

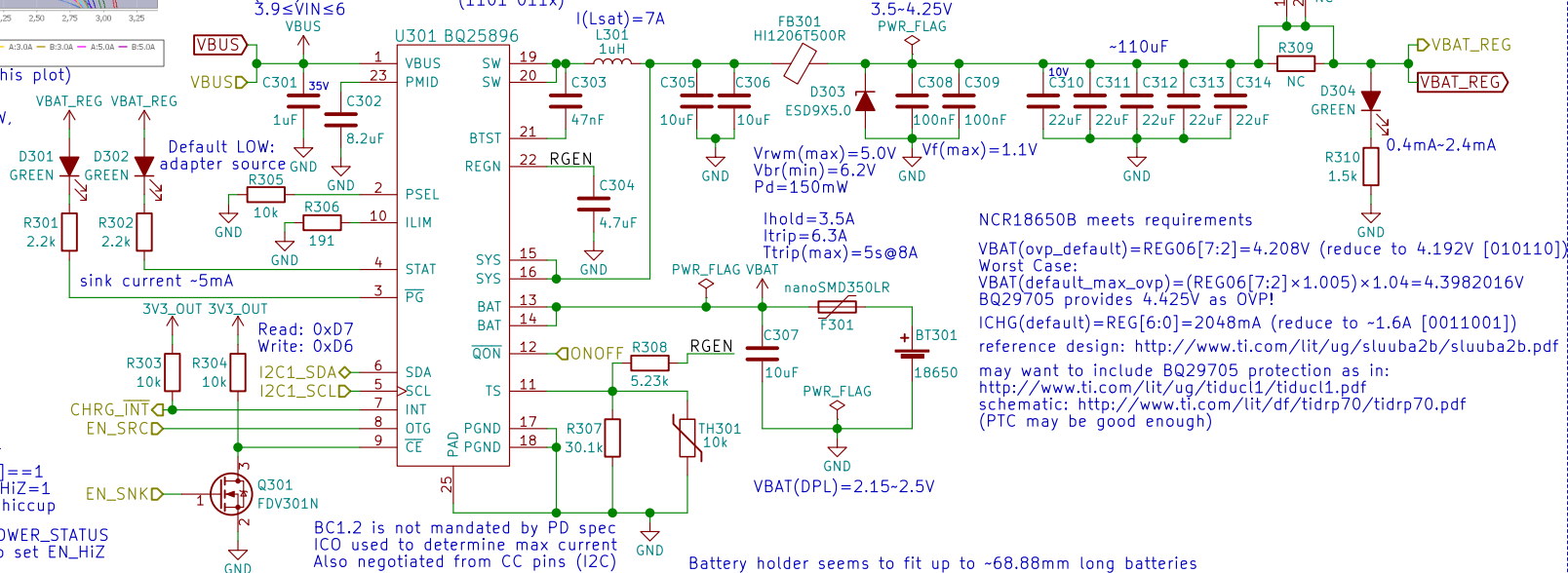


(interpret RSOC% based on this plot)

Drawing ~320mA, or consuming $\leq 1.152W$, should give close to 10 hours going from 100% to 0% charge

use AUTO_DPDM_EN to auto-detect IINLIM

$1.658 \leq ILIM \leq 2.063$
 $ILIM(nom) \approx 1.859A$
 $3.9 \leq VIN \leq 6$
 7-bit Slave Address: 0x6B (1101 011x)



Reading PTN5110HQ's CC_STATUS and POWER_STATUS registers will tell TCPM (i.MX8M) when to set EN_HiZ

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 seems to fit up to ~68.88mm long batteries
 need to test 18650 protected cells which are ~69.35mm long

Battery

Purism

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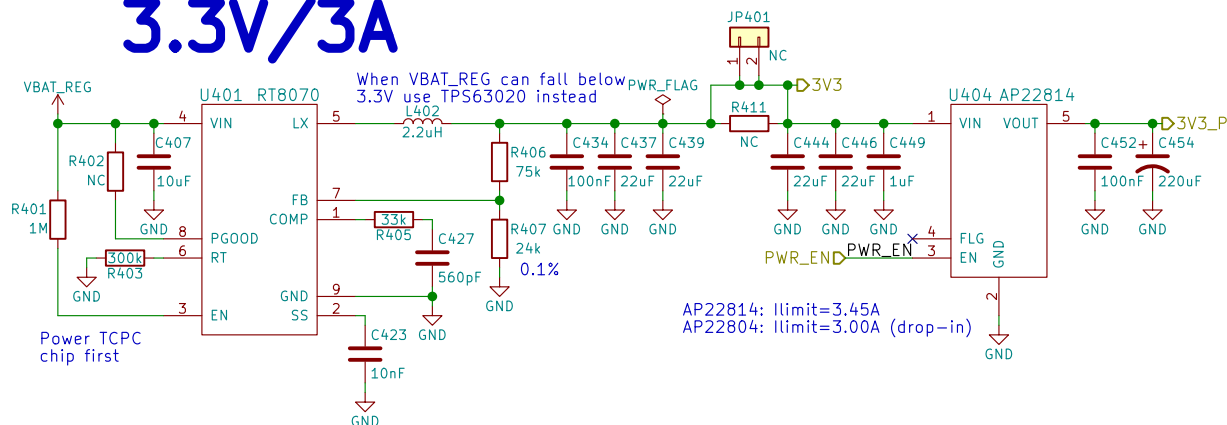
Sheet: /Battery/
 File: battery.sch

Size: A4
 KiCad E.D.A. kicad 5.0.0

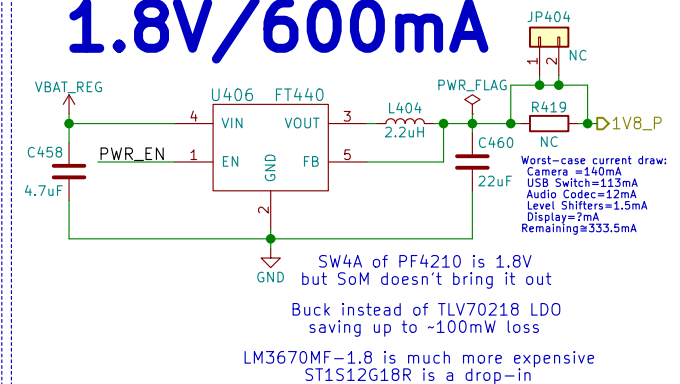
eric.kuzmenko@puri.sm
 angus.ainslie@puri.sm
 nicole.farber@puri.sm
 christian.schilmoeller@puri.sm

Rev: v0.1.0
 Id: 3/24

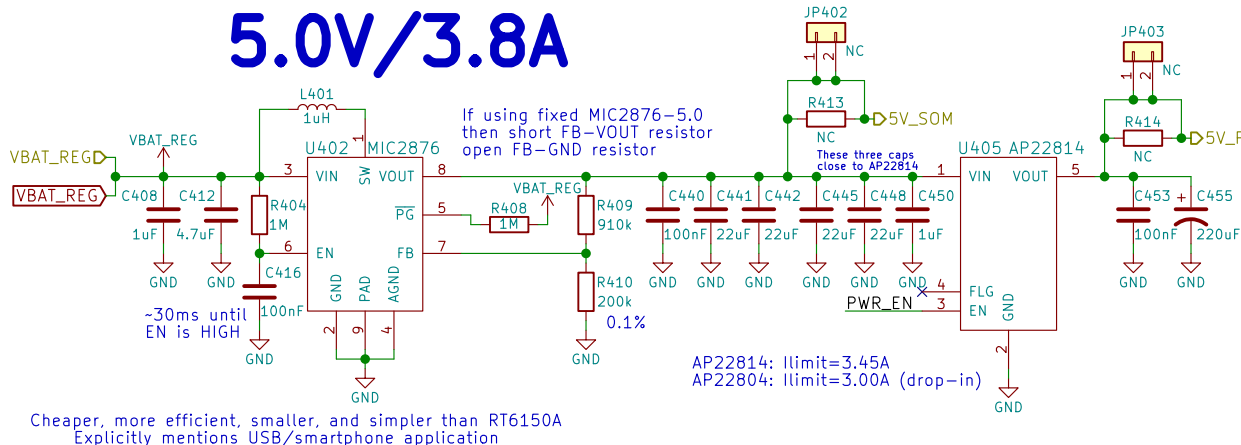
3.3V/3A



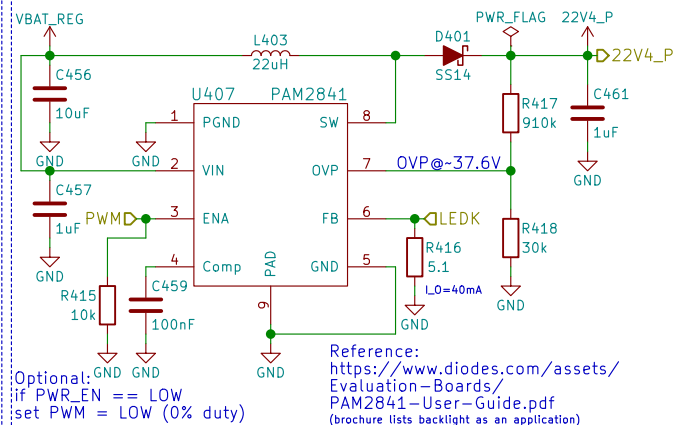
1.8V/600mA



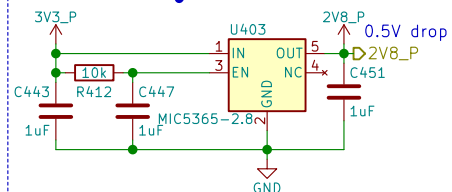
5.0V/3.8A



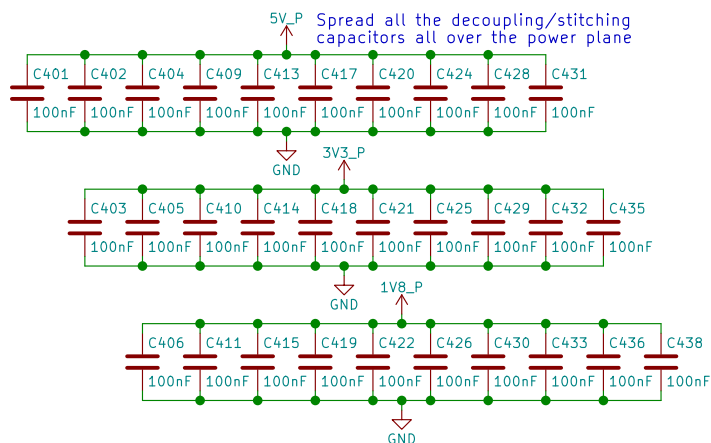
22.4V/40mA



2.8V/150mA



Power



Power

Purism

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Sheet: /Power/
File: power.sch

Size: A4
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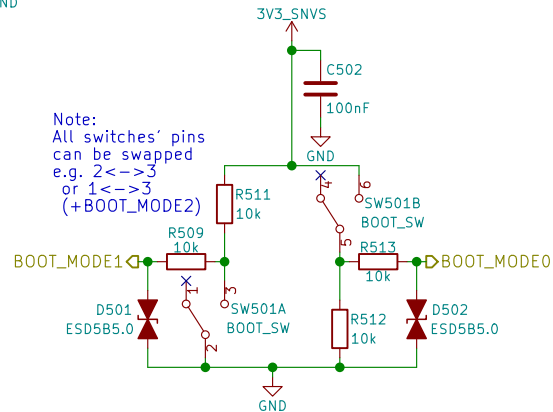
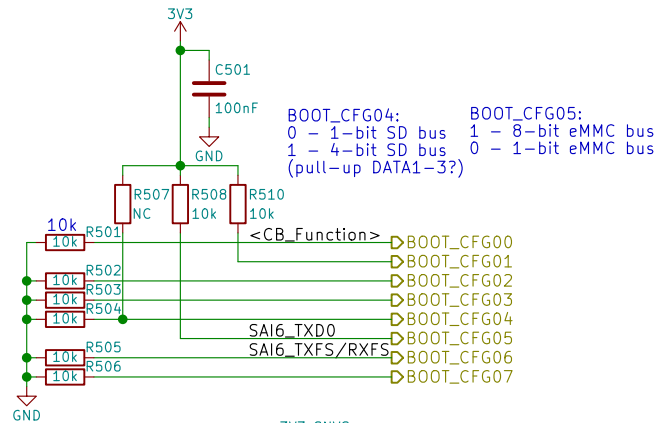
angus.ainslie@puri.sm

nicole.faeber@puri.sm

christian.schilmoeller@puri.sm

Rev: v0.1.0
Id: 4/24

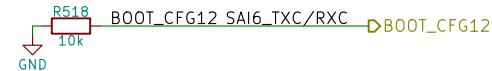
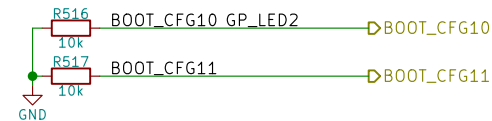
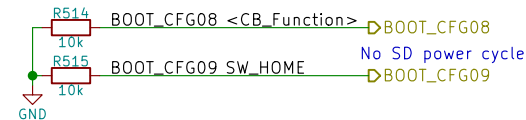
Boot Config



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



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Sheet: /Boot Config/
File: boot.sch

Size: A4
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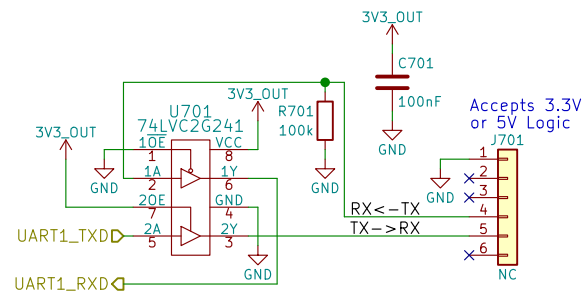
Rev: v0.1.0

Id: 5/24

[illegible]

<div> <div> <div>RTC</div> <div>  <div>Purism</div> </div> </div> <div> <div>eric.kuzmenko@puri.sm</div> <div>angus.ainslie@puri.sm</div> <div>nicole.ferber@puri.sm</div> <div>christian.schilmoeller@puri.sm</div> </div> </div>	
<div> <div>Copyright 2018 GNU GPLv3</div> <div> <div>Sheet: /RTC/</div> <div>File: rtc.sch</div> </div> </div>	
<div> <div>Size: A4</div> <div>Date: 2018-07-17</div> </div>	<div> <div>Rev:</div> <div>Id: 6</div> </div>
<div> <div>KiCad E.D.A. kicad 5.0.0</div> </div>	

UART Debug



UART Debug



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Sheet: /UART Debug/

File: uart.sch

Size: A4

Date: 2018-07-17

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Rev: v0.1.0

Id: 7/24

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 Purism

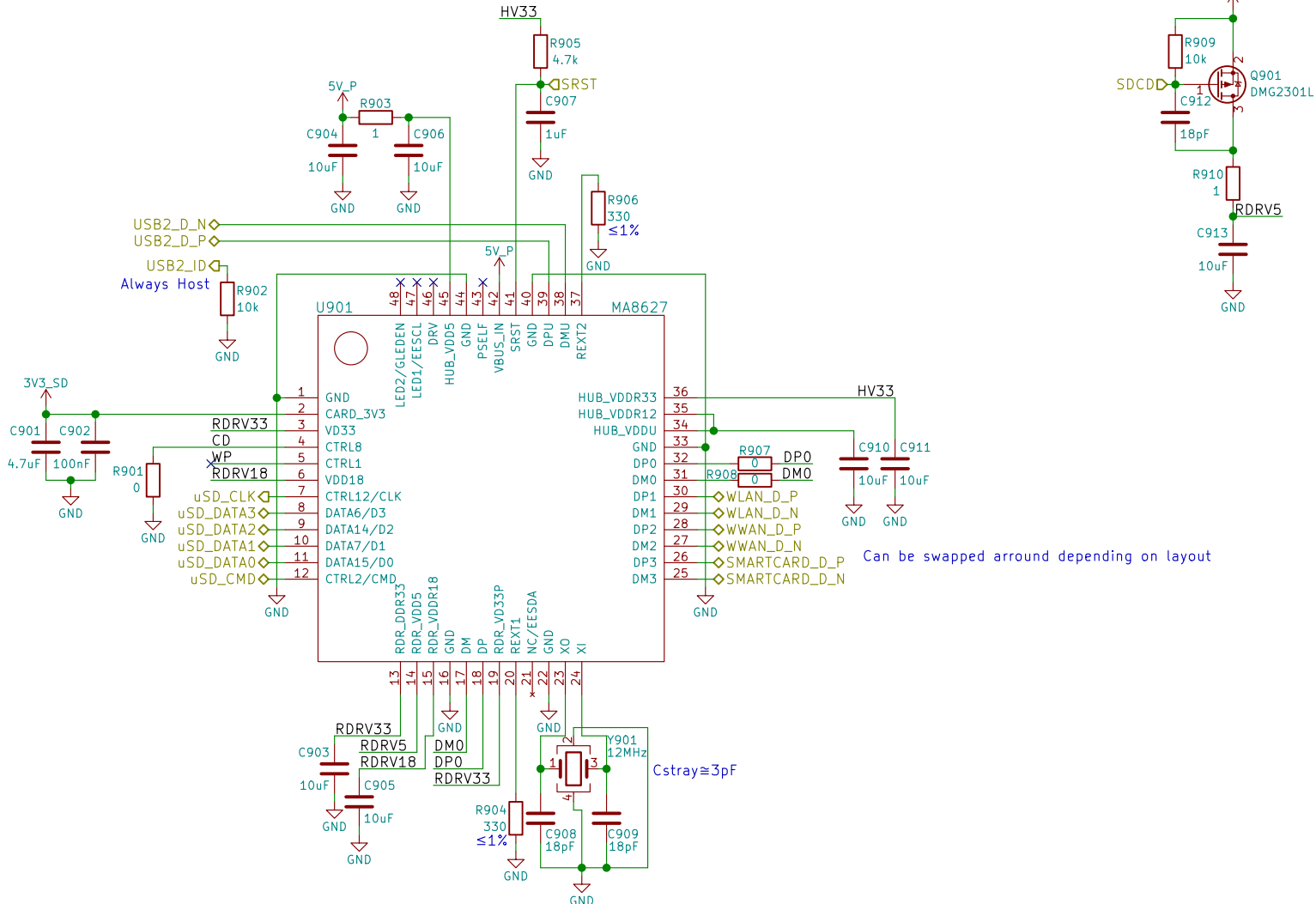
eric.kuzmenko@puri.sm
angus.ainslie@puri.sm
nicole.farber@puri.sm
christian.schilmoeller@puri.sm

File: jtag.sch

Rev: v0.1.0

Id: 8/24

USB Hub + SDIO Bridge



USB Hub + SDIO Bridge



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Sheet: /USB Hub + SDIO Bridge/

Size: A4

Date: 2018-07-17

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eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

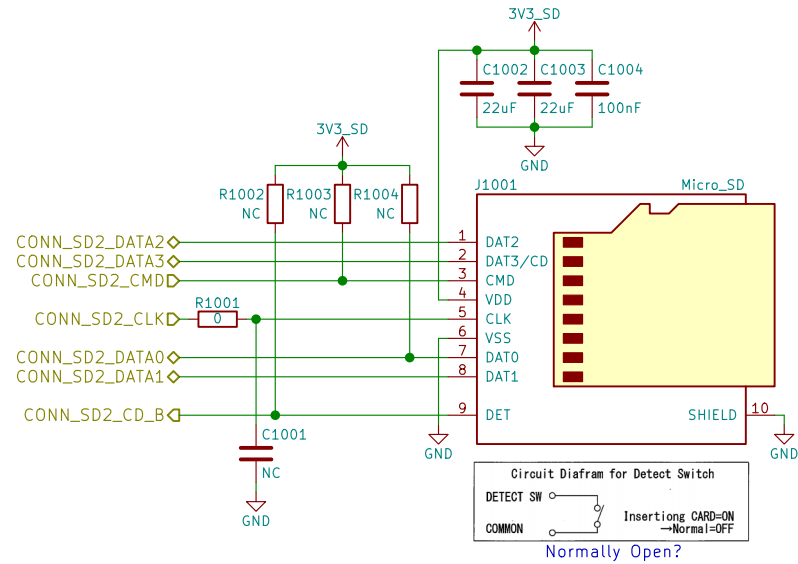
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Rev: v0.1.0

Id: 9/24

μSD



uSD Card



Purism

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Sheet: /uSD Card/

File: sd.sch

Size: A4 Date: 2018-07-17

KiCad E.D.A. kicad 5.0.0

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angus.ainstlie@puri.sm

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Rev: v0.1.0

Id: 10/24

MIPI



MIPI



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Sheet: /MIPI/
File: mipi.sch

Size: A4 Date: 2018-07-17
KiCad E.D.A. kicad 5.0.0

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Rev: v0.1.0
Id: 11/24

A

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D

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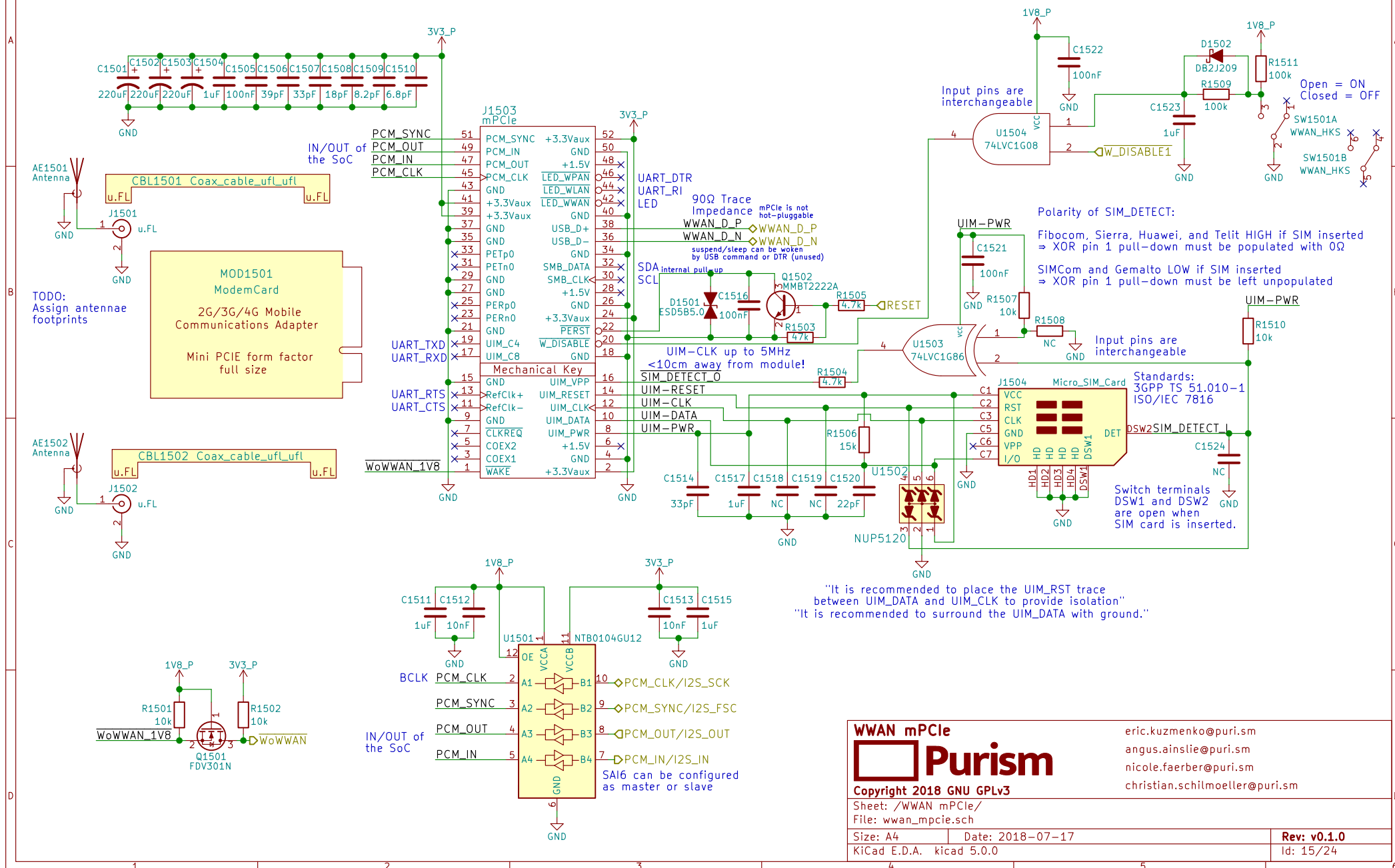
Rev: v0.1.0
Id: 12/24

Id: 13/24

C

D

WWAN mPCIe



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-circuitry>
 +Zener diode to protect against ranges outside of -0.9V to 3.3V

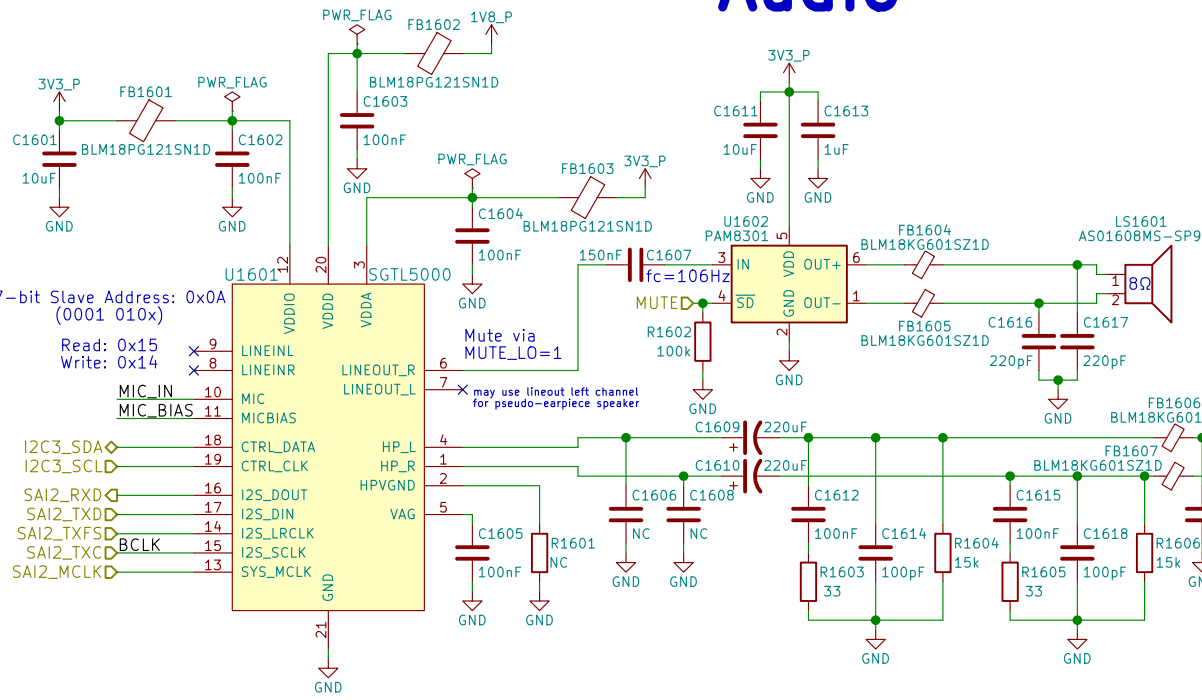
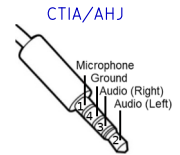
dB specs in datasheet is a unit of power gain (not dBu or VU) with respect to the DAC's unattenuated output

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

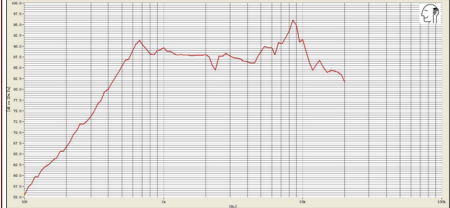
If HP_DET is HIGH for >100ms then HPs are present

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

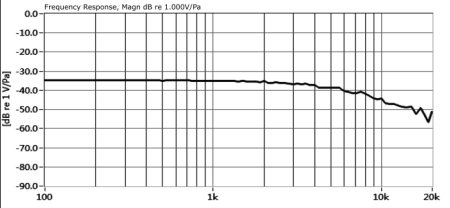
Could use FSA8008 to detect mic



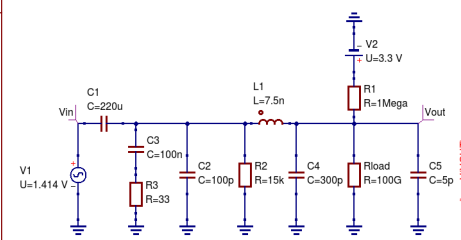
Built-In Speaker's Frequency Response:



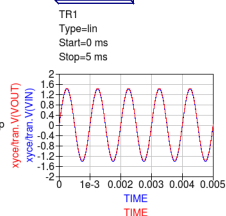
Built-In Mic's Frequency Response:



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



transient simulation



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 $L_s = 244.4uH$ $L_p = 141.99mH$ $C_s = 103.6uF$ $C_p = 178.77nF$ $R_s = 36.86\Omega$ $R_p = 36.86\Omega$ $\theta = -2.3deg$	Earbud Speaker: @1kHz $L_s = 25.2uH$ $L_p = 311.0mH$ $C_s = 1.0mF$ $C_p = 81.95nF$ $R_s = 17.030\Omega$ $R_p = 17.034\Omega$ $\theta = 0.5deg$
--	---	--

Audio



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Sheet: /Audio/
 File: audio.sch

Size: A4
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 nicole.farber@puri.sm
 christian.schilmoeller@puri.sm

Rev: v0.1.0
 Id: 16/24

Ext-Mic enabled MIC_SEL=HIGH
 Int-Mic enabled MIC_SEL=LOW

Note: 5->4 = ON
 5->6 = OFF
 All switches' pins can be swapped
 e.g. 5<->4 or 5<->6 (+camera)

-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

[illegible]

Purism

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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

Socket: Table 46
Module: Table 23

M.2 Key E

3V3_P

NC

Key E

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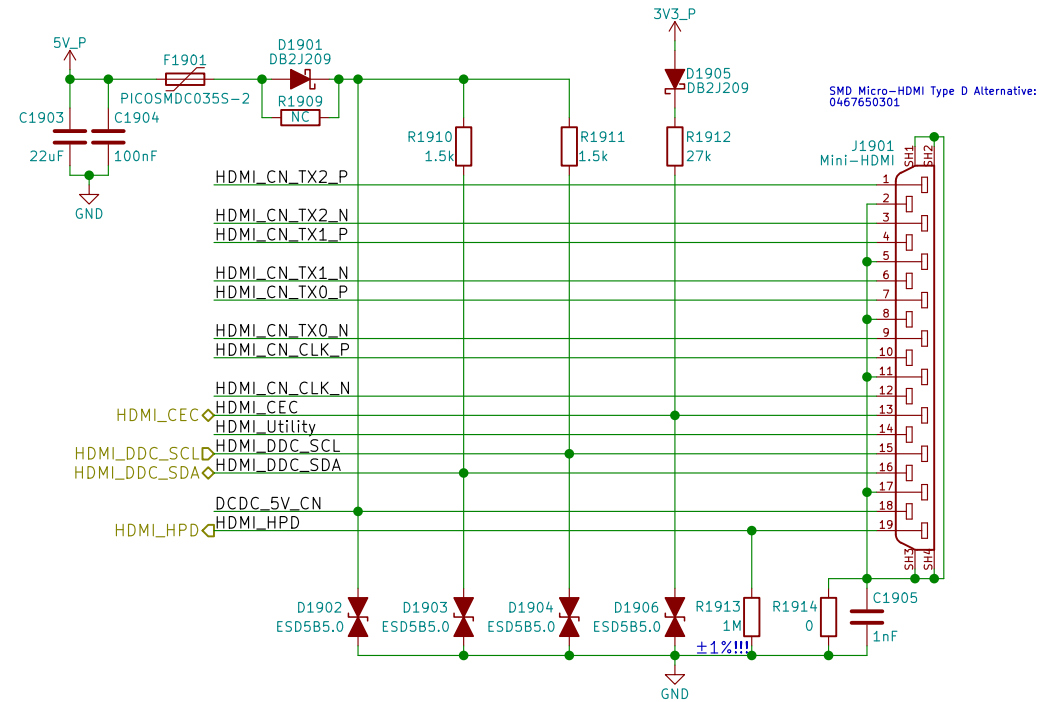
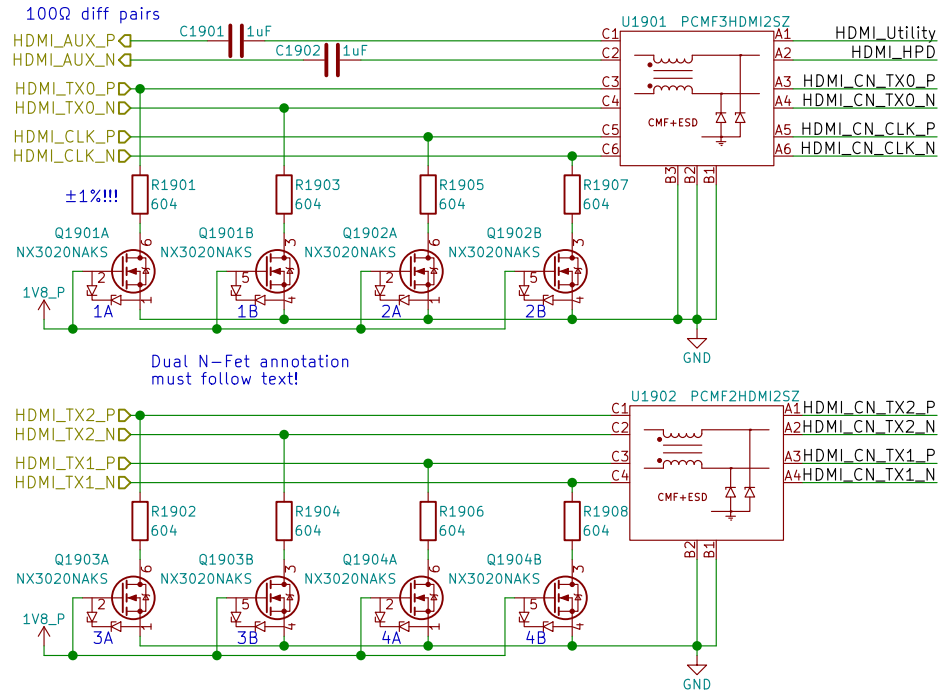
289

290

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

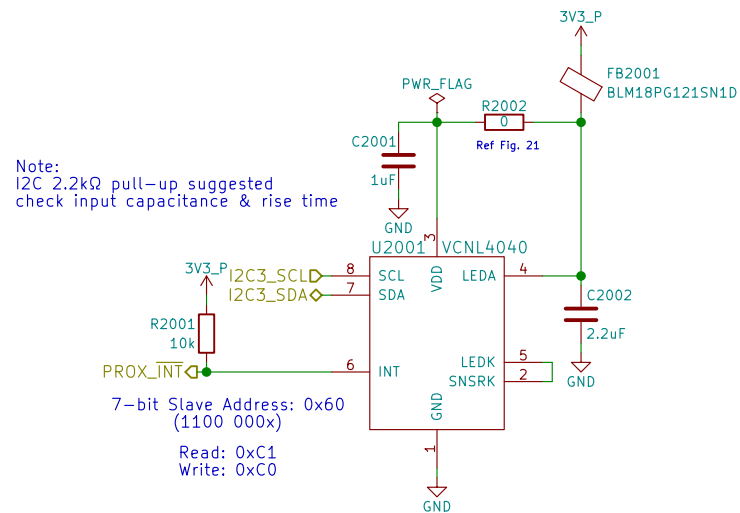
Size: A4 Date: 2018-07-17
KiCad E.D.A. kicad 5.0.0

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

Rev: v0.1.0
Id: 19/24

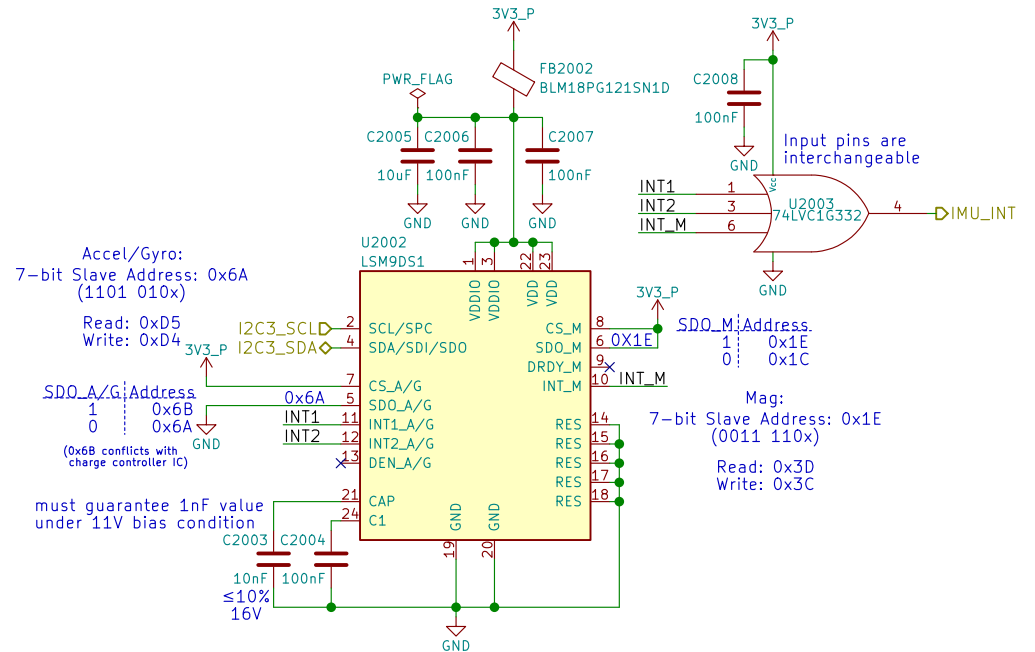
Sensors

Proximity & Ambient Light

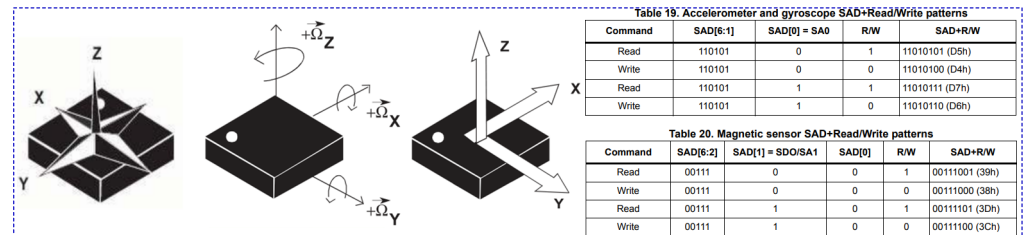


Reference:
<https://www.vishay.com/docs/84307/designingvcnl4040.pdf>
<http://www.vishay.com/docs/84931/vcni4040sensorboardfiles.pdf>

9-Axis IMU



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



Sensors



Purism

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Sheet: /Sensors/
File: sensors.sch

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

nicole.farber@puri.sm

christian.schilmoeller@puri.sm

Size: A4	Date: 2018-07-17
----------	------------------

Size: A1	Date:
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Rev: v0.1.0

Id: 20/24

SPI NOR Flash  Purism		eric.kuzmenko@puri.sm angus.ainslie@puri.sm nicole.ferber@puri.sm christian.schilmoeller@puri.sm
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Sheet: /SPI Flash/ File: flash.sch		
Size: A4	Date: 2018-07-17	Rev: v0.1.0
KiCad E.D.A. kicad 5.0.0		Id: 21/24

[illegible]

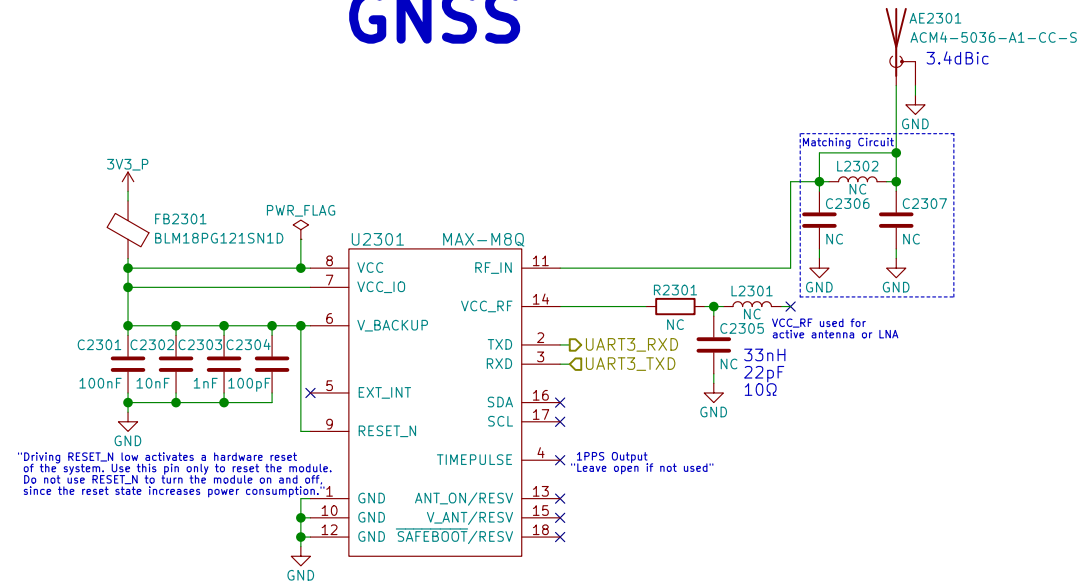
Smart Card



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
KiCad E.D.A. kicad 5.0.0

Date: 2018-07-17

Rev: v0.1.0

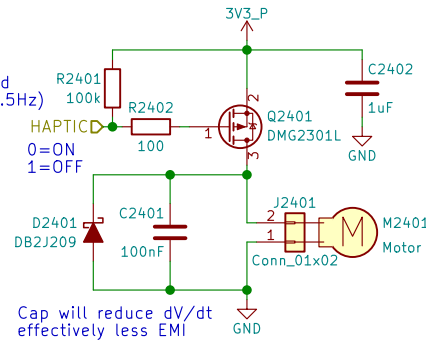
Id: 23/24

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 (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)
 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: 2018-07-17
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 angus.ainstlie@puri.sm
 nicole.farber@puri.sm
 christian.schilmoeller@puri.sm

Rev: v0.1.0
 Id: 24/24