



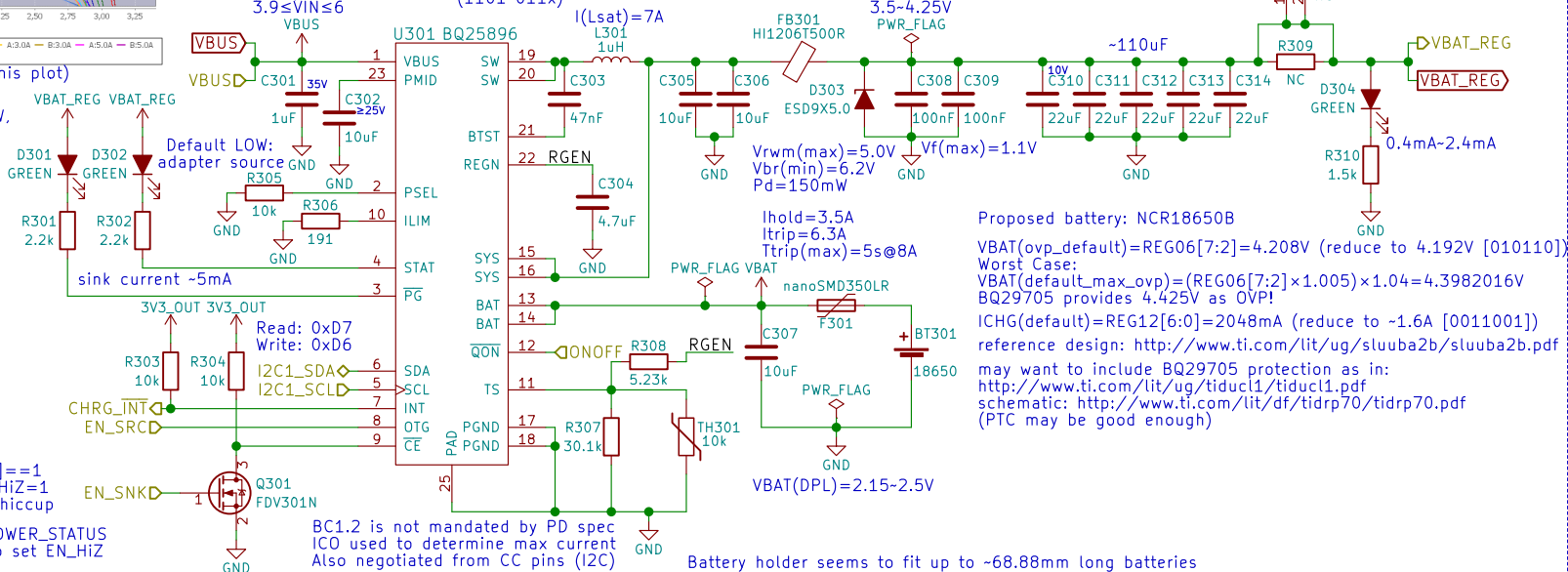
(interpret RSOC% based on this plot)

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)

Battery Charge Controller



Proposed battery: NCR18650B

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)=REG12[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/tiduc1/tiduc1.pdf>
<http://www.ti.com/lit/df/tidrp70/tidrp70.pdf>
 (PTC may be good enough)

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

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

Purism

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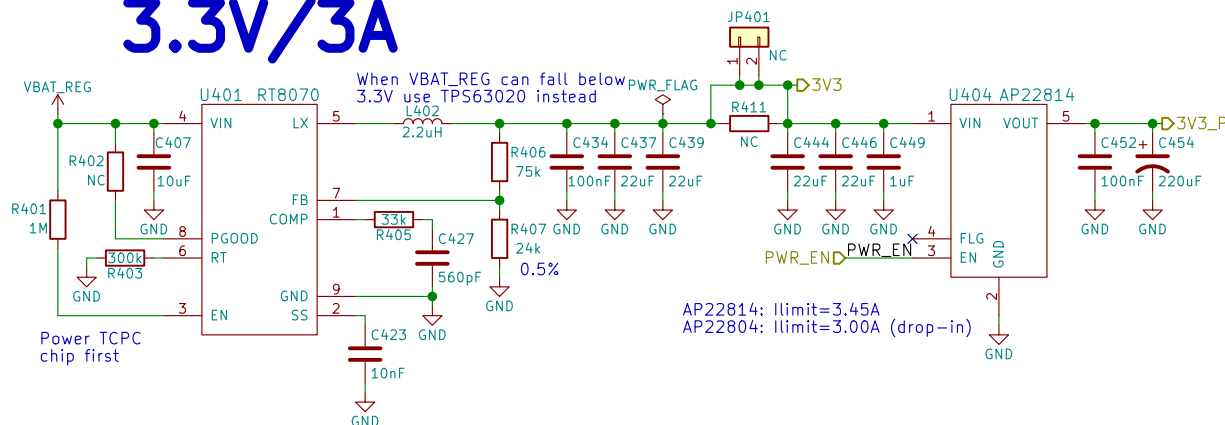
Sheet: /Battery/
 File: battery.sch

Size: A4 Date: 2018-08-14
 KiCad E.D.A. kicad 5.0.0

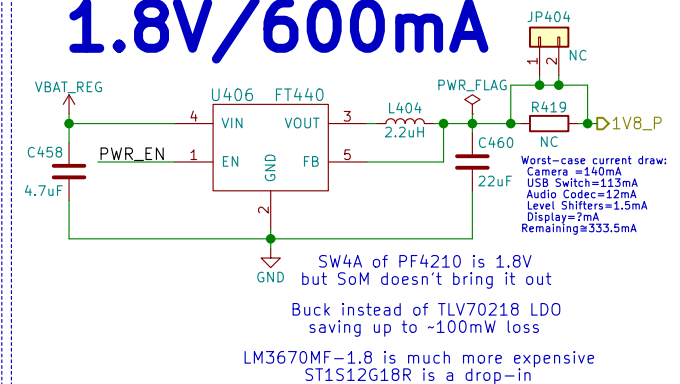
eric.kuzmenko@puri.sm
 angus.ainslie@puri.sm
 nicole.faeber@puri.sm
 christian.schilmoeller@puri.sm

Rev: v0.1.0
 Id: 3/24

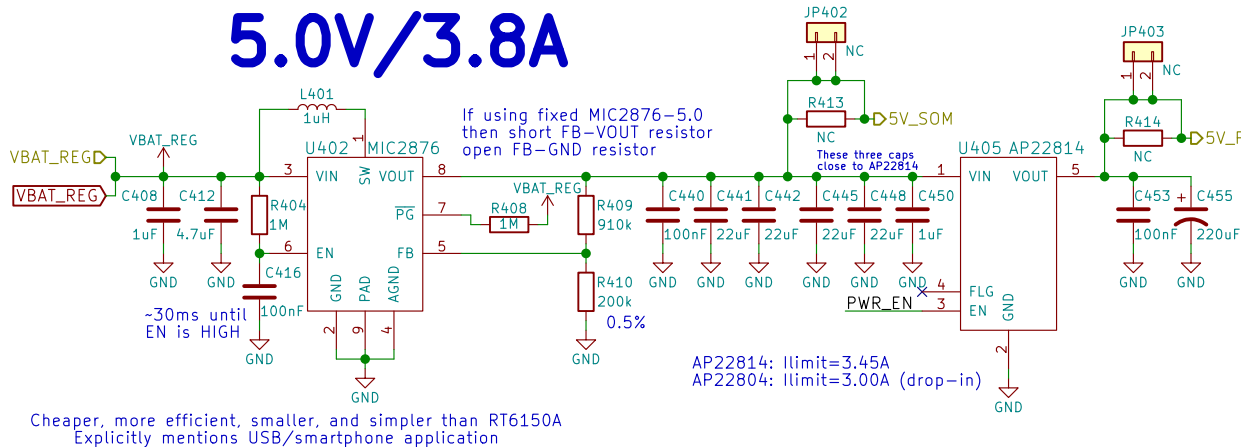
3.3V/3A



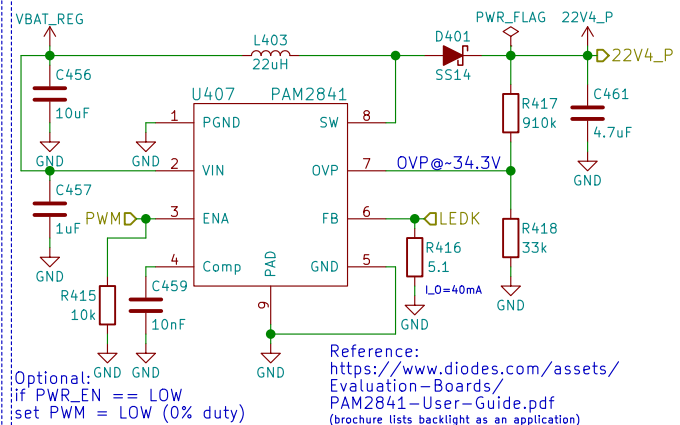
1.8V/600mA



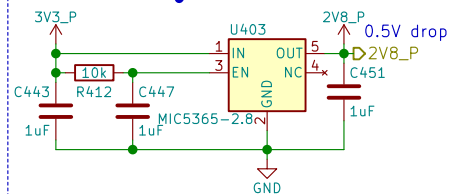
5.0V/3.8A



22.4V/40mA



2.8V/150mA



Power

Power

Purism

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Sheet: /Power/
File: power.sch

Size: A4
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Date: 2018-08-14

Rev: v0.1.0

Id: 4/24

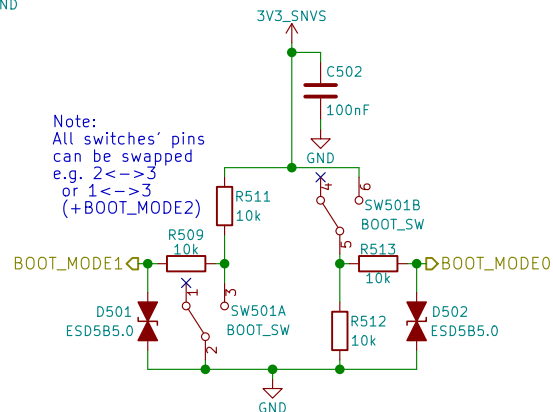
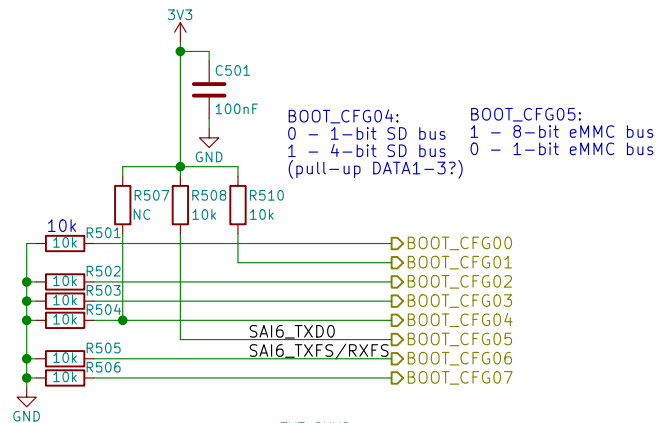
eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

nicole.faeber@puri.sm

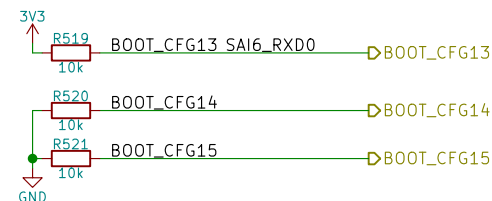
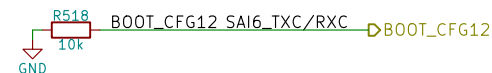
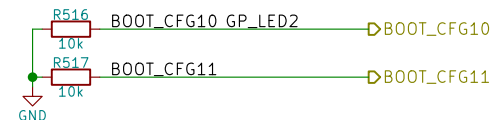
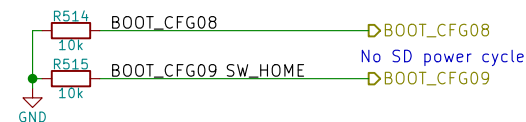
christian.schilmoeller@puri.sm

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

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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Date: 2018-08-14

Rev: v0.1.0

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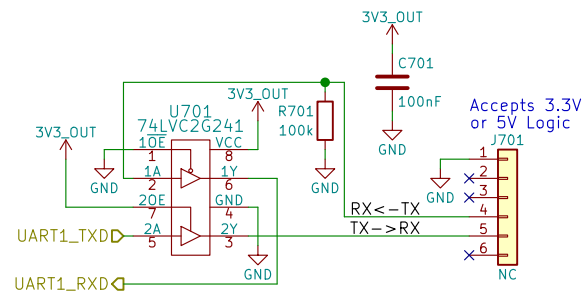
nicole.ferber@puri.sm

christian.schilmoeller@puri.sm

[illegible]

<div> <div>RTC</div> <div>  <div>Purism</div> </div> </div> <div> <div>Copyright 2018 GNU GPLv3</div> <div> <div>Sheet: /RTC/</div> <div>File: rtc.sch</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>
Size: A4	Date: 2018-08-14	Rev:
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UART Debug



UART Debug



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Sheet: /UART Debug/

File: uart.sch

Size: A4

Date: 2018-08-14

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Rev: v0.1.0

Id: 7/24

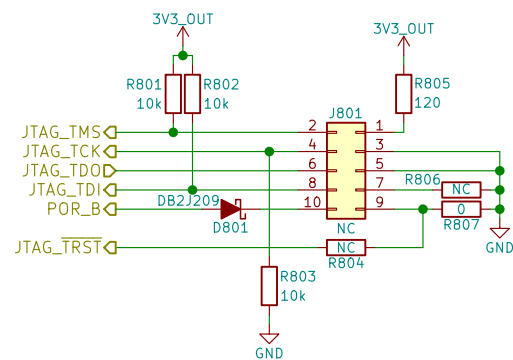
eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

nicole.farber@puri.sm

christian.schilmoeller@puri.sm

JTAG



JTAG



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Sheet: /JTAG/

File: jtag.sch

Size: A4	Date: 2018-08-14
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Size: A4	Date: .
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eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

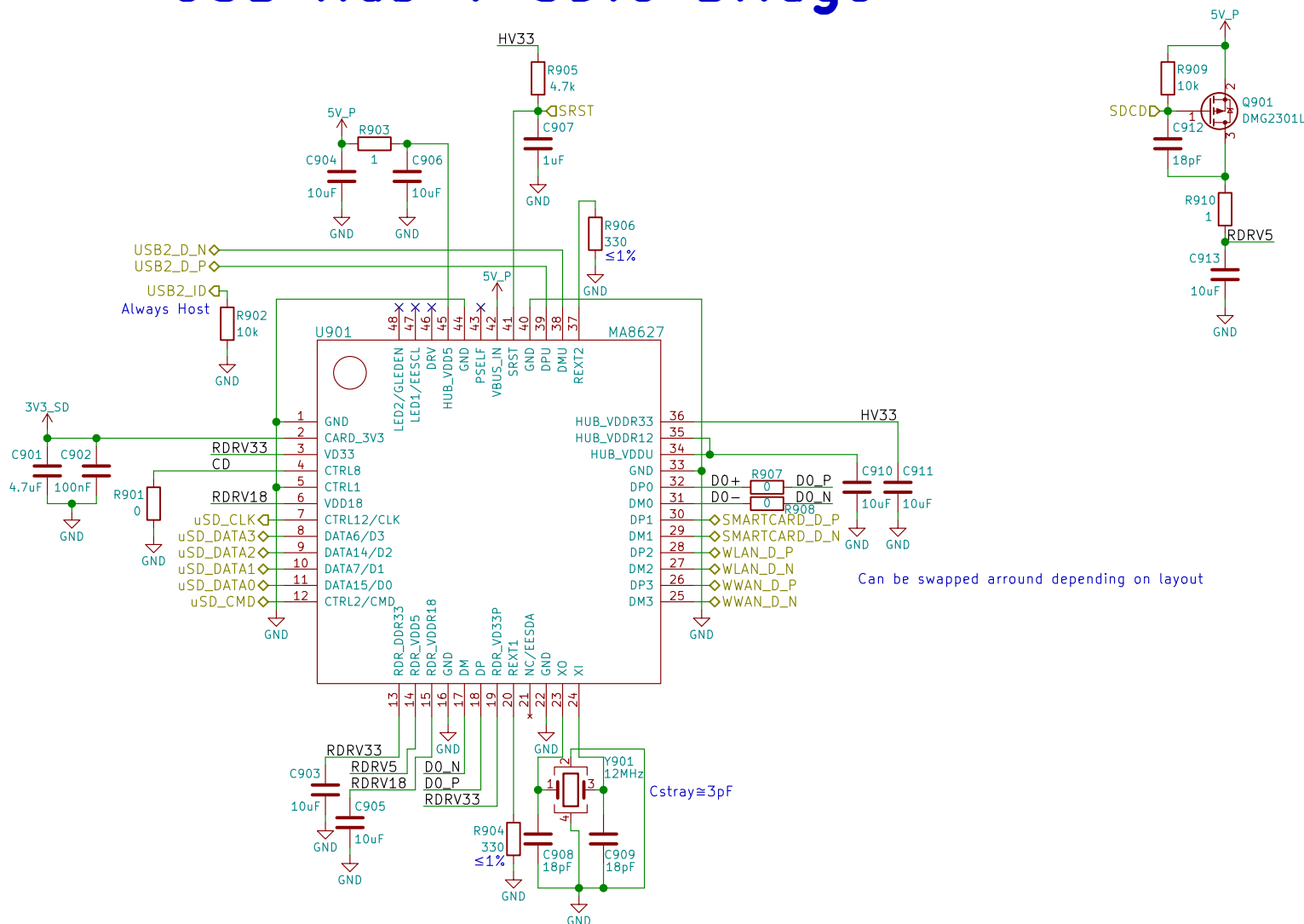
nicole.faerber@puri.sm

christian.schilmoeller@puri.sm

Rev: v0.1.0

Id: 8/24

USB Hub + SDIO Bridge



USB Hub + SDIO Bridge



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

Size: A4 Date: 2018-08-14

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eric.kuzmenko@puri.sm

angus.ainstie@puri.sm

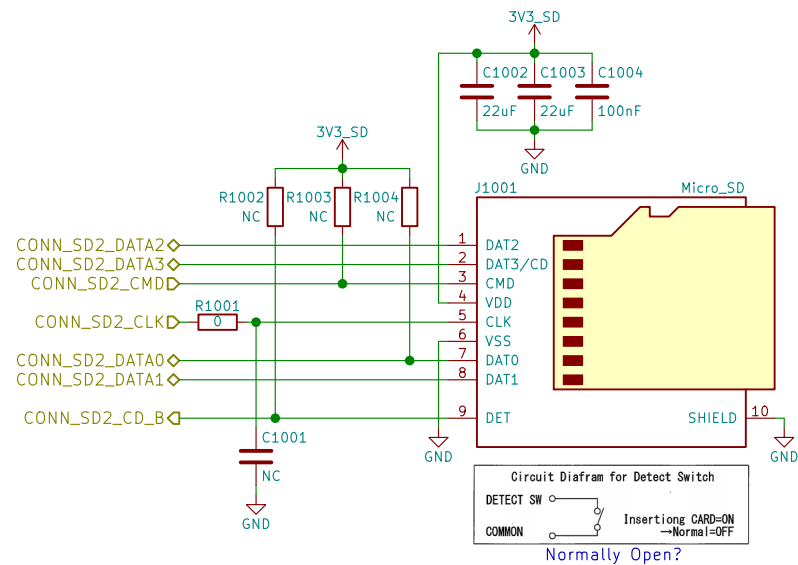
nicole.farber@puri.sm

christian.schilmoeller@puri.sm

Rev: v0.1.0

Id: 9/24

μSD



uSD Card



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Sheet: /uSD Card/

File: sd.sch

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

nicole.faerber@puri.sm

christian.schilmoeller@puri.sm

Size: A4	Date: 2018-08-14
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Size: A1	Date: 2
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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: 2018-08-14

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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

Display Driver IC PN:
Sitronix ST7703

Display_JH057N00900

DISP1201

5.7 "
RGB
720 x 1440
pixels

FPC6
Touch

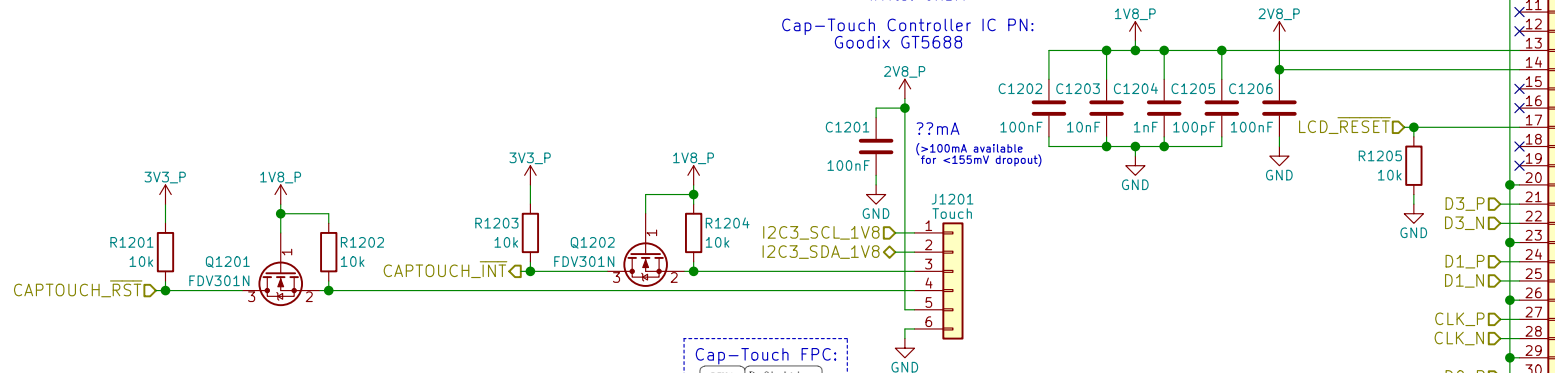
FPC39
Display +
Backlight

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

7-bit Slave Address: 0x5D
(1011 101x)

Read: 0xBB
Write: 0xBA

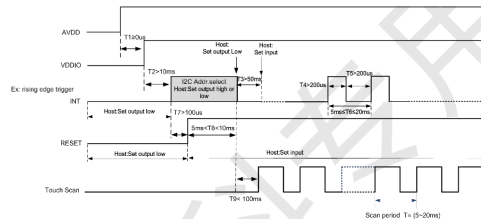
Cap-Touch Controller IC PN:
Goodix GT5688



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:

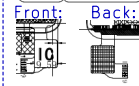
INT	7-bit Address	8-bit Write Address	8-bit Read Address
LOW	0x5D	0xBA	0xBB
HIGH	0x14	0x28	0x29

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

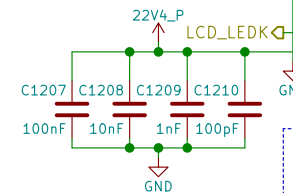


Cap-Touch FPC:

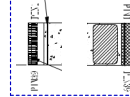
Pin#	Definition
1	SCL
2	SDA
3	INT
4	RESET
5	VDD2, 85
6	GND



100Ω Differential Impedance



DSI FPC:
Front: Back:



Backlight Array:



MIPI DSI

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Sheet: /MIPI/DSI/

File: dsi.sch

Size: A4 Date: 2018-08-14

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angus.ainstie@puri.sm

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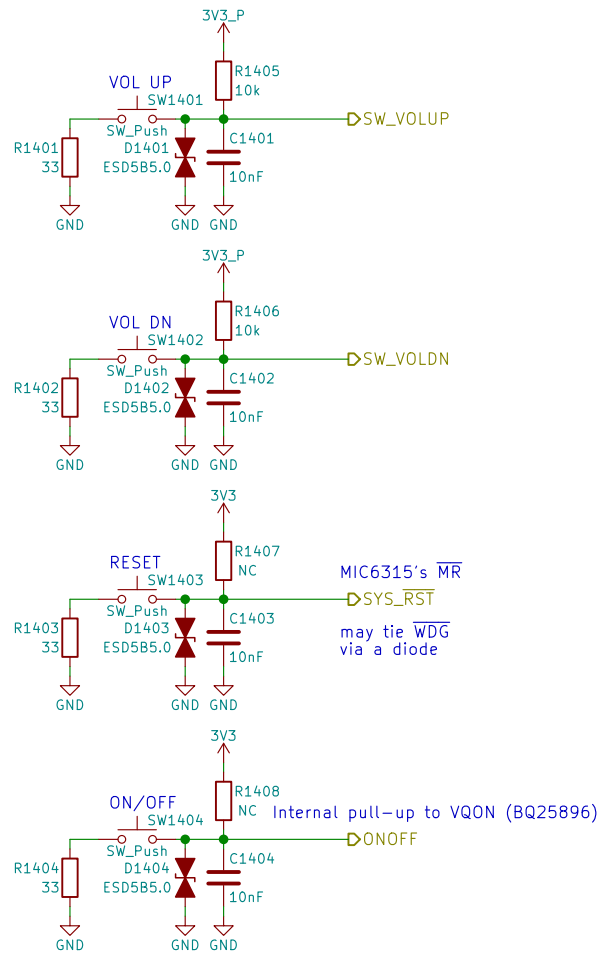
christian.schilmoeller@puri.sm

Rev: v0.1.0

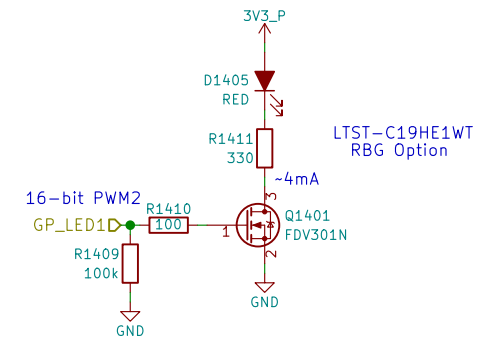
Id: 12/24

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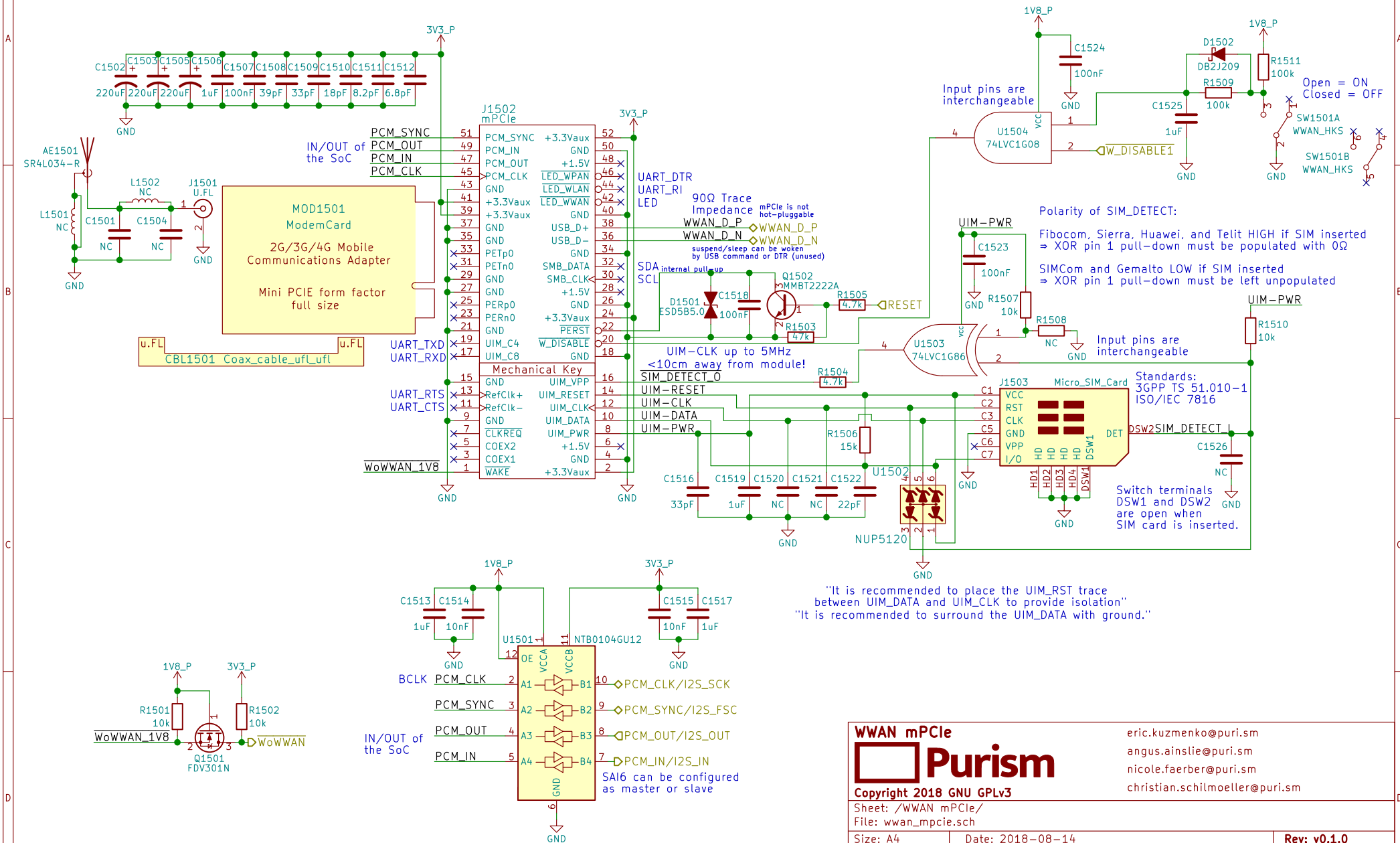
Sheet: /Buttons & LED/
File: buttons_led.sch

Size: A4 Date: 2018-08-14
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: 14/24

WWAN mPCIe



Purism

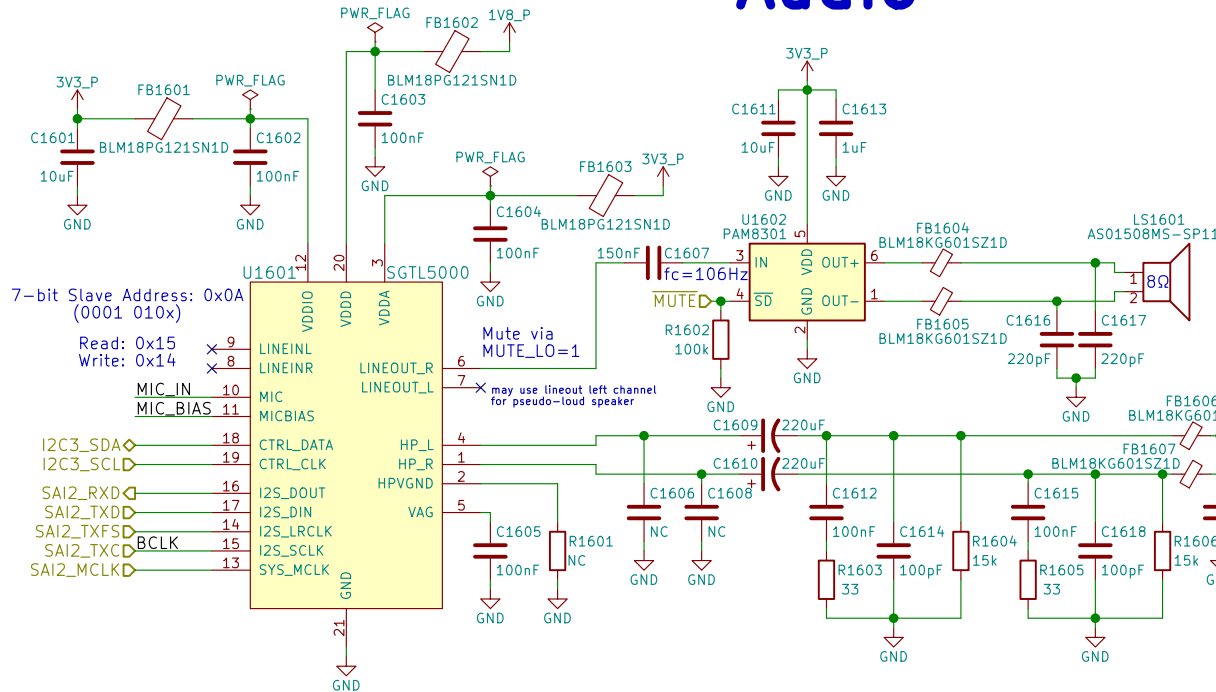
Sheet: /WWAN mPCIe/
File: wwan_mpcie.sch

Size: A4	Date: 2018-08-14
KiCad E.D.A. kicad 5.0.0	

eric.kuzmenko@puri.sm
angus.ainslie@puri.sm
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Rev: v0.1.0
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-crc>
 +Zener diode to protect against ranges outside of -0.9V to 3.3V

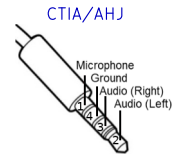
dB specs in datasheet is a unit of power gain (not dBu or VU) with respect to the DAC's unattenuated output

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

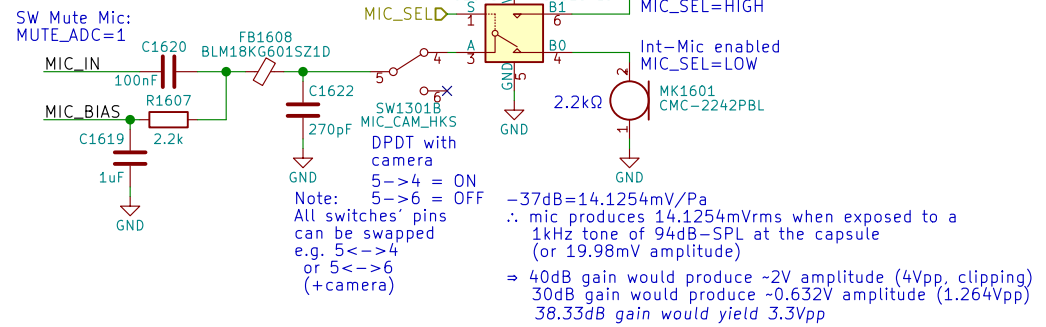
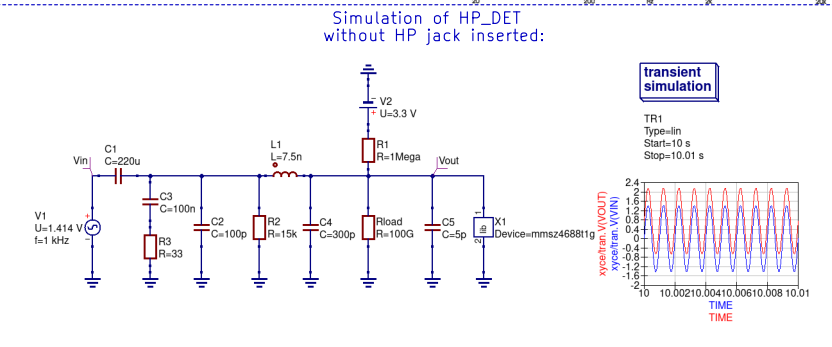
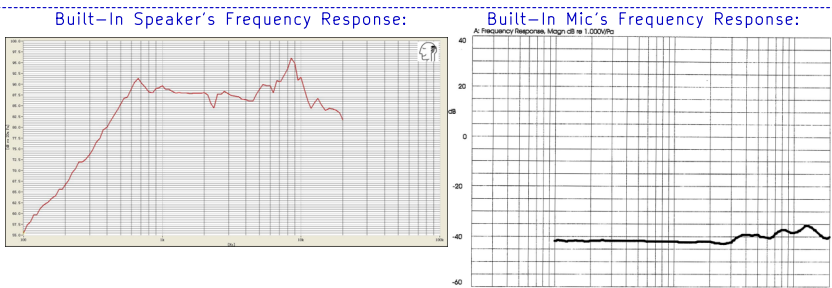
If HP_DET is HIGH for >100ms then HPs are present

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



LCR Measurements:

Earbud Microphone:	Headset Speaker:	Earbud Speaker:
@1kHz	@1kHz	@1kHz
$L_s = 3.844mH$	$L_s = 244.4\mu H$	$L_s = 25.2\mu H$
$L_p = 15.757H$	$L_p = 141.99mH$	$L_p = 311.0mH$
$C_s = 6.583\mu F$	$C_s = 103.6\mu F$	$C_s = 1.0mF$
$C_p = 1612.8pF$	$C_p = 178.77nF$	$C_p = 81.95nF$
$R_s = 1.5465k\Omega$	$R_s = 36.86\Omega$	$R_s = 17.030\Omega$
$R_p = 1.5478k\Omega$	$R_p = 36.86\Omega$	$R_p = 17.034\Omega$
$\theta = -0.8deg$	$\theta = -2.3deg$	$\theta = 0.5deg$



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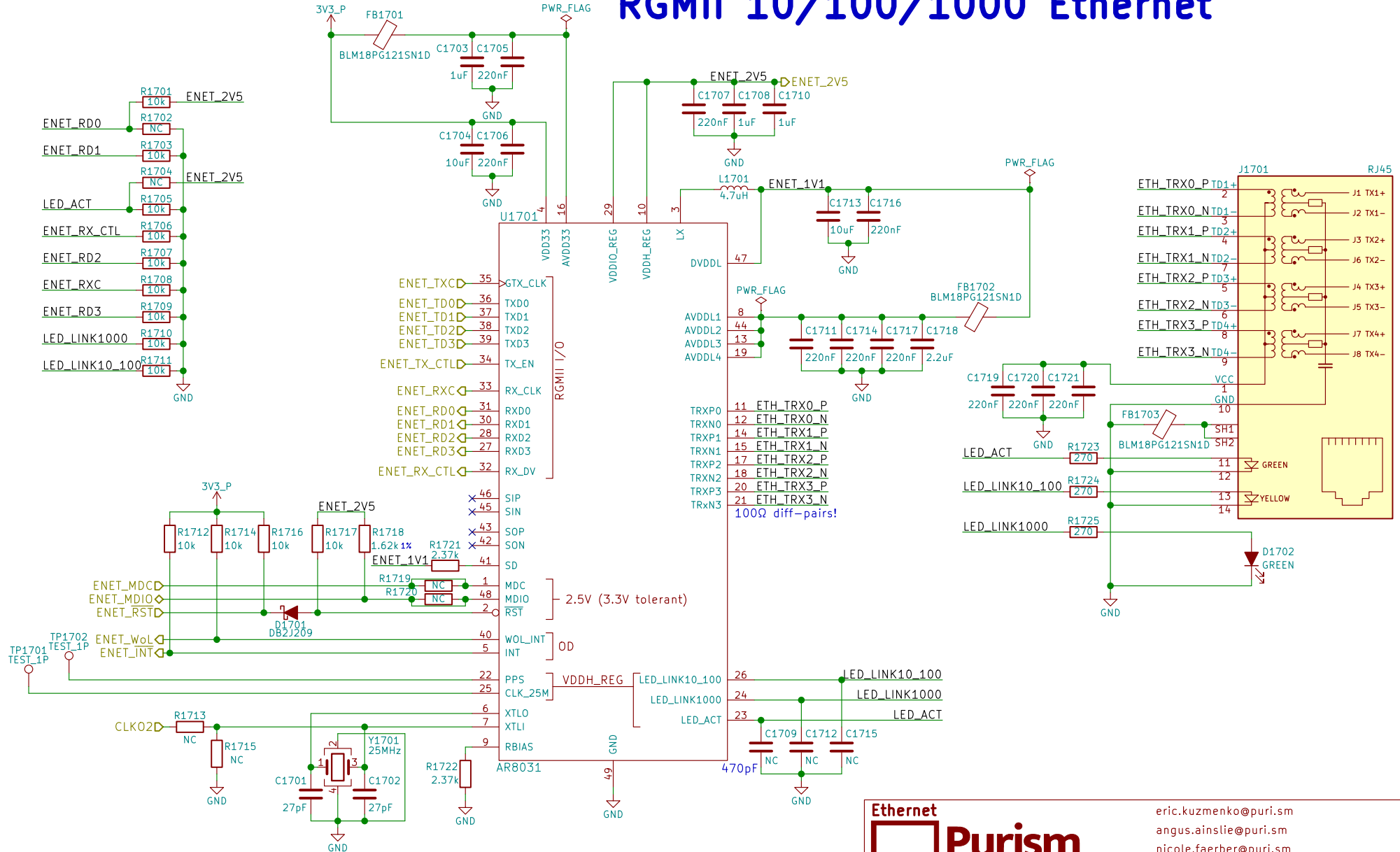
Sheet: /Audio/
 File: audio.sch

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

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

Rev: v0.1.0
 Id: 16/24

RGMII 10/100/1000 Ethernet



Ethernet

Purism

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Sheet: /Ethernet/
File: ethernet.sch

Size: A4 Date: 2018-08-14
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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

WLAN_D_P
WLAN_D_N
WIFI_CLK
WIFI_CMD
WIFI_DATA0
WIFI_DATA1
WIFI_DATA2
WIFI_DATA3
WIFI_WAKE

VIH=2.31V

WIFI_RST

W_DISABLE1

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

W_DISABLE2

W_DISABLE1

M2_I2C_SDA

M2_I2C_SCL

WIFI_DISABLE

BT_DISABLE

WIFI_DISABLE

BT_DISABLE

WIFI_DISABLE

BT_DISABLE

WIFI_DISABLE

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WIFI_DISABLE

BT_DISABLE

Socket: Table 46
Module: Table 23

3V3_P

M.2 Key E

R1802

J1803

NC

Key E

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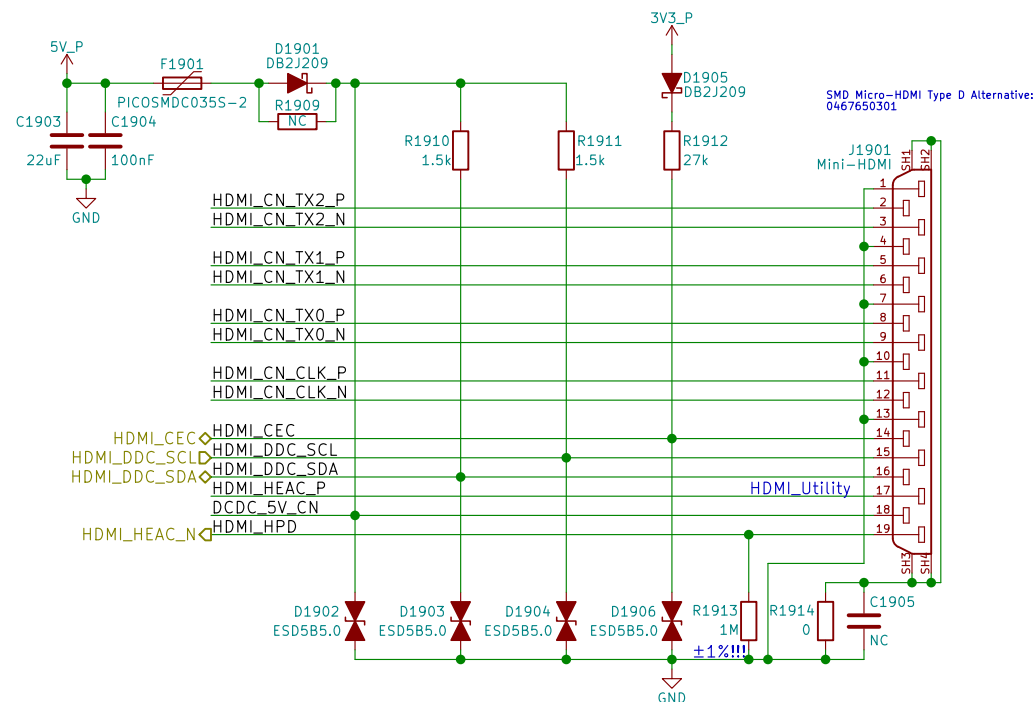
236

237

238

239

HDMI




 **Purism**

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

Rev: v0.1.0
Id: 19/24

D

SPI NOR Flash  Purism		eric.kuzmenko@puri.sm angus.ainslie@puri.sm nicole.faeber@puri.sm christian.schilmoeller@puri.sm
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Sheet: /SPI Flash/ File: flash.sch		
Size: A4	Date: 2018-08-14	Rev: v0.1.0
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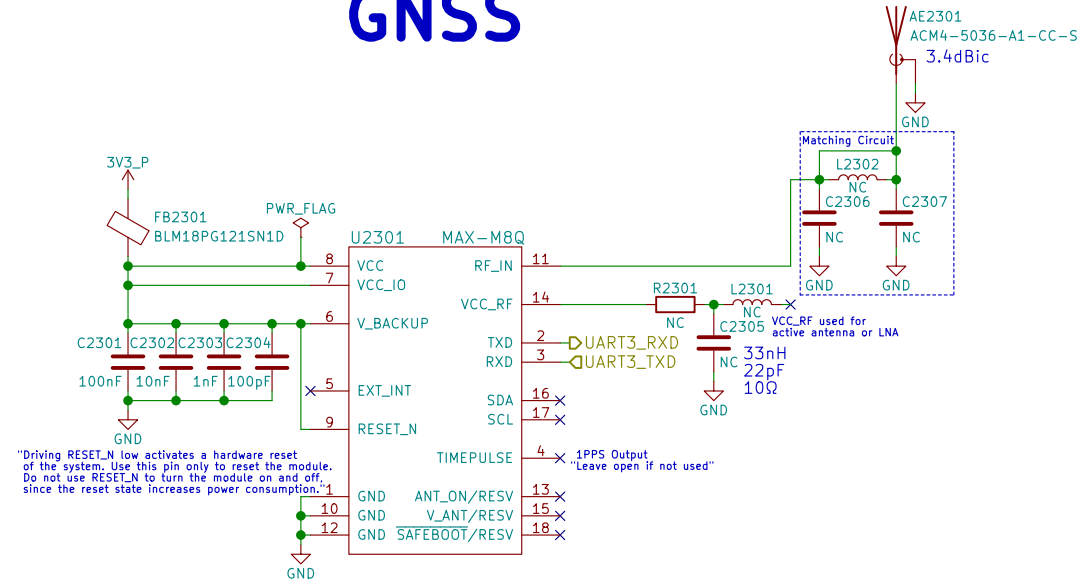
Smart Card



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 Date: 2018-08-14
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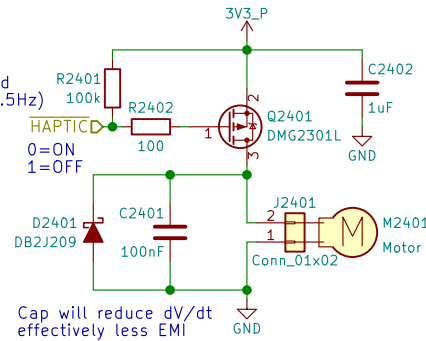
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Rev: v0.1.0
Id: 23/24

Haptic Motor

PWM pins occupied:
 GPIO1_I001 - LCD Backlight
 GPIO1_I013 - LED
 GPIO1_I014 - Ethernet (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



Cap will reduce dV/dt
 effectively less EMI

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

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