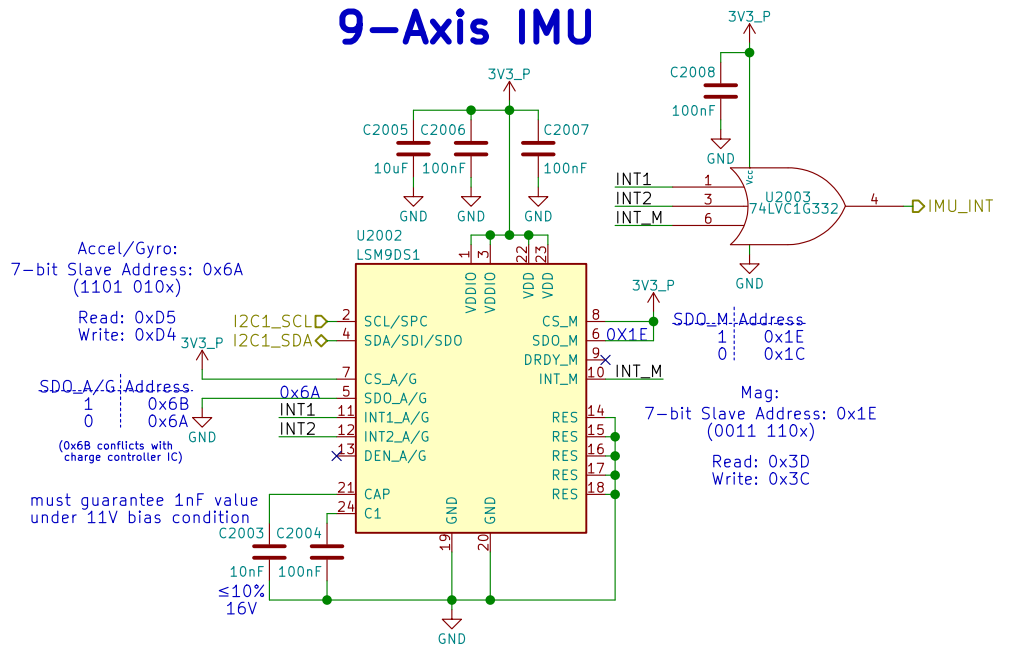
Note:  
I2C 2.2kΩ pull-up suggested  
check input capacitance & rise time



7-bit Slave Address: 0x60  
(1100 000x)  
Read: 0xC1  
Write: 0xC0

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

## 9-Axis IMU



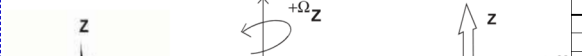
Accel/Gyro:  
7-bit Slave Address: 0x6A  
(1101 010x)  
Read: 0xD5  
Write: 0xD4

SDD\_A/G: Address:  
1 0x6B  
0 0x6A  
(0x6B conflicts with  
charge controller IC)

must guarantee 1nF value  
under 11V bias condition

Mag:  
7-bit Slave Address: 0x1E  
(0011 110x)  
Read: 0x3D  
Write: 0x3C

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



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)



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)

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Copyright 2018  
**Purism SPC**

Sheet: /Sensors/  
File: sensors.sch

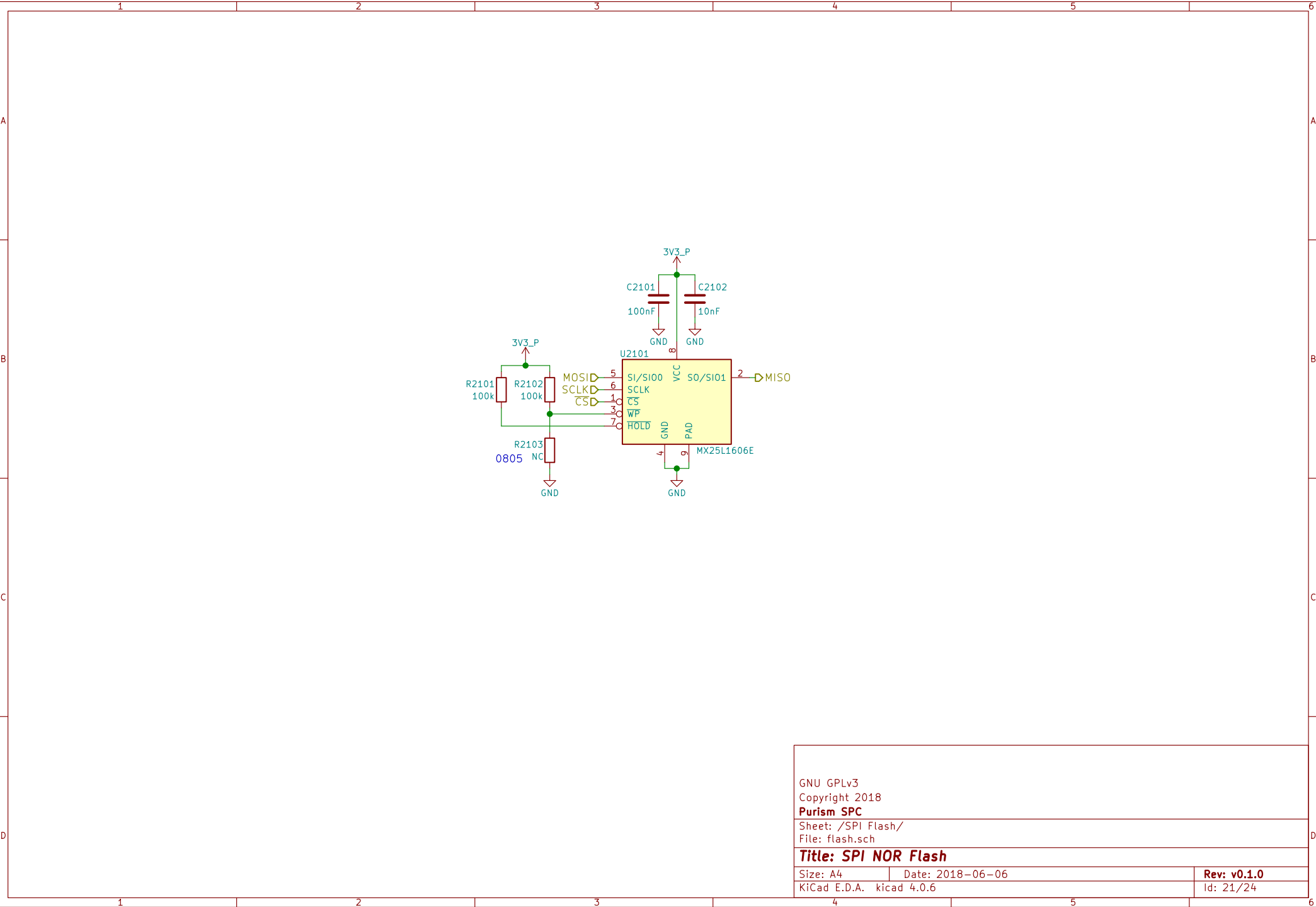
**Title: Sensors**

Size: A4 Date: 2018-06-06

KiCad E.D.A. kicad 4.0.6

**Rev: v0.1.0**

Id: 20/24



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**Purism SPC**

Sheet: /SPI Flash/  
File: flash.sch

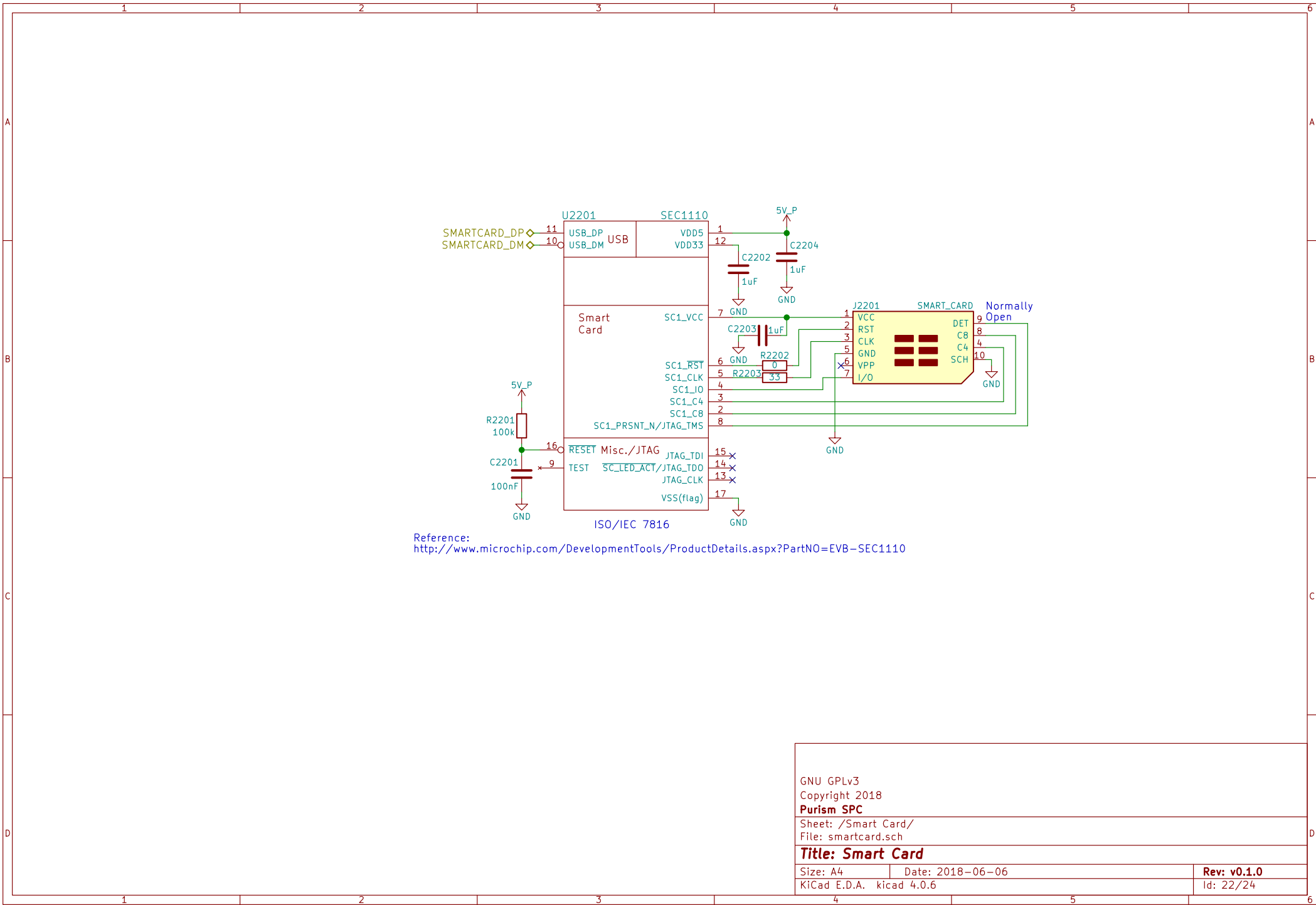
**Title: SPI NOR Flash**

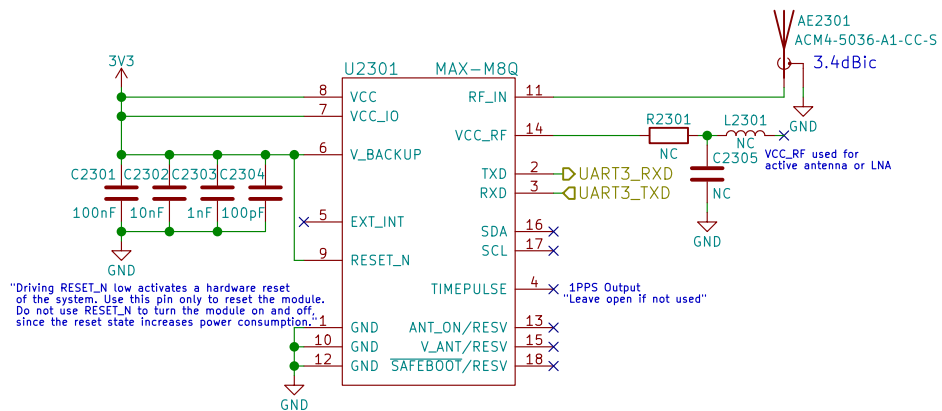
Size: A4 Date: 2018-06-06

KiCad E.D.A. kicad 4.0.6

**Rev: v0.1.0**

Id: 21/24





Reference:  
[https://www.u-blox.com/sites/default/files/MAX-8-M8-FW3\\_HardwareIntegrationManual\\_1503005929.pdf](https://www.u-blox.com/sites/default/files/MAX-8-M8-FW3_HardwareIntegrationManual_1503005929.pdf)

GNU GPLv3  
 Copyright 2018  
**Purism SPC**

Sheet: /GNSS/  
 File: gnss.sch

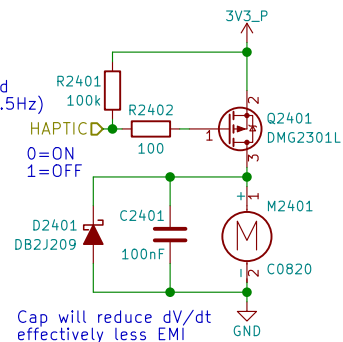
**Title: GNSS**

Size: A4 Date: 2018-06-06  
 KiCad E.D.A. kicad 4.0.6

**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)!

Cap will reduce  $dV/dt$   
 effectively less EMI

Cheaper 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)

Motor Source:  
[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)  
 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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