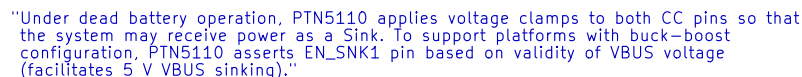


USB-C



fast role swap is optional
PTN5110 8.1.4 leaves it floating (good)!

Unused
Open-drain output
tied with CHRG_INT

Read: 0xA5
 Write: 0xA4
 7-Bit Slave Address: 0x52
 (1010 010x)

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

Size: A4	Date: 2018-06-18
----------	------------------

Size: 711	Date:
KiCad E.D.A.	kicad 4.0.7

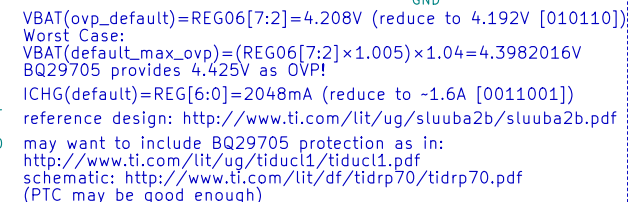
eric.kuzmenko@puri.sm
angus.ainslie@puri.sm
nicole.faeber@puri.sm
christian.schilmoeller@puri.sm

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

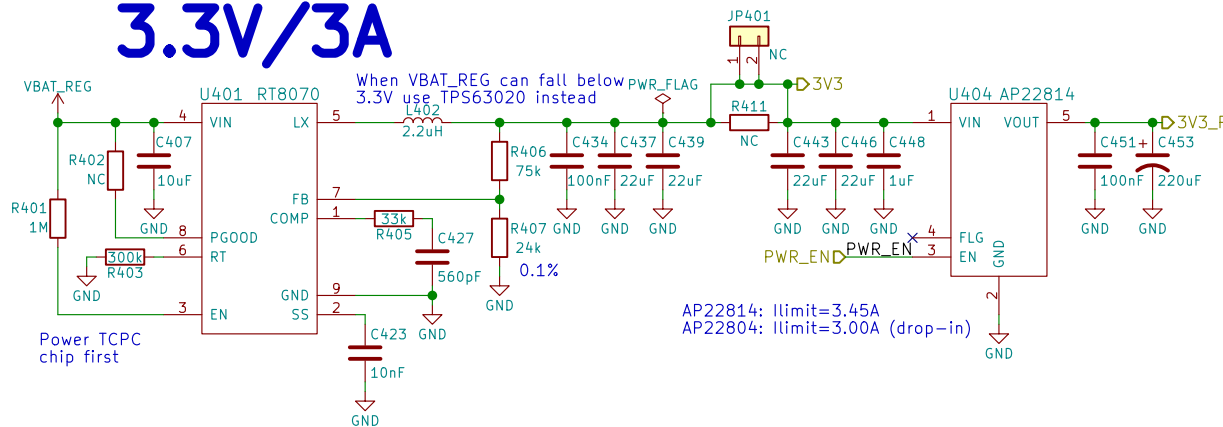
$$\begin{aligned} 1.658 \leq I_{LIM} \leq 2.063 \\ I_{LIM(nom)} \cong 1.859A \\ 3.9 \leq V_{IN} \leq 14 \end{aligned}$$
$$I(L_{sat}) = 7A$$


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)

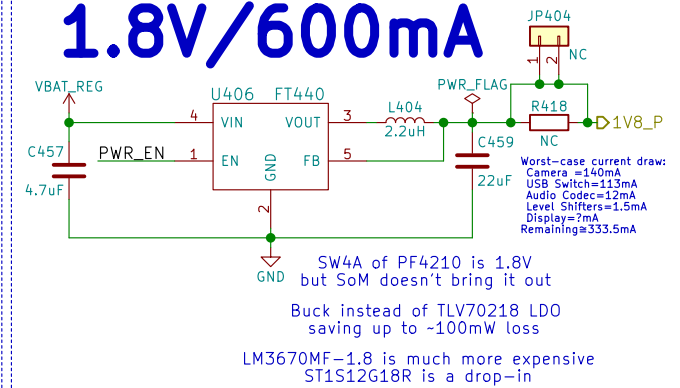
Battery holder gives ~1mm clearance underneath the battery
Thermistor is 1.1 ± 0.15 mm thick, should fit fine with stack-up
Battery holder seems to fit up to ~68.88mm long batteries
need to test 18650 protected cells which are ~69.35mm long

Size: A4	Date: 2018-06-18	Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7		Id: 3/24

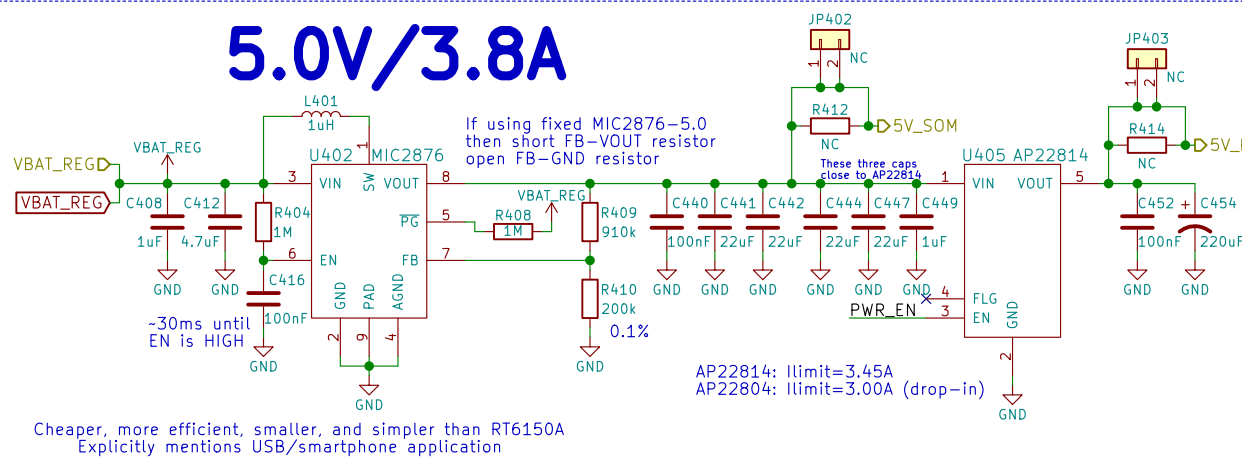
3.3V/3A



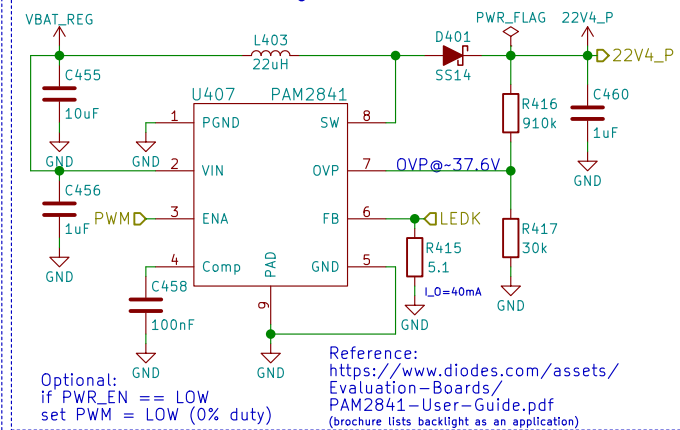
1.8V/600mA



5.0V/3.8A



22.4V/40mA



2.8V/150mA



Power

Power

Purism

Copyright 2018 GNU GPLv3

Sheet: /Power/
File: power.sch

Size: A4 Date: 2018-06-18
KiCad E.D.A. kicad 4.0.7

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

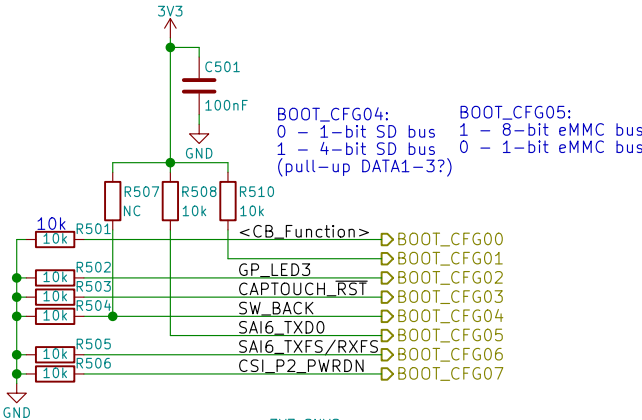
nicole.farber@puri.sm

christian.schilmoeller@puri.sm

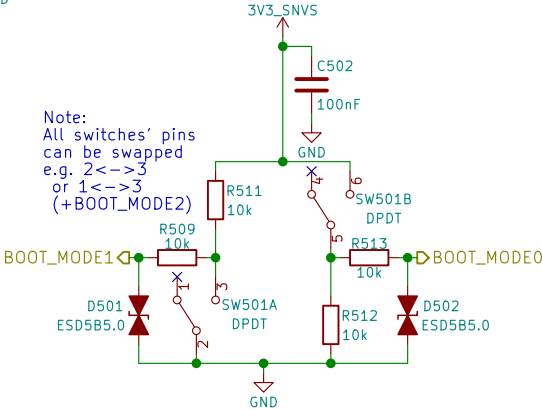
Rev: v0.1.0

Id: 4/24

Boot Config



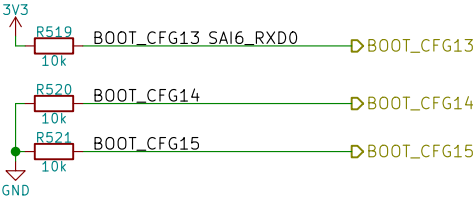
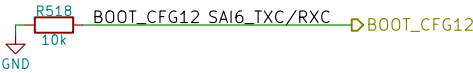
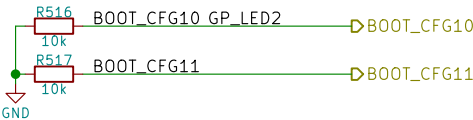
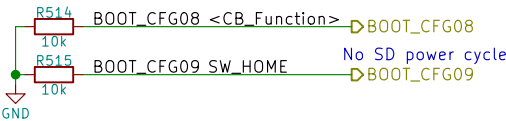
BOOT_CFG04: 0 - 1-bit SD bus
1 - 4-bit SD bus (pull-up DATA1-3?)
BOOT_CFG05: 1 - 8-bit eMMC bus
0 - 1-bit eMMC bus




Note:
All switches' pins
can be swapped
e.g. 2<->3
or 1<->3
(+BOOT_MODE2)

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



Boot Configuration

Purism

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Sheet: /Boot Config/
File: boot.sch

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

Date: 2018-06-18

Rev: v0.1.0
Id: 5/24

eric.kuzmenko@puri.sm
angus.ainstlie@puri.sm
nicole.ferber@puri.sm
christian.schilmoeller@puri.sm

Real-Time Clock



Note:
Datasheet says slave address is 0xD0
with a R/W bit appended, since 0xD must
be 4-bits wide the actual 7-bit address is
0x68 (110 1000), and becomes 0xD0 during a
write operation (1101 0000)

Reference:
https://github.com/HIO-Project/linux-imx6-nano-imx_3.10.17_1.0.1_ga/blob/8848e94b2f889fe44f6736e2d4c98851a2282275/arch/arm/boot/dts/imx6qdl-mtp.dtsi#L351

RTC



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Sheet: /RTC/

File: rtc.sch

Size: A4

Date: 2018-06-18

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 6/24

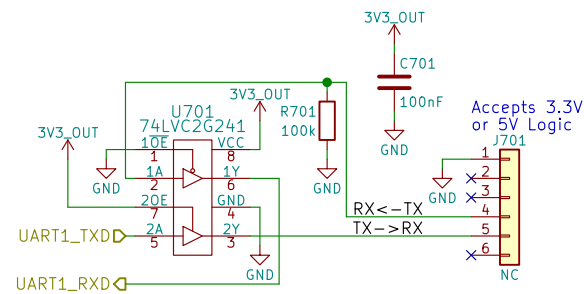
eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

nicole.farber@puri.sm

christian.schilmoeller@puri.sm

UART Debug



UART Debug



Copyright 2018 GNU GPLv3

Sheet: /UART Debug/
File: uart.sch

Size: A4 Date: 2018-06-18
KiCad E.D.A. kicad 4.0.7

eric.kuzmenko@puri.sm
angus.ainstlie@puri.sm
nicole.farber@puri.sm
christian.schilmoeller@puri.sm

Rev: v0.1.0
Id: 7/24

JTAG



JTAG



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Sheet: /JTAG/

File: jtag.sch

Size: A4

Date: 2018-06-18

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

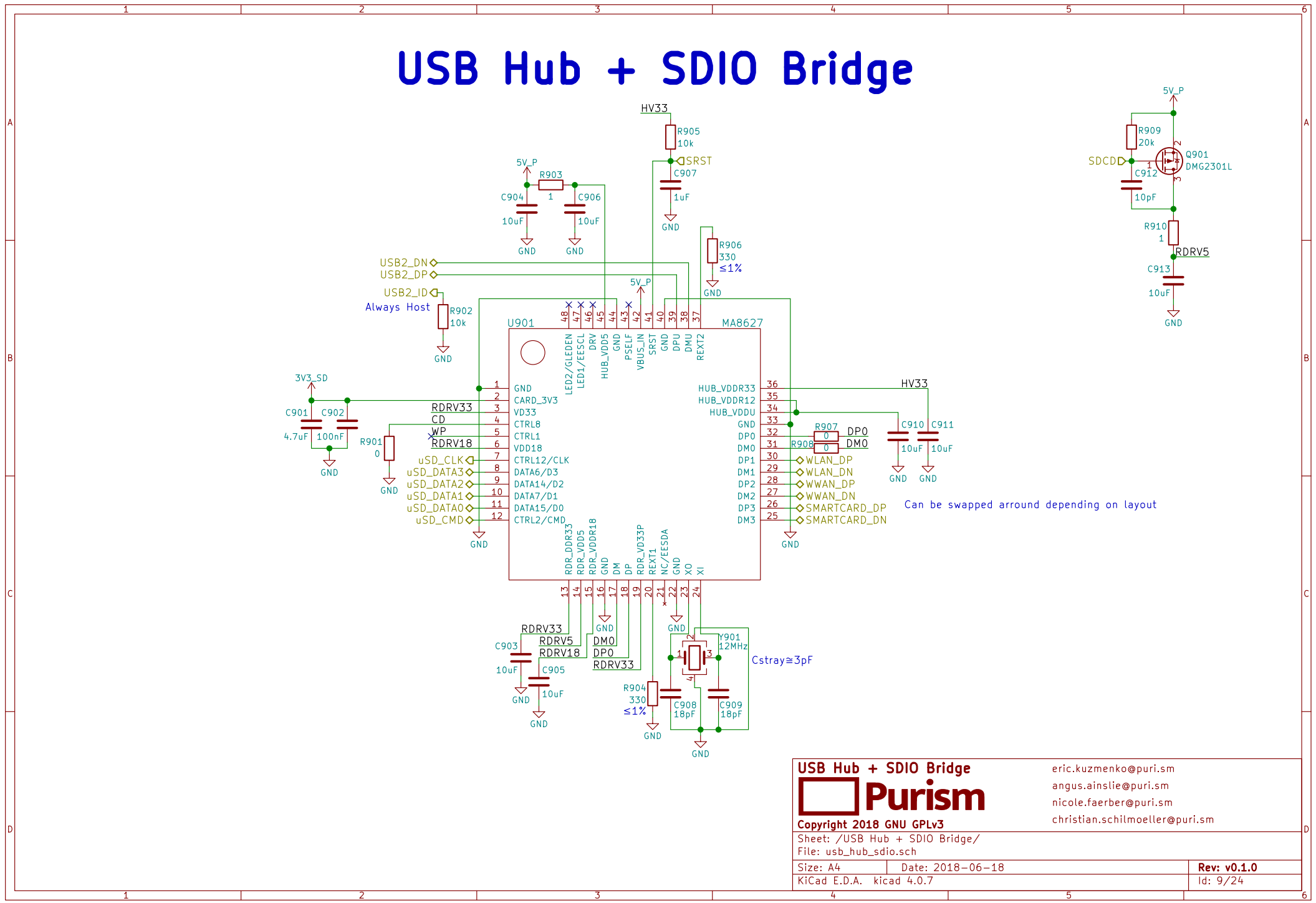
Id: 8/24

eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

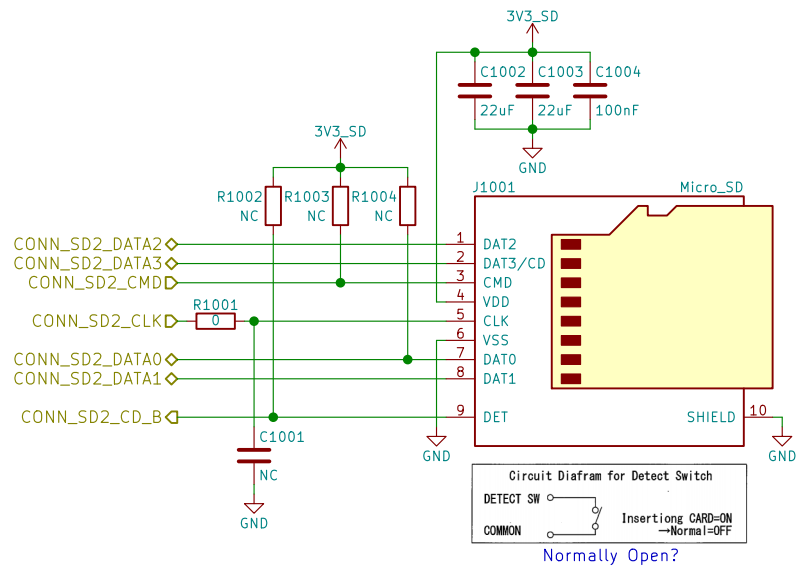
nicole.farber@puri.sm

christian.schilmoeller@puri.sm

[illegible][illegible]

Id: 9/24

μSD



uSD Card



Purism

Copyright 2018 GNU GPLv3

Sheet: /uSD Card/

File: sd.sch

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

nicole.farber@puri.sm

christian.schilmoeller@puri.sm

Size: A4

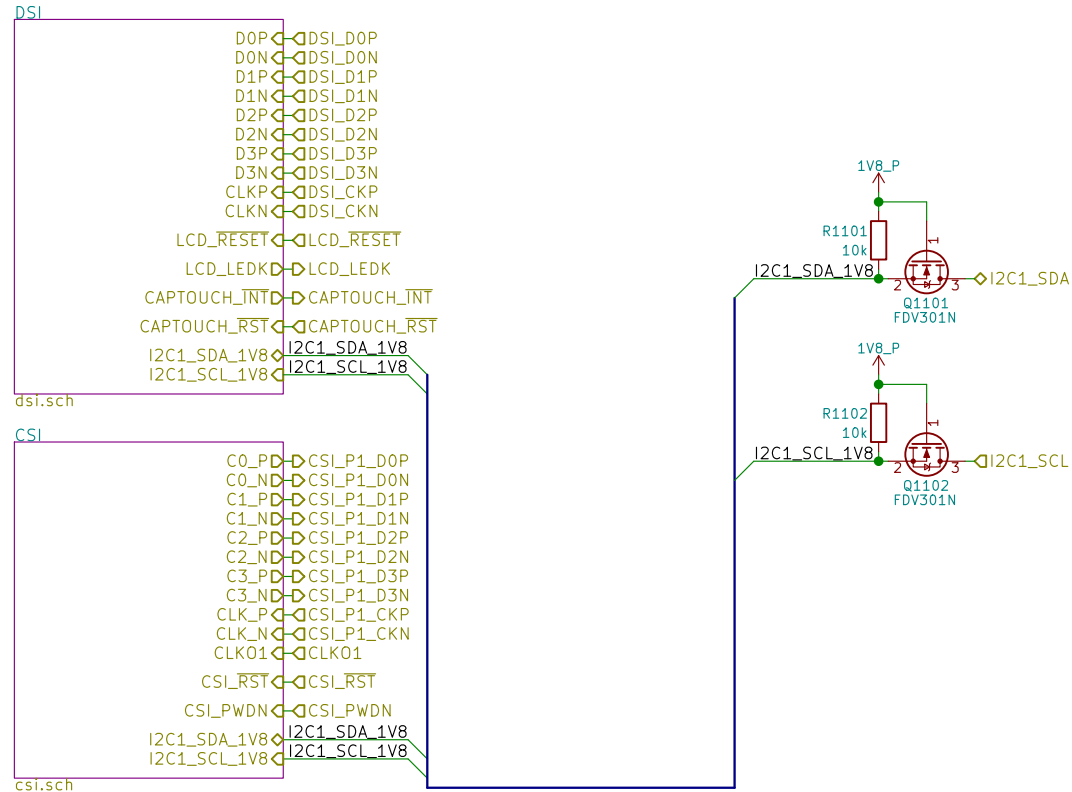
Date: 2018-06-18

Rev: v0.1.0

KiCad E.D.A.	kicad 4.0.7
--------------	-------------

Id: 10/24

MIPI



MIPI



Copyright 2018 GNU GPLv3

Sheet: /MIPI/

File: mipi.sch

Size: A4 Date: 2018-06-18

KiCad E.D.A. kicad 4.0.7

eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

nicole.ferber@puri.sm

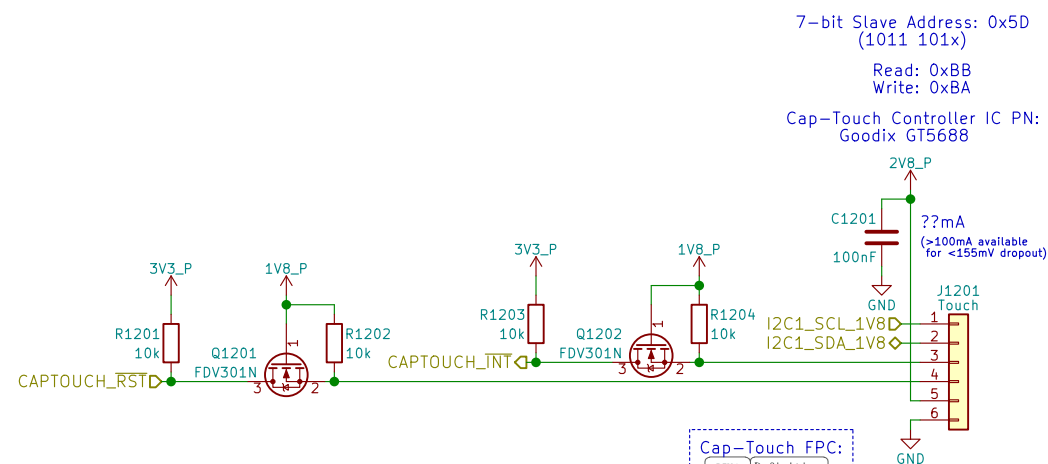
christian.schilmoeller@puri.sm

Rev: v0.1.0

Id: 11/24

Display & Touch Controller

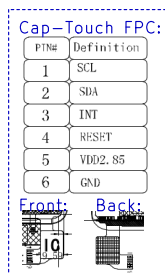
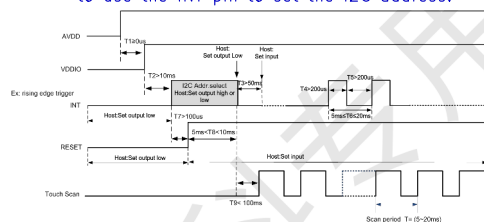
LCD PN:
Shenzhen Jinghong Electronics Co., Ltd.
JH057N00900



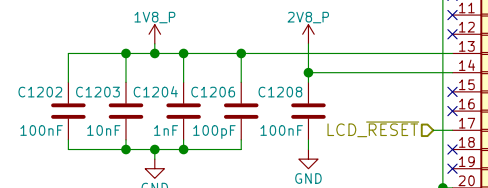
The upper 7 bits are the address, and bit 0 is used to select read or write. GT5688 has two slave device addresses to choose from:

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

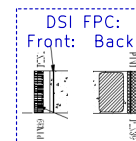
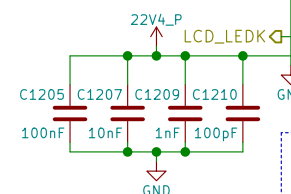
Every time you power on or reset, you need to use the INT pin to set the I2C address:



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



100Ω Differential Impedance



Backlight Array:



MIPI DSI



Copyright 2018 GNU GPLv3

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

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

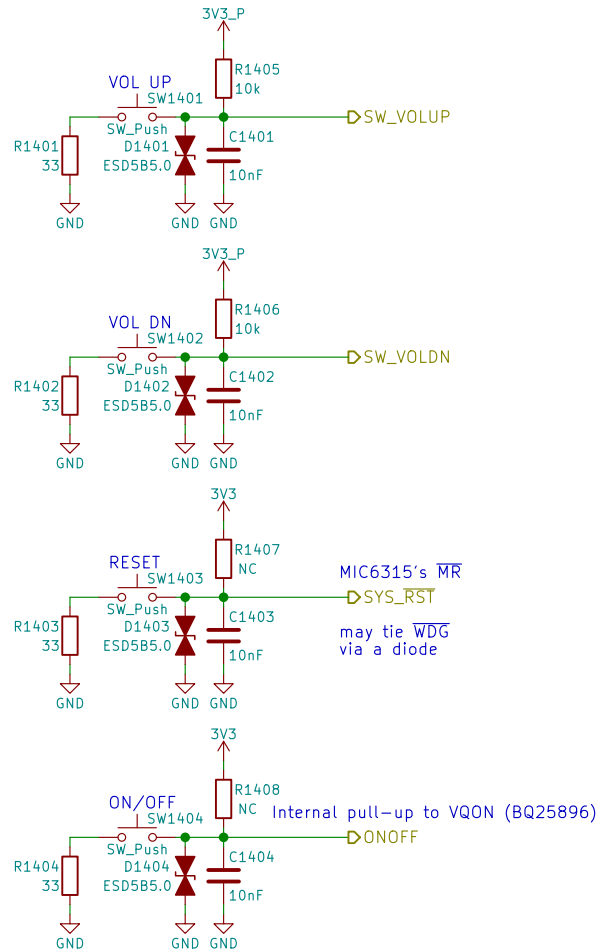
Date: 2018-06-18

eric.kuzmenko@puri.sm
angus.ainslie@puri.sm
nicole.ferber@puri.sm
christian.schilmoeller@puri.sm

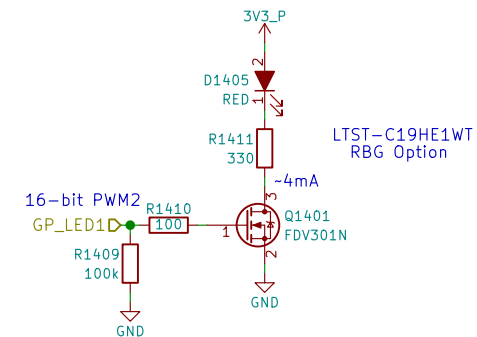
Rev: v0.1.0
Id: 12/24

Id: 13/24

Buttons & LED



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)



Buttons & LED



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Sheet: /Buttons & LED/
File: buttons_led.sch

Size: A4 Date: 2018-06-18

KiCad E.D.A. kicad 4.0.7

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

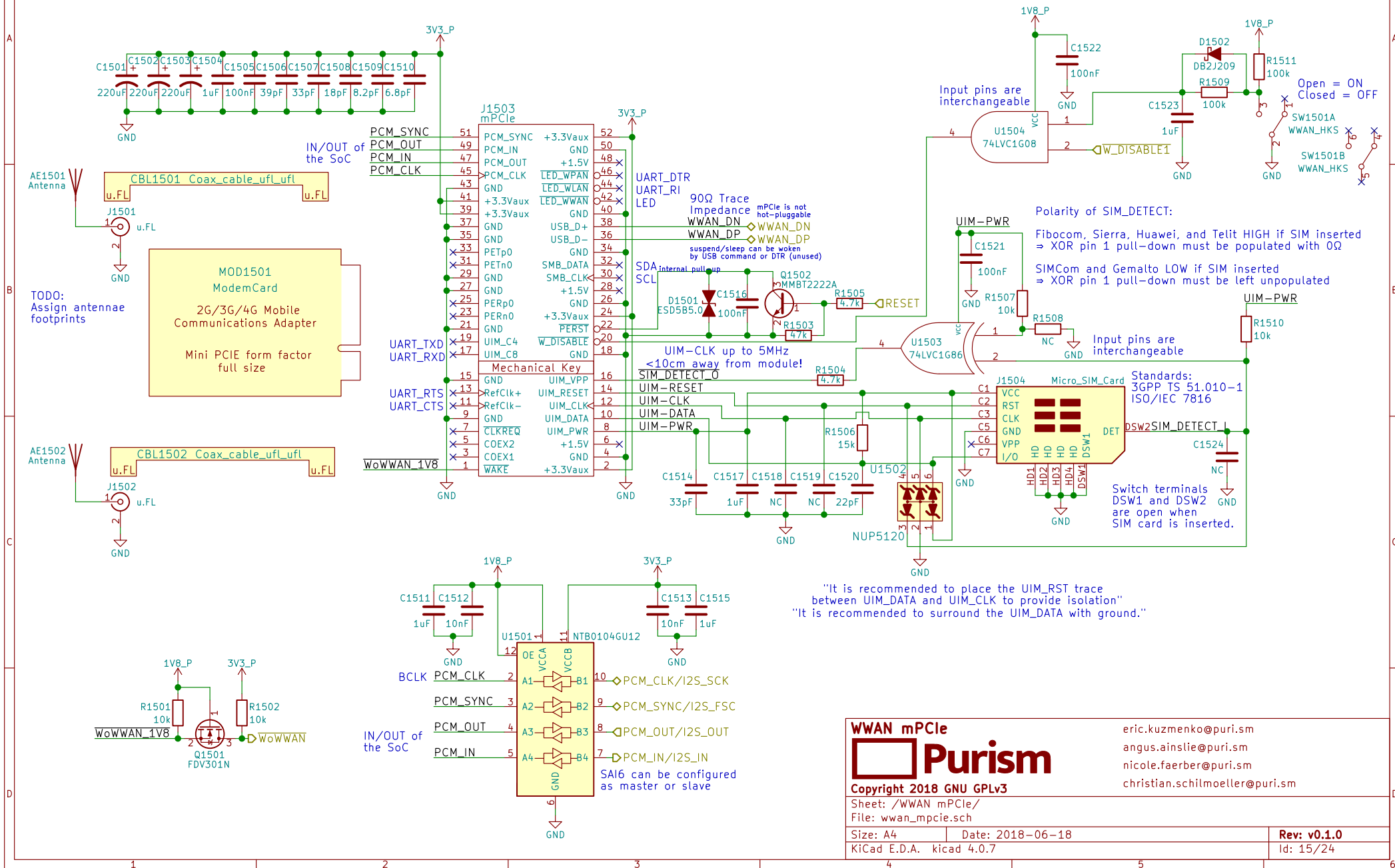
nicole.farber@puri.sm

christian.schilmoeller@puri.sm

Rev: v0.1.0

Id: 14/24

WWAN mPCle



Audio

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-cre>
 (Nit6 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 for key function

Could use FSA8008 to detect mic



Pin 5 (tip switch) is NC, open when inserted
 If just headphones then HP_DET=HIGH, R(mic)=0
 may add ~220uF cap parallel to Zener

Ext-Mic enabled MIC_SEL=HIGH
 Int-Mic enabled MIC_SEL=LOW
 Add TVS next to int-mic? (OpenMoko does this)
 $-37dB=14.1254mV/Pa$
 $\therefore \text{mic produces } 14.1254mV_{rms} \text{ when exposed to a } 1kHz \text{ tone of } 94dB-SPL \text{ at the capsule (or } 19.98mV \text{ amplitude)}$
 $\Rightarrow 40dB \text{ gain would produce } -2V \text{ amplitude (4Vpp, clipping)}$
 $30dB \text{ gain would produce } -0.632V \text{ amplitude (1.264Vpp)}$
 $38.33dB \text{ gain would yield } 3.3V_{pp}$

SW Mute Mic: MUTE_ADC=1

MIC_IN

MIC_BIAS

C1619

1uF

GND

C1620

100nF

GND

FB1608

BLM18KG601SZ1D

C1622

270pF

GND

DPDT

SW1301B

DPDT with camera

5->4 = ON

5->6 = OFF

All switches' pins can be swapped

e.g. 5<->4

or 5<->6

(+camera)

GND

GND

FB1606

BLM18KG601SZ1D

C1621

270p

GND

D1601

ESD5B5.0

GND

D1602

ESD5B5.0

GND

C1624

270p

GND

3V3_P

C1623

100nF

GND

C1625

10nF

GND

U1603

FSA6157L6X

2.2kΩ

GND

GND

U1601

SGTL5000

VDDIO

VDDA

VDDIO

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RGMII 10/100/1000 Ethernet

Ethernet

Purism

Copyright 2018 GNU GPLv3

Sheet: /Ethernet/
File: ethernet.sch

Size: A4 Date: 2018-06-18 Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7 Id: 17/24

eric.kuzmenko@puri.sm
angus.ainslie@puri.sm
nicole.fauber@puri.sm
christian.schilmoeller@puri.sm

 **Purism**

eric.kuzmenko@puri.sm
angus.ainslie@puri.sm
nicole.farber@puri.sm
christian.schilmoeller@puri.sm

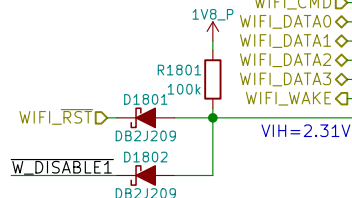
Rev: v0.1.0
Id: 17/24

WLAN+BT M.2

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 if USB used



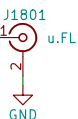
RedPine RS9116
has 100k pull-up to
3.3V making SDIO_RST
~2.55V when HIGH

MOD1801
WifiBTCard
WiFi + Bluetooth
M.2 Form Factor
Key ID "E"
width: 22 mm
length: 30 mm

TODO:
Assign antennae
footprints

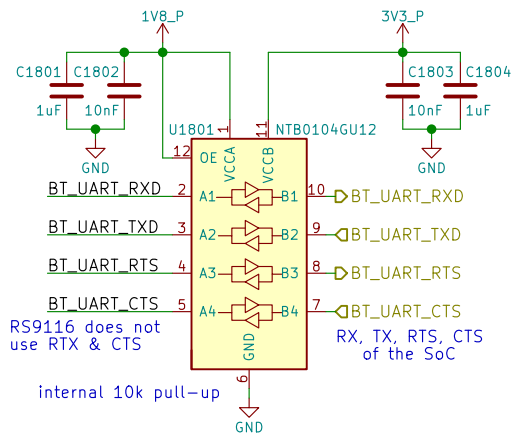
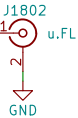
AE1801
FR05-S1-NO-1-004

CBL1801 Coax_cable_ufl_ufl
u.FL



AE1802
FR05-S1-NO-1-004

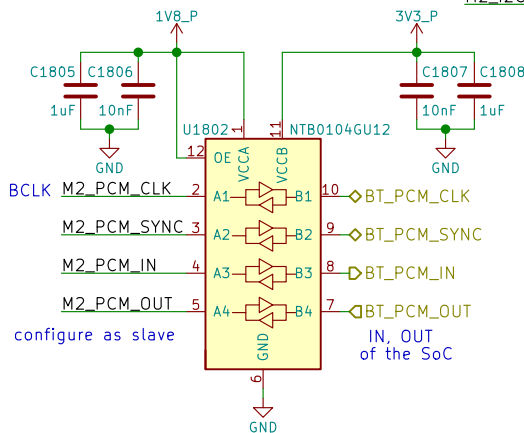
CBL1802 Coax_cable_ufl_ufl
u.FL



RS9116 does not
use RTX & CTS

internal 10k pull-up

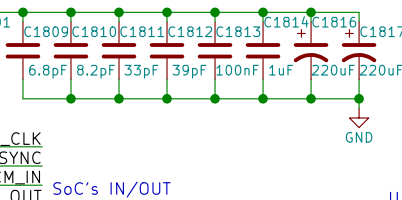
RX, TX, RTS, CTS
of the SoC



configure as slave

IN, OUT
of the SoC

Socket: Table 46
Module: Table 23
3V3_P
M.2 Key E



SoC's IN/OUT

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

U1803A 74LVC2G08
U1803B 74LVC2G08

BT_DISABLE
WIFI_DISABLE

Input pins are
interchangeable

BT_DISABLE
WIFI_DISABLE

BT_DISABLE
WIFI_DISABLE

BT_DISABLE
WIFI_DISABLE

BT_DISABLE
WIFI_DISABLE

BT_DISABLE
WIFI_DISABLE

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BT_DISABLE
WIFI_DISABLE

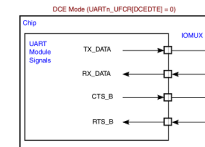
BT_DISABLE
WIFI_DISABLE

BT_DISABLE
WIFI_DISABLE

BT_DISABLE
WIFI_DISABLE

6.2 M.2 Signal Directions

UARTn_UFCR[DCEDTE]=0 on POR



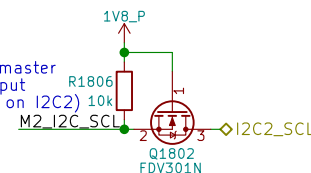
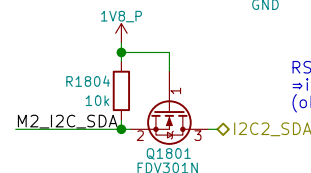
TX output
RX input
CTS output
RTS input
⇒ TX→RX
RX→TX
CTS→CTS
RTS→RTS

Note:
All switches' pins
can be swapped
e.g. 2<->3
or 1<->3

Open = ON
Closed = OFF

SW1801A
WLAN_HKS
SW1801B
WLAN_HKS

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



WLAN+BT M.2

Purism

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Sheet: /WLAN+BT M.2/

File: wifi_bt_m2.sch

Size: A4

Date: 2018-06-18

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

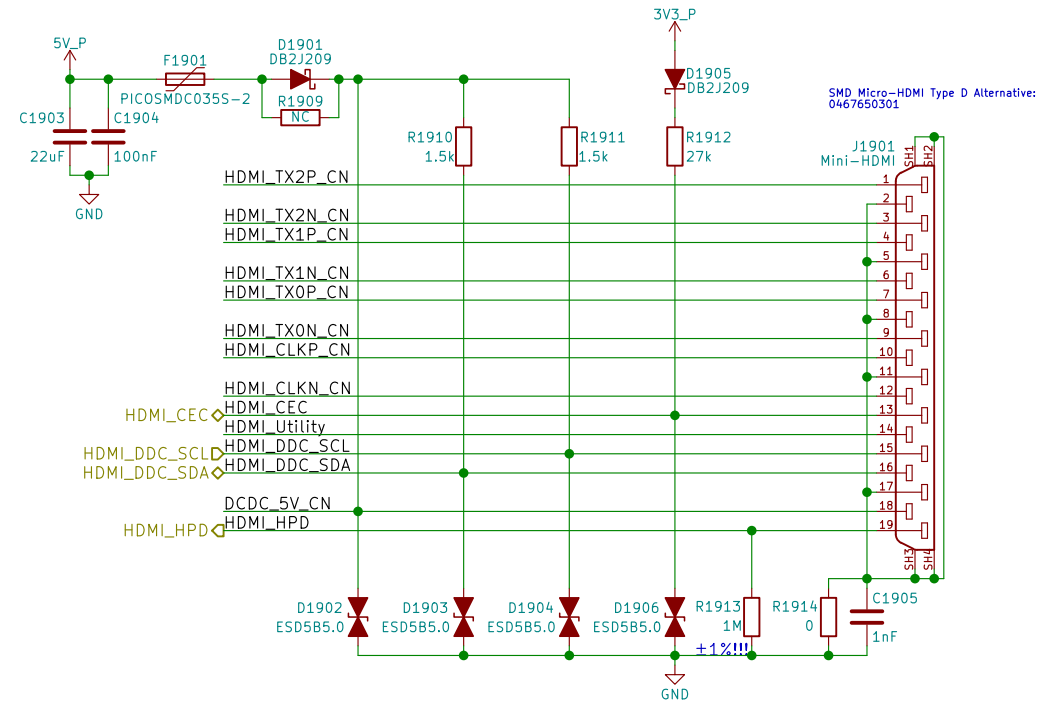
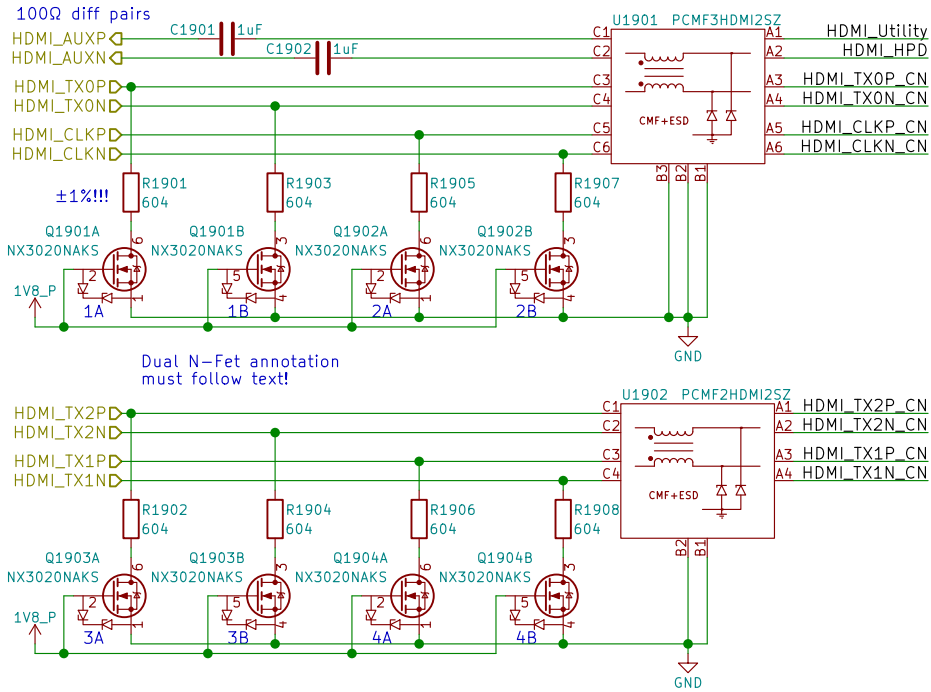
Id: 18/24

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TUSB1046 can be used for DP over USB-C

HDMI

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



HDMI



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Sheet: /HDMI/
File: hdmi.sch

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

Date: 2018-06-18

Rev: v0.1.0
Id: 19/24

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1

B



C

D

1



1



Id: 20/24

SPI NOR Flash



SPI NOR Flash



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Sheet: /SPI Flash/
File: flash.sch

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

Date: 2018-06-18

Rev: v0.1.0
Id: 21/24

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Id: 22/24

GNSS



GNSS



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Sheet: /GNSS/
File: gnss.sch

Size: A4 Date: 2018-06-18
KiCad E.D.A. kicad 4.0.7

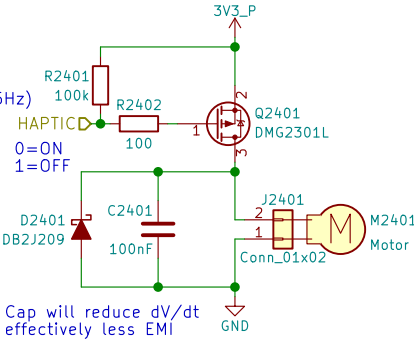
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Rev: v0.1.0
Id: 23/24

Haptic Motor

PWM pins occupied:
GPIO1_I001 - LCD Backlight
GPIO1_I013 - LED
GPIO1_I014 - Ethernet (CLK0_25MHz)
GPIO1_I015 - CSI (CLK02)

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)
Metal housing is floating
thick adhesive layer underneath
(not connected to either pin)

Haptic/Vibration Motor



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Sheet: /Haptic Motor/
File: haptic.sch

Size: A4 Date: 2018-06-18

KiCad E.D.A. kicad 4.0.7

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Rev: v0.1.0

Id: 24/24