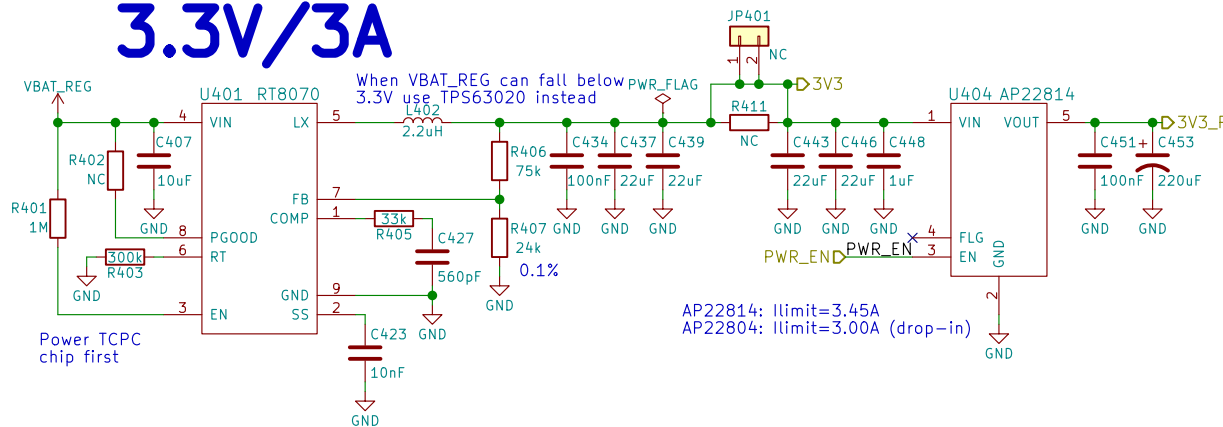


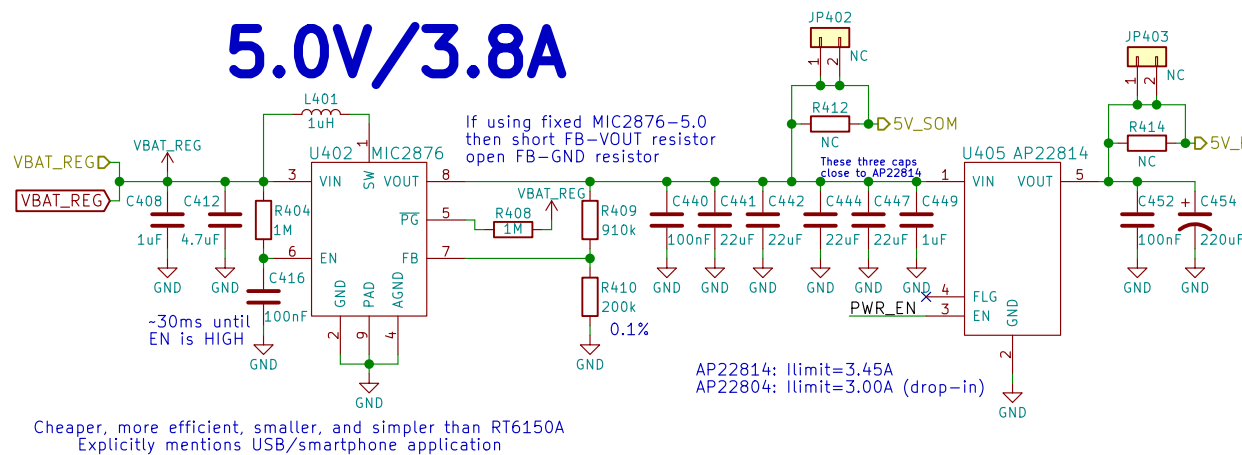
3.3V/3A



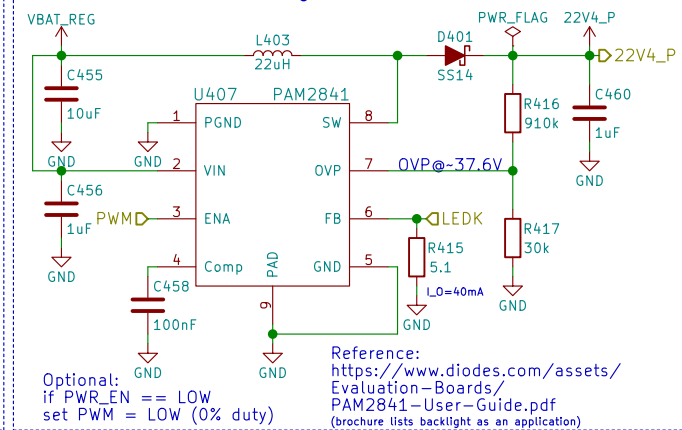
1.8V/600mA



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

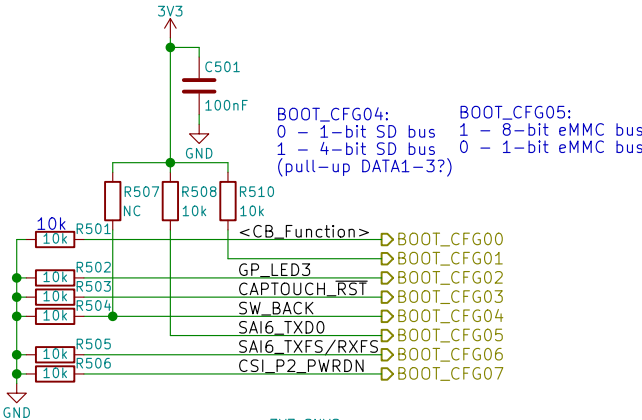
nicole.farber@puri.sm

christian.schilmoeller@puri.sm

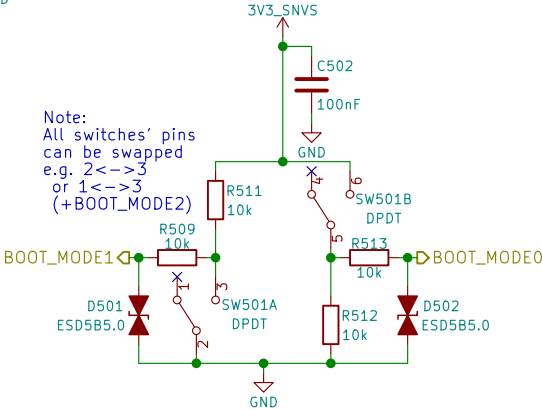
Rev: v0.1.0

Id: 4/24

Boot Config



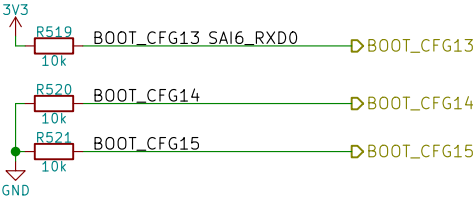
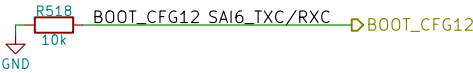
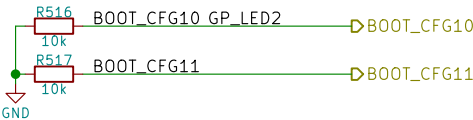
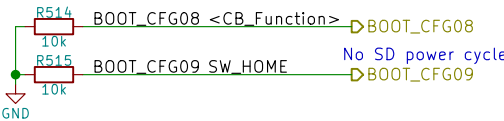
BOOT_CFG04: 0 - 1-bit SD bus
1 - 4-bit SD bus (pull-up DATA1-3?)
BOOT_CFG05: 1 - 8-bit eMMC bus
0 - 1-bit eMMC bus




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

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

Rev: v0.1.0
Id: 5/24

7-bit Slave Address: 0x68 (1101 000x)

Read: 0xD1
Write: 0xD0

I2C1_SDA

U601

1 SDA SCL 8

2 SQW NC 7

3 VSS TRQ 6

4 NC VDD 5

GND RV-4162-C7

3V3_OUT

R601 10k

D601 DB2J209

FB601

VIH(min) not given, however assuming $VIH(min) \approx VDD \cdot 0.7857$
@VDD=4.2 then $VIH(min) \approx 3.3012V$

When powered on VBAT_REG is used 3.5-4.25V

BLM18PG1215N1D

VBAT

R602 4.99k

D602 BAT54C

VBAT_REG

C601 100nF

GND

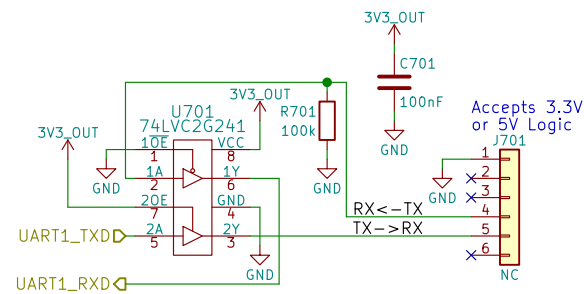
VBAT is PTC fused
If battery is depleted then current is ~350nA (<1μWatt)

Reference:
https://github.com/HIO-Project/linux-imx6-nano-imx_3.10.17_1.0.1_ga/blob/8848e94b2f889fe44f6736e2d4c98851a282275/arch/arm/boot/dts/imx6qdl-mtp.dtsi#L351

 Purism

Id: 6/24

UART Debug



UART Debug



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Sheet: /UART Debug/

File: uart.sch

Size: A4

Date: 2018-06-18

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Rev: v0.1.0

Id: 7/24

eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

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christian.schilmoeller@puri.sm

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

eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

nicole.farber@puri.sm

christian.schilmoeller@puri.sm

Rev: v0.1.0

Id: 8/24

[illegible]

 Purism

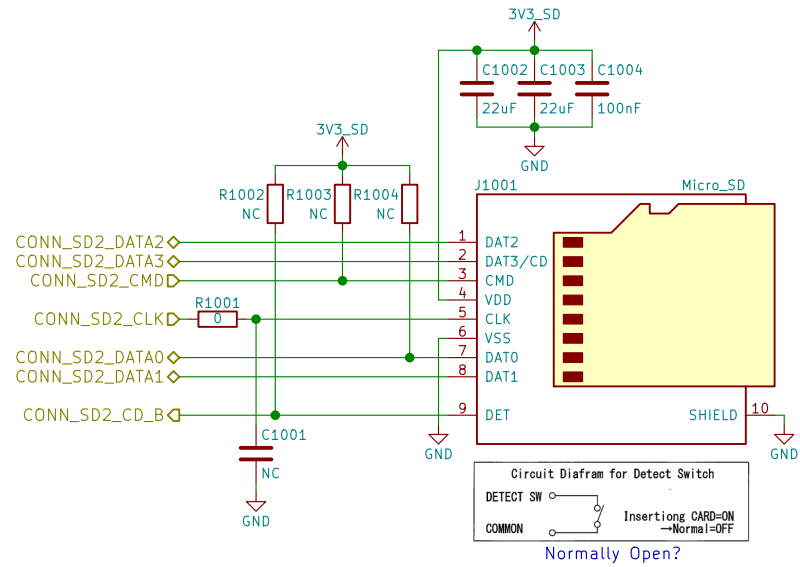
Sheet: /USB Hub + SDIO Bridge/
File: usb_hub_sdio.sch

SIZE: A4	DATE:
KiCad E.D.A.	kicad 4.0.7

christian.schilmoeller@p

Id: 9/24

μ SD



uSD Card



Purism

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Sheet: /uSD Card/

File: sd.sch

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

KiCad E.D.A.	kiCad 4.0.7
--------------	-------------

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

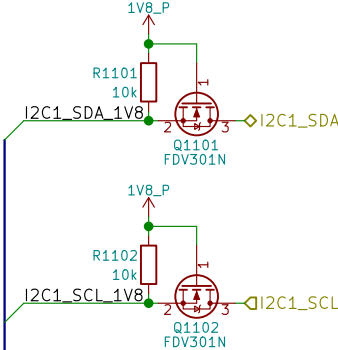
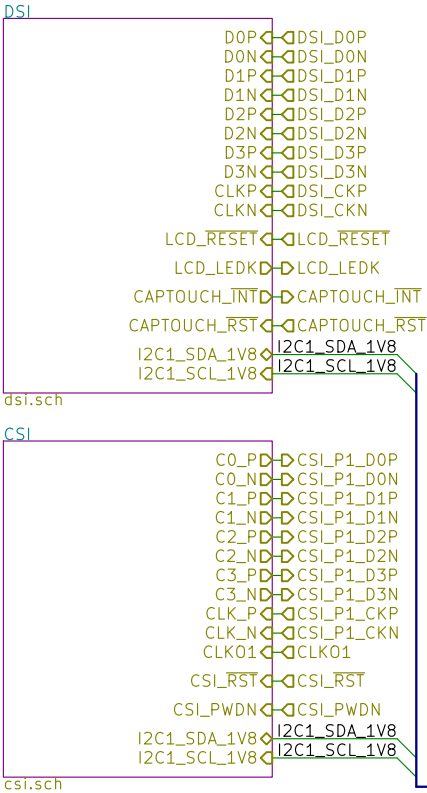
nicole.faerber@puri.sm

christian.schilmoeller@puri.sm

Rev: v0.1.0

Id: 10/24

MIPI



MIPI



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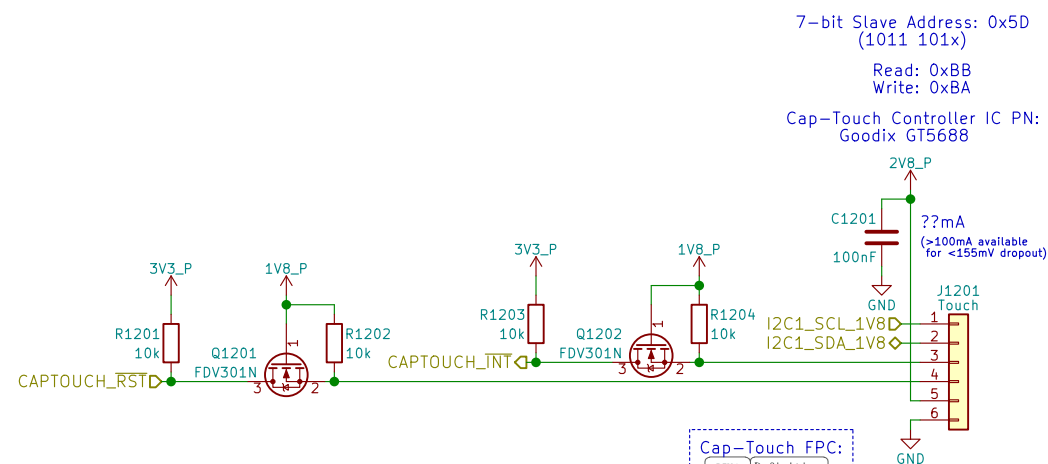
Sheet: /MIPI/
File: mipi.sch

Size: A4	Date: 2018-06-18	Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7		Id: 11/24

eric.kuzmenko@puri.sm
angus.ainstlie@puri.sm
nicole.farber@puri.sm
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Display & Touch Controller

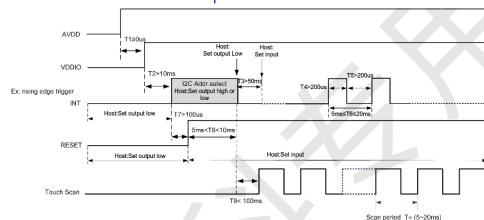
LCD PN:
Shenzhen Jinghong Electronics Co., Ltd.
JH057N00900



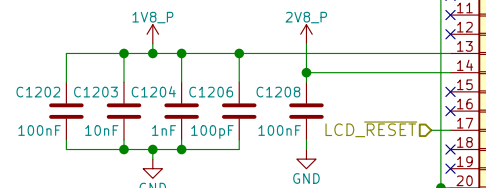
The upper 7 bits are the address,
and bit 0 is used to select read or write.
GT5688 has two slave device addresses to choose from:

	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



Display_JH057N00900

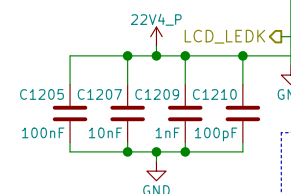
DISP1201

5.7 "
RGB
720 x 1440
pixels

FPC6
Touch

FPC39
Display +
Backlight

100Ω Differential Impedance



DSI FPC:
Front: Back:

Backlight Array:



MIPI DSI

Purism

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Sheet: /MIPI/DSI/

File: dsi.sch

Size: A4 Date: 2018-06-18

KiCad E.D.A. kicad 4.0.7

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

nicole.ferber@puri.sm

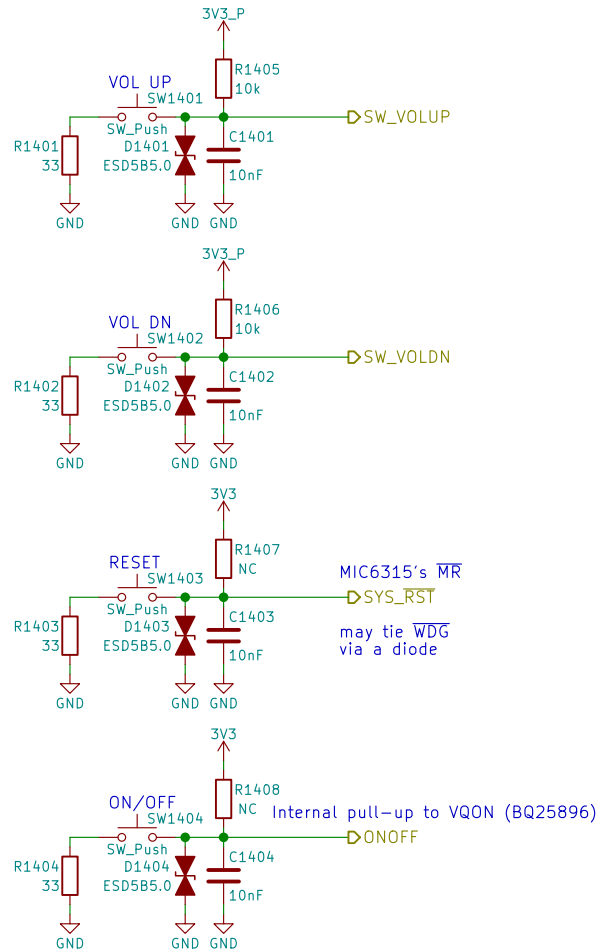
christian.schilmoeller@puri.sm

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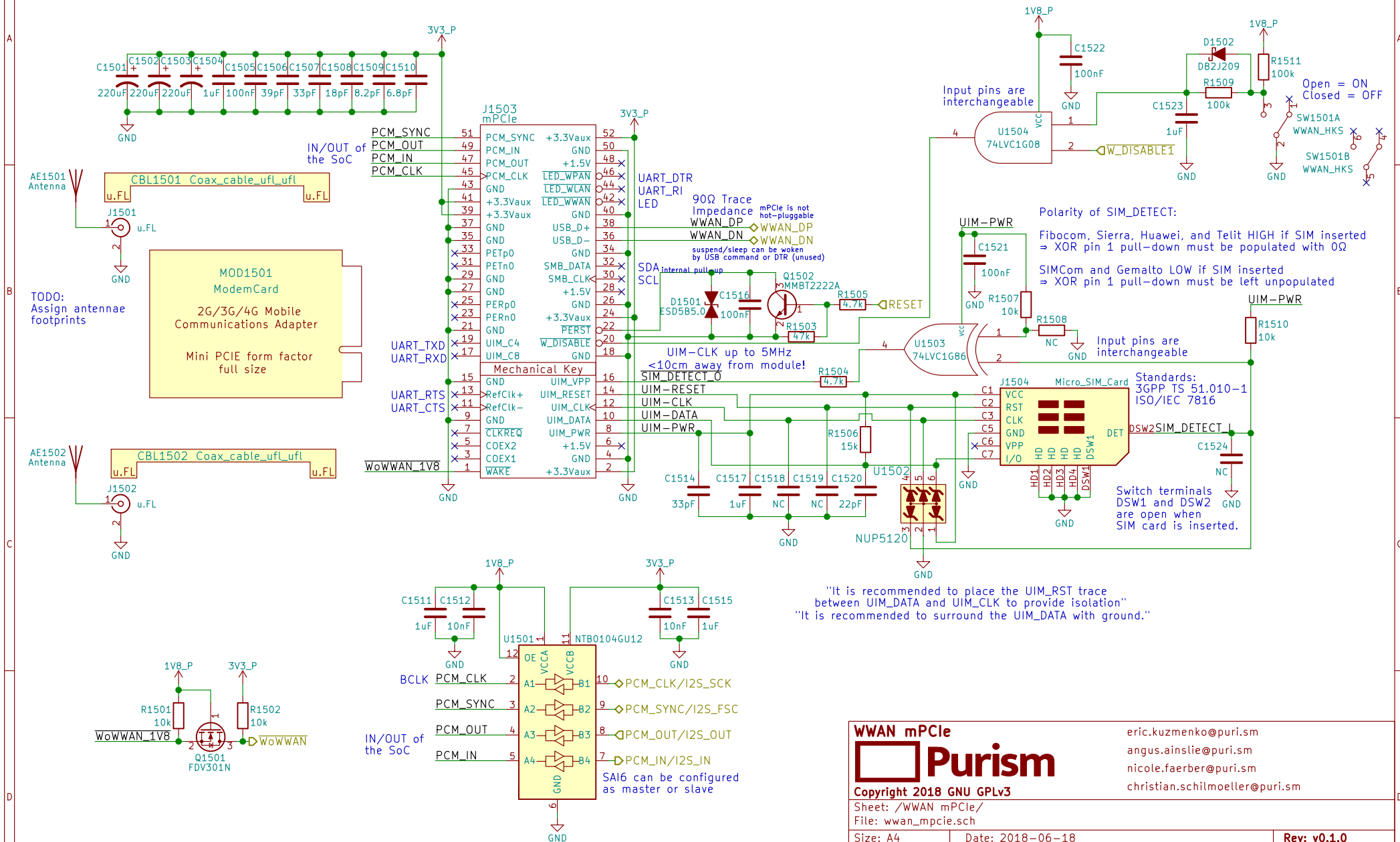
Sheet: /Buttons & LED/
File: buttons_led.sch

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 mPCIe



WWAN mPCIe



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Sheet: /WWAN mPCIe/
File: wwan_mpcie.sch

eric.kuzmenko@puri.sm

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christian.schilmoeller@puri.sm

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

Rev: v0.1.0

KiCad E.D.A. kicad 4.0.7

Id: 15/24

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



$Z(\text{hp}) \geq 16\Omega$

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

LCR Measurements:

Earbud Microphone: @1kHz
 $L_s = 3.844mH$
 $L_p = 15.757H$
 $C_s = 6.583uF$
 $C_p = 1612.8pF$
 $R_s = 1.5465k\Omega$
 $R_p = 1.5478k\Omega$
 $\theta = -0.8deg$

Headset Speaker: @1kHz
 $L_s = 244.4uH$
 $L_p = 141.99mH$
 $C_s = 103.6uF$
 $C_p = 178.77nF$
 $R_s = 36.860\Omega$
 $R_p = 36.860\Omega$
 $\theta = -2.3deg$

Earbud Speaker: @1kHz
 $L_s = 25.2uH$
 $L_p = 311.0mH$
 $C_s = 1.0mF$
 $C_p = 81.95nF$
 $R_s = 17.0300\Omega$
 $R_p = 17.0340\Omega$
 $\theta = 0.5deg$

Audio

Purism

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Sheet: /Audio/
 File: audio.sch

Size: A4

Date: 2018-06-18

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

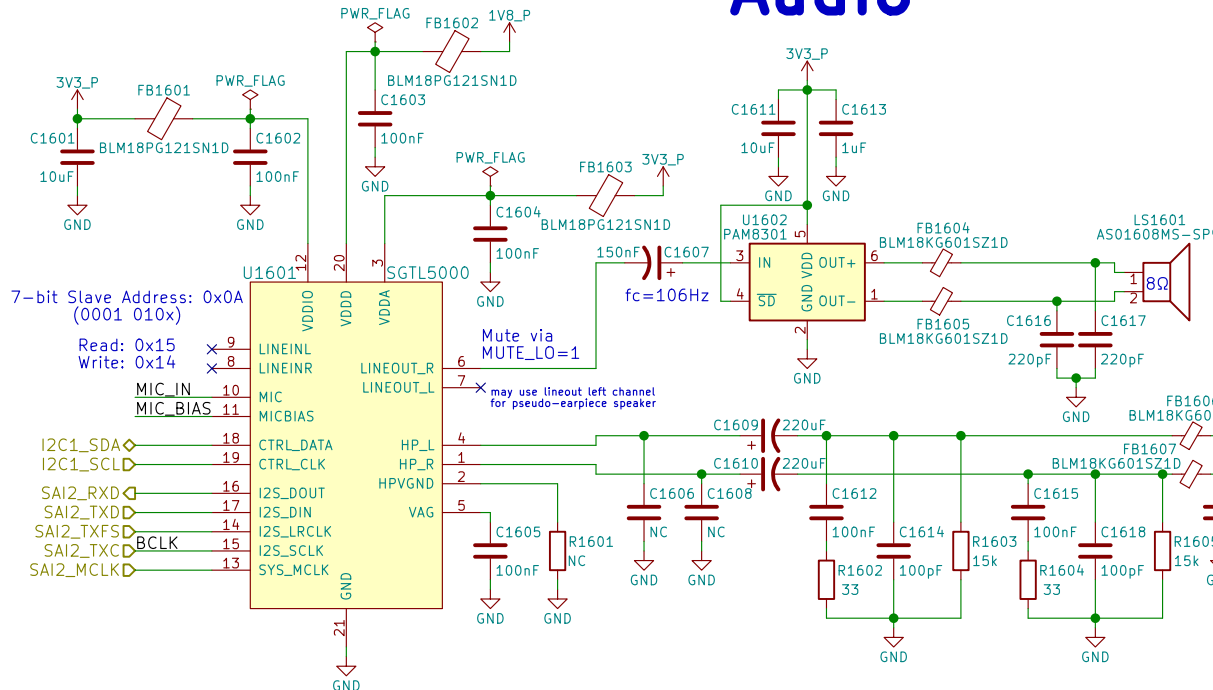
Id: 16/24

eric.kuzmenko@puri.sm

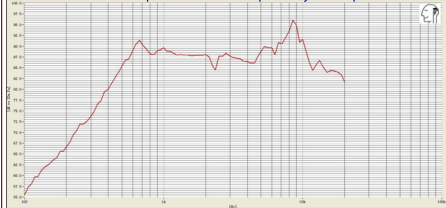
angus.ainslie@puri.sm

nicole.farber@puri.sm

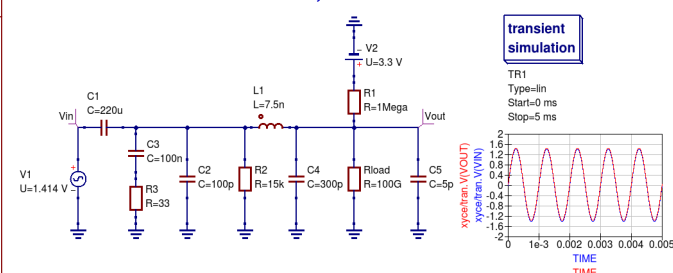
christian.schilmoeller@puri.sm



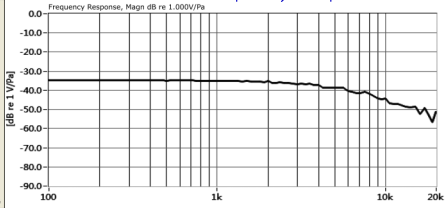
Built-In Speaker's Frequency Response:



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



Built-In Mic's Frequency Response:



[illegible]

 **Purism**

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

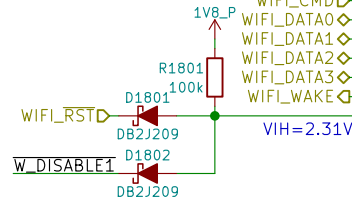
Rev: v0.1.0
Id: 17/24

WLAN+BT M.2

RS9116 NC:
RTS, CTS, BT_HOST_WAKE

RS9116 datasheet says
no WIFI_WAKE
but the schematic has it

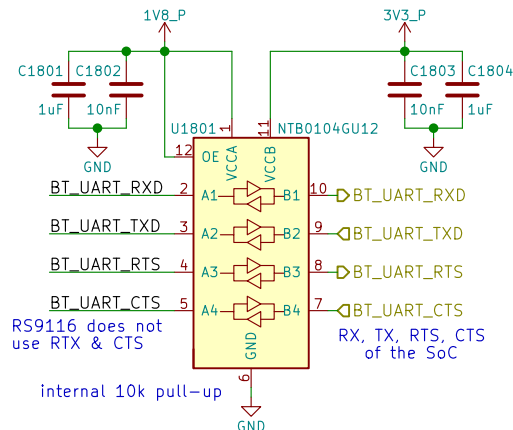
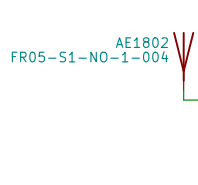
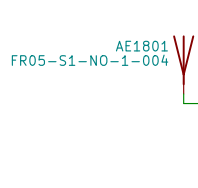
RedPine RS9116 MB0
Requires 5V on
Pin 54 if USB used



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

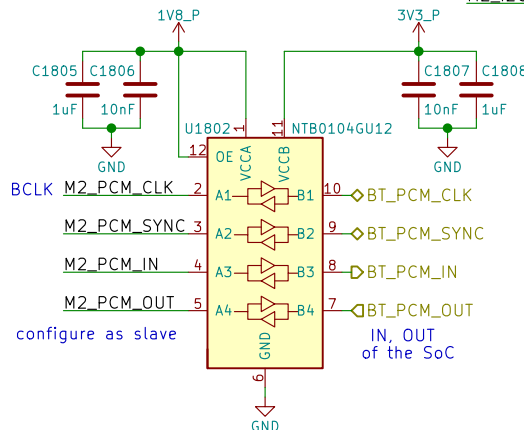
TODO:
Assign antennae
footprints



RS9116 does not
use RTX & CTS

internal 10k pull-up

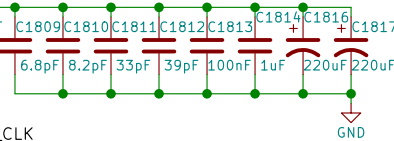
RX, TX, RTS, CTS
of the SoC



configure as slave

IN, OUT
of the SoC

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



SoC's IN/OUT

BT_HOST_WAKE

BT_UART_RXD

SoC's RX

Module's TX

SoC's TX

Module's RX

BT_UART_TXD

BT_UART_RTS

BT_UART_CTS

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

1V8_P

3V3_P

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

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GND

GND

GND

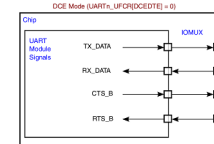
GND

GND

GND

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

Leave BT_DISABLE
LOW for RS9116

BT_DISABLE

Input pins are
interchangeable

WIFI_DISABLE

3V3_P

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

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GND

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GND

GND

GND

GND

GND

GND

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

M2_I2C_SDA

M2_I2C_SCL

1V8_P

3V3_P

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

GND

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

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

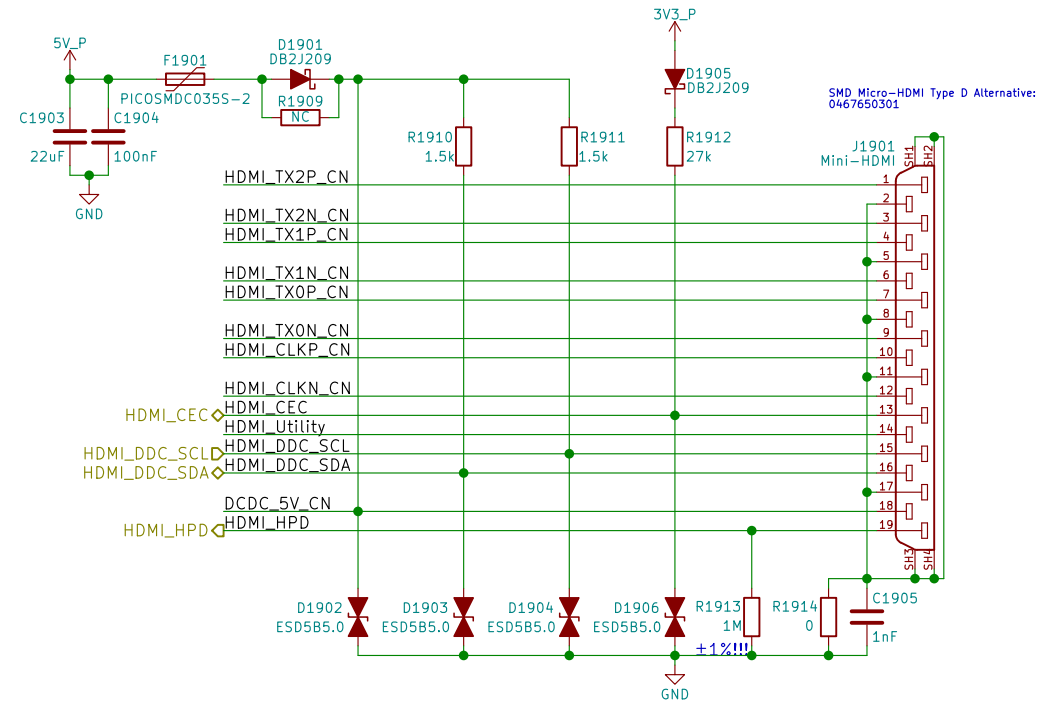
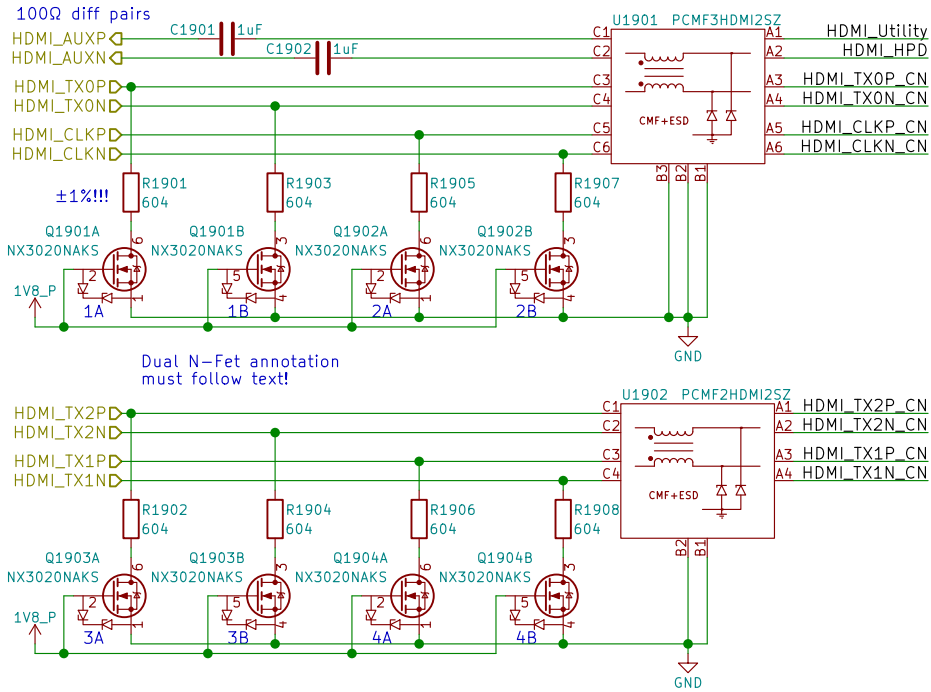
nicole.farber@puri.sm

christian.schilmoeller@puri.sm

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

eric.kuzmenko@puri.sm

angus.ainstie@puri.sm

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christian.schilmoeller@puri.sm

1

B



C

D

1



1



1

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

eric.kuzmenko@puri.sm
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Smart Card



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

Id: 22/24

GNSS



References:

https://www.u-blox.com/sites/default/files/MAX-M8_HardwareIntegrationManual_L%28UBX-13004876%29.pdf
https://www.u-blox.com/sites/default/files/MAX-8-M8-FW3_HardwareIntegrationManual_L%28UBX-15030059%29.pdf

GNSS



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Sheet: /GNSS/

File: gnss.sch

Size: A4

Date: 2018-06-18

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 23/24

eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

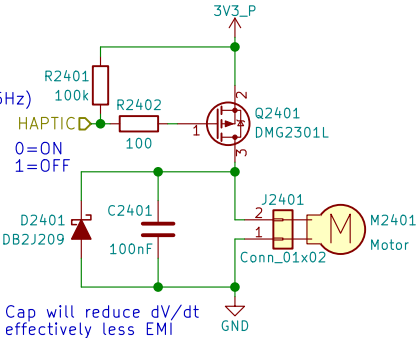
nicole.farber@puri.sm

christian.schilmoeller@puri.sm

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

Purism

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nicole.farber@puri.sm
christian.schilmoeller@puri.sm

Sheet: /Haptic Motor/
File: haptic.sch

Size: A4

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