

USB-C



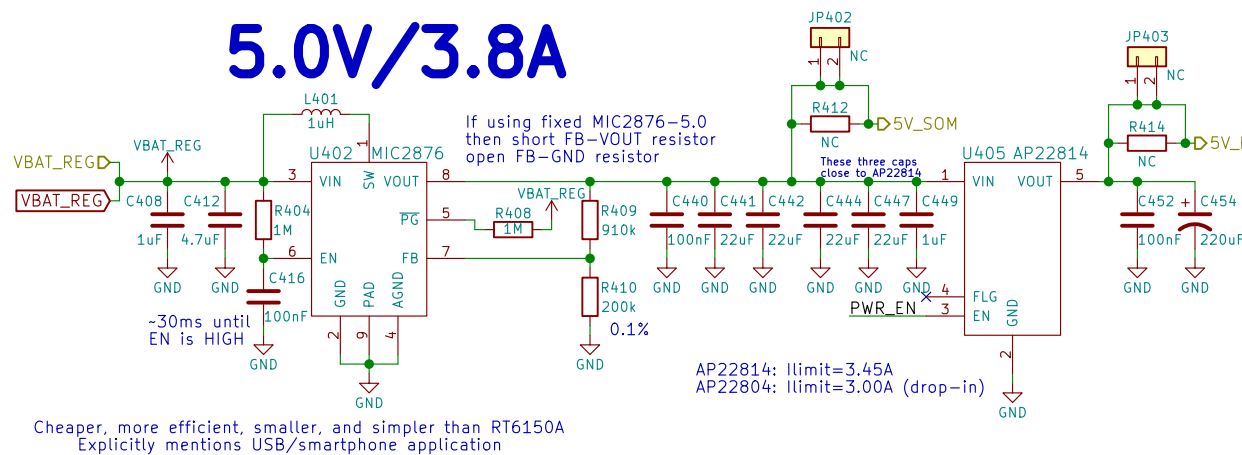
3.3V/3A



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
KiCad E.D.A. kicad 4.0.7

Date: 2018-06-18

Rev: v0.1.0

Id: 4/24

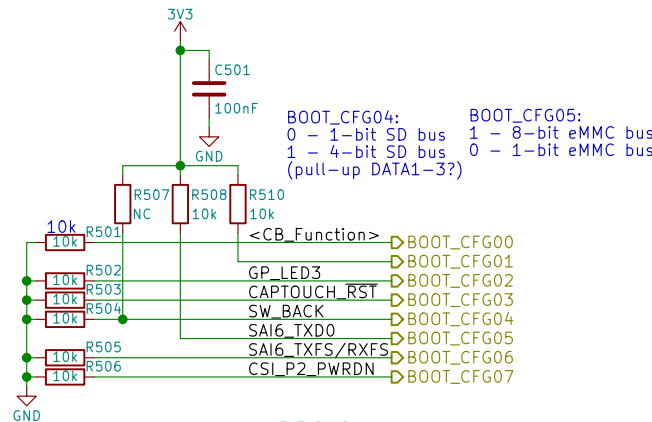
eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

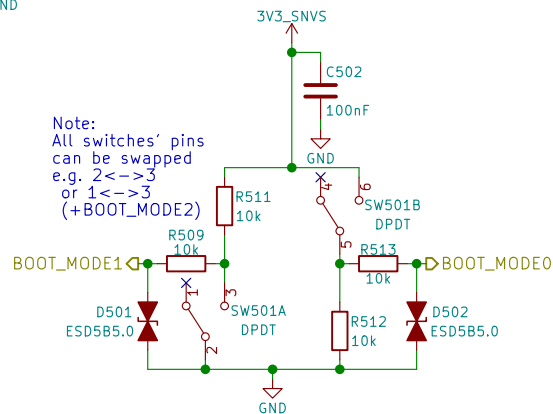
nicole.farber@puri.sm

christian.schilmoeller@puri.sm

Boot Config



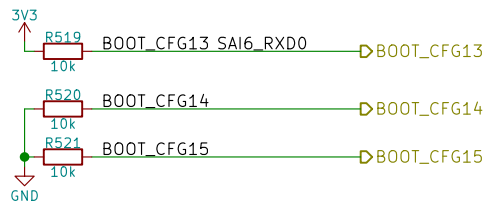
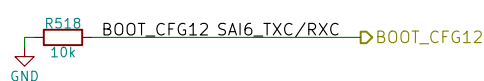
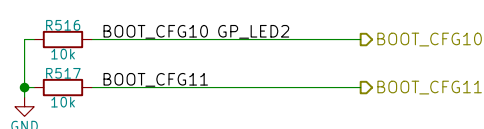
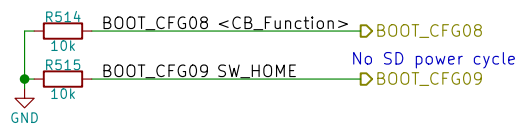
BOOT_CFG04: 0 - 1-bit SD bus
1 - 4-bit SD bus (pull-up DATA1-3?)
BOOT_CFG05: 1 - 8-bit eMMC bus
0 - 1-bit eMMC bus



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

Rev: v0.1.0
Id: 5/24

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

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Rev: v0.1.0

Id: 6/24

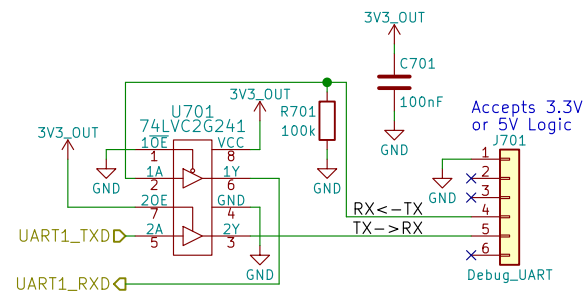
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nicole.farber@puri.sm

christian.schilmoeller@puri.sm

UART Debug



UART Debug



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Sheet: /UART Debug/
File: uart.sch

Size: A4 Date: 2018-06-18
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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

eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

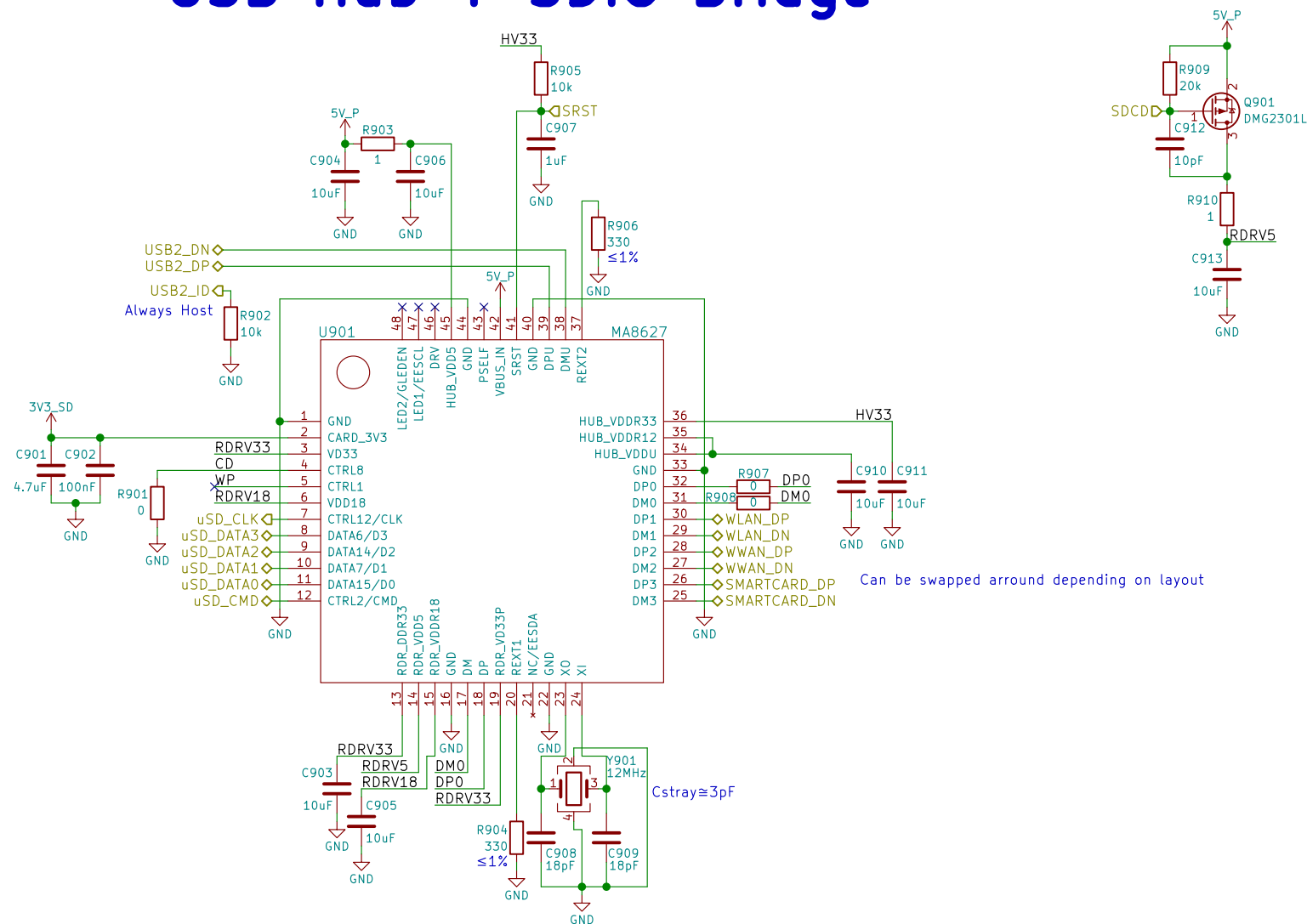
nicole.farber@puri.sm

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: 2018-06-18
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Size: 711	Date:
KiCad E.D.A.	kicad 4.0.7

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

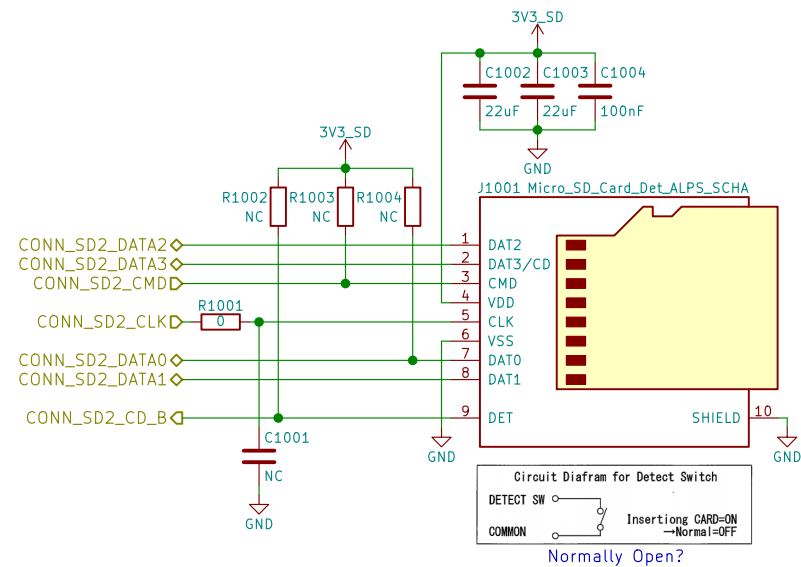
nicole.ferber@puri.sm

christian.schilmoeller@puri.sm

Rev: v0.1.0

Id: 9/24

μ SD



uSD Card



Purism

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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

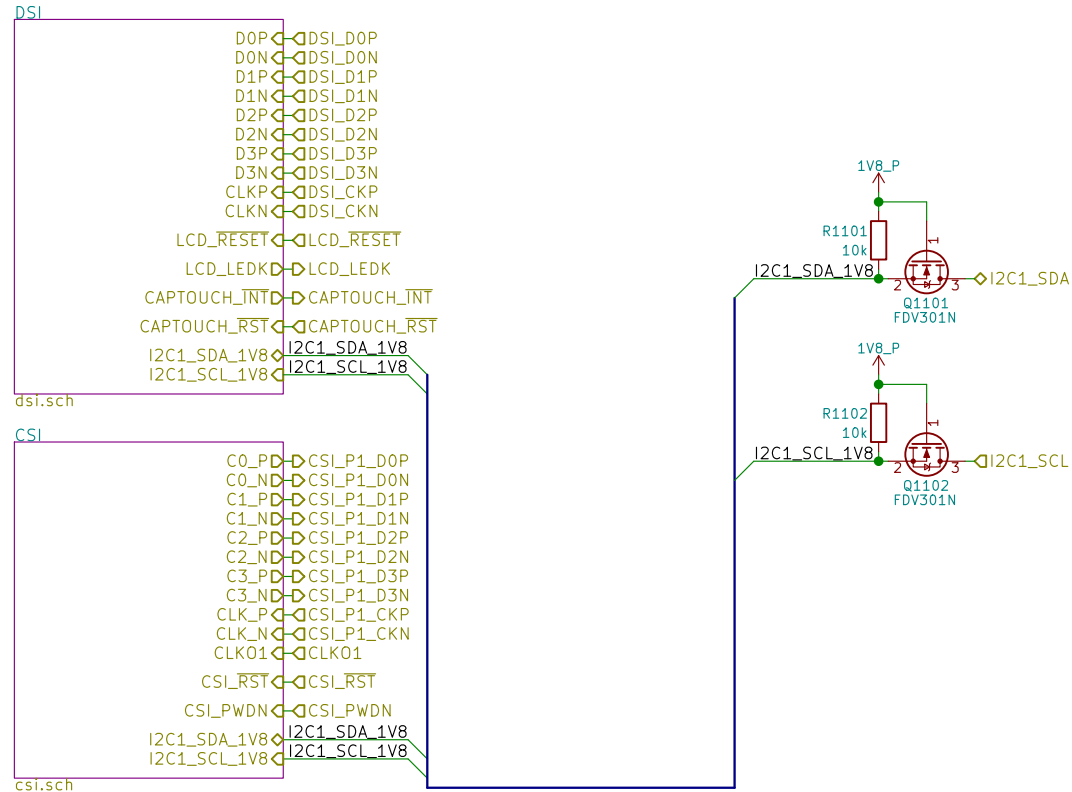
Date: 2018-06-18

Rev: v0.1.0

Size: A4	Date: 2025-01-27
KiCad E.D.A.	kicad 4.0.7

Id: 10/24

MIPI



MIPI



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Sheet: /MIPI/

File: mipi.sch

Size: A4 Date: 2018-06-18

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eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

nicole.ferber@puri.sm

christian.schilmoeller@puri.sm

Rev: v0.1.0

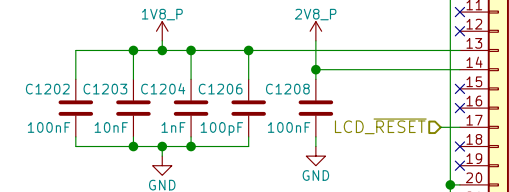
Id: 11/24

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

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

Read: 0xBB
Write: 0xBA



Cap-Touch Controller IC PN:
Goodix GT5688



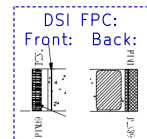
The upper 7 bits are the address,
and bit 0 is used to select read or write.
GT5688 has two slave device addresses to choose from:

Cap-Touch FPC:

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

Front:  **Back:** 

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



Backlight Array:



MIPI DSI



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Sheet: /MIPI/DSI/

File: dsi.sch

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

eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

nicole.farber@puri.sm

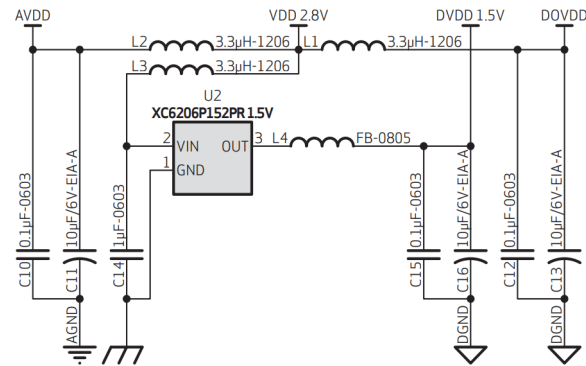
christian.schilmoeller@puri.sm

Rev: v0.1.0

Id: 12/24

Camera

Using Internal DVDD 1.5V Regulator:



2.7 POWER UP SEQUENCE

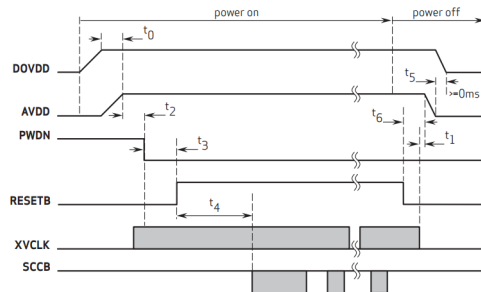
Based on the system power configuration (1.8V or 2.8V for I/O power, using external DVDD or internal DVDD, requiring access to the I2C during power up period or not), the power up sequence will differ. If 1.8V is used for I/O power, using the internal DVDD is preferred. If 2.8V is used for I/O power, 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 ≥ 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

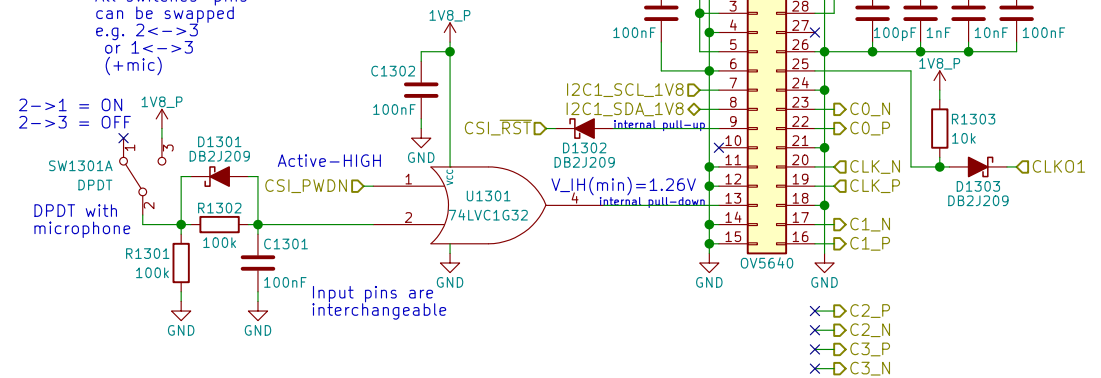
figure 2-3 power up timing with internal DVDD



- 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

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



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

MIPI CSI



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Sheet: /MIPI/CSI/

File: csi.sch

Size: A4 Date: 2018-06-18

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eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

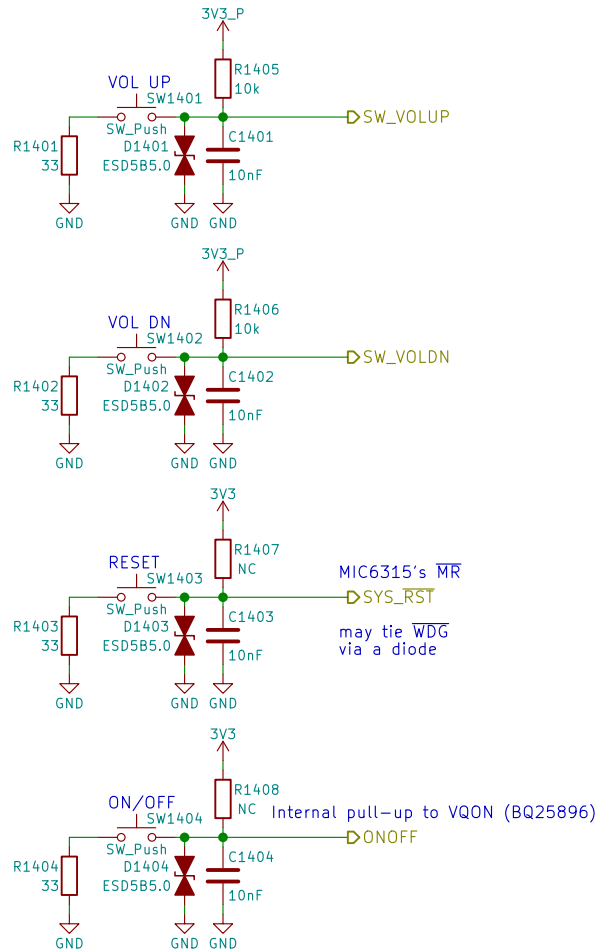
nicole.farber@puri.sm

christian.schilmoeller@puri.sm

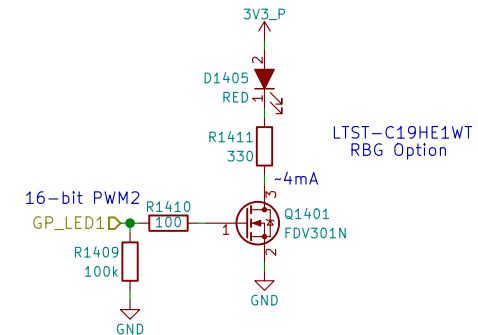
Rev: v0.1.0

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

[illegible]

Even pins 40–48 are unused

	Pin	Port Config. ^{0,1}	Port Config. ^{1,2}	Port Config. ^{2,3}	Port Config. ^{3,4}
GPIO_0	40	GNSS_SCL	GNSS_SCL	SIM_DET2	HSIO_Data
GPIO_1	42	GNSS_SDA	GNSS_SDA	UIM_DTA2	HSIO_Strobe
GPIO_2	44	GNSS_IRQ	GNSS_IRQ	UIM_CLK2	IPC_0
GPIO_3	46	SYSCLK	GNSS_0	UIM_RST2	IPC_1
GPIO_4	48	TX_BLANKING	GNSS_1	UIM_PWR2	IPC_2
GPIO_5	20	AUDIO_0	AUDIO_0	RFU	Audio_0
GPIO_6	22	AUDIO_1	AUDIO_1	RFU	Audio_1
GPIO_7	24	AUDIO_2	AUDIO_2	RFU	IPC_3/Audio_2
GPIO_8	28	AUDIO_3	AUDIO_3	RFU	IPC_4/Audio_3
GPIO_9	10	LED#1	LED#1	DSB#1	IPC_5
GPIO_10	26	W_Disable2#	W_Disable2#	W_Disable2#	IPC_6
GPIO_11	23	Wake_On_WWAN	Wake_On_WWAN	Wake_On_WWAN	IPC_7
GPIO_12	25	DPR	DPR	DPR	IPC_8

Module Configuration Decodes					Port Configuration ²
CONFIG_0 (Pin 21)	CONFIG_1 (Pin 68)	CONFIG_2 (Pin 75)	CONFIG_3 (Pin 31)	Module Type and Main Host Interface ¹	
GNd	GNd	GNd	GNd	SSD - SATA	N/A
GNd	NC	GNd	GNd	SSD - PCIe	N/A
GNd	NC	NC	GNd	WWAN - PCle	1
GNd	GNd	GNd	NC	WWAN - USB 3.0	0
GNd	NC	GNd	NC	WWAN - USB 3.0	1
GNd	GNd	NC	NC	WWAN - USB 3.0	2
GNd	NC	NC	NC	WWAN - USB 3.0	3
NC	GNd	GNd	GNd	WWAN - SSIC	0
NC	NC	GNd	GNd	WWAN - SSIC	1
NC	NC	NC	GNd	WWAN - SSIC	2
NC	GNd	NC	GNd	WWAN - SSIC	3
NC	GNd	GNd	NC	WWAN - PCle	2
NC	NC	GNd	NC	WWAN - PCle	3
NC	GNd	NC	NC	RFU	N/A
NC	NC	NC	NC	No Module Present	N/A

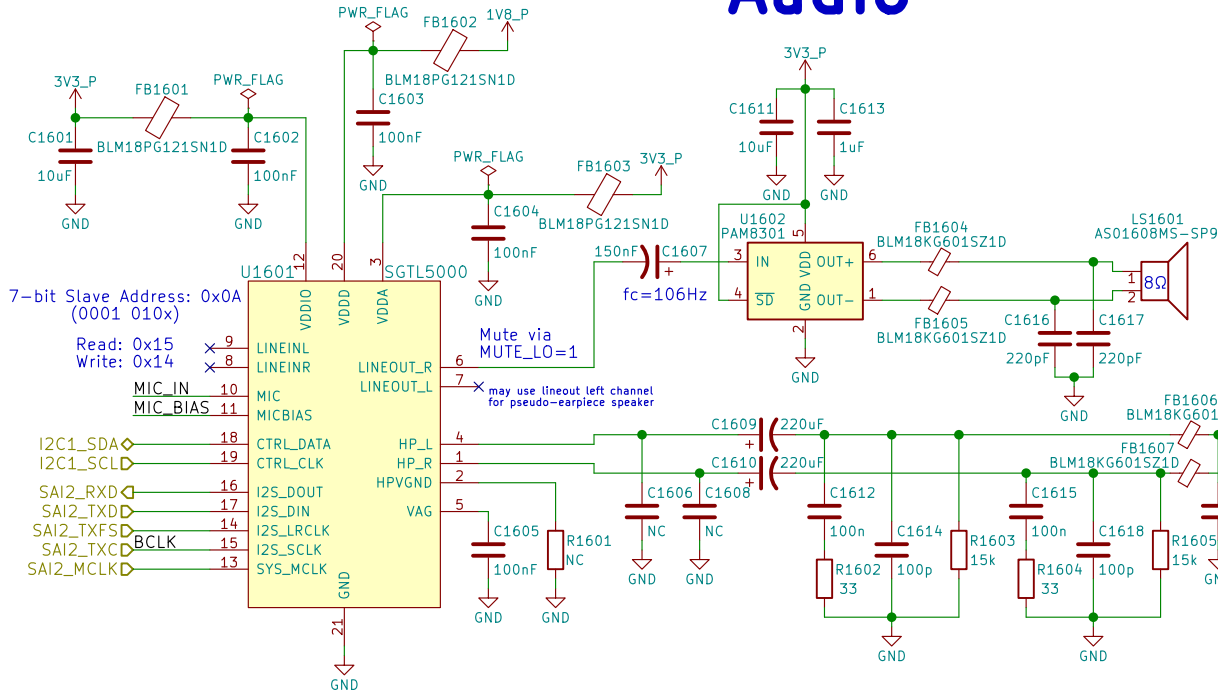


Purism

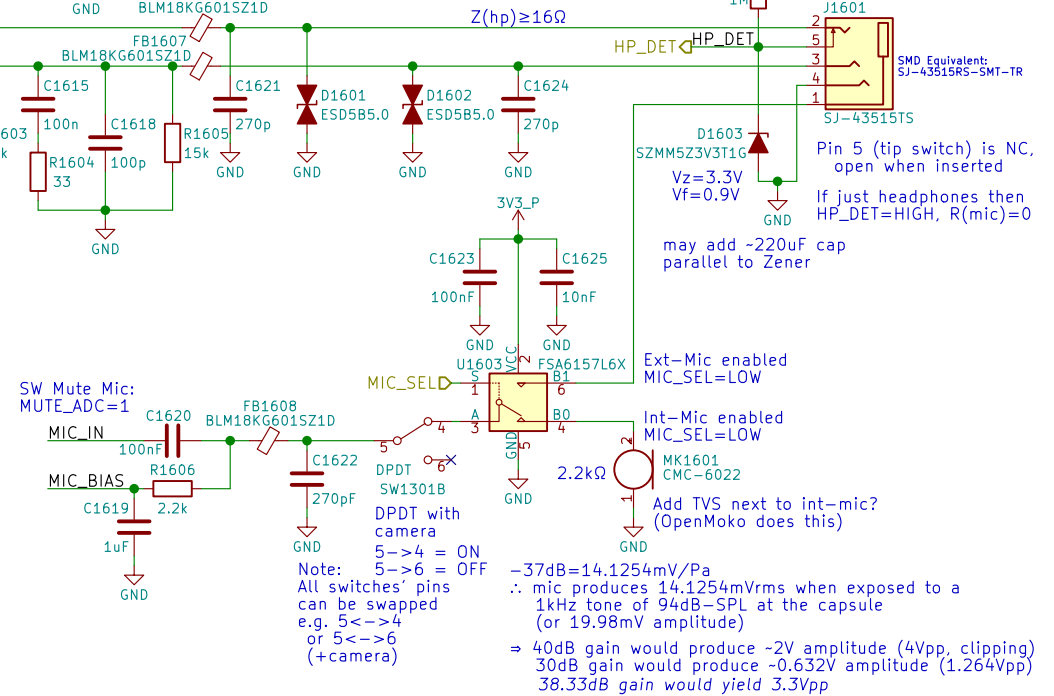
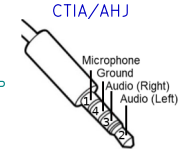
eric.kuzmenko@puri.sm
angus.ainslie@puri.sm
nicole.ferber@puri.sm
christian.schilmoeller@puri.sm

Rev: v0.1.0
Id: 15/24

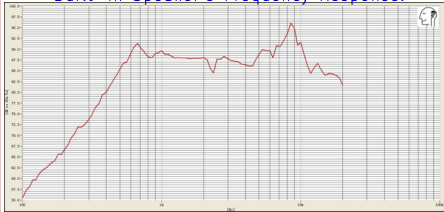
Audio



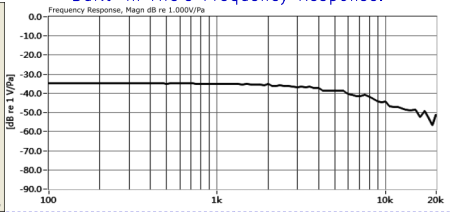
Could use FSA8008 to detect mic



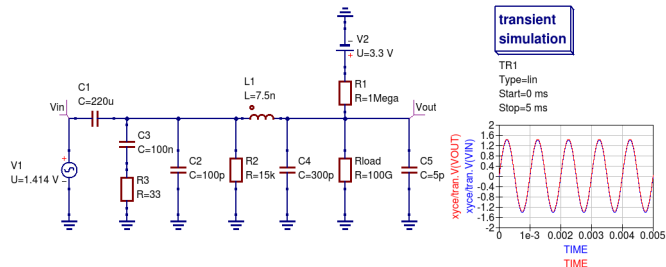
Built-In Speaker's Frequency Response:



Built-In Mic's Frequency Response:



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



transient
simulation

LCR Measurements:

Earbud Microphone:
@1kHz
Ls = 3.844mH
Lp = 15.757H
Cs = 6.583uF
Cp = 1612.8pF
Rs = 1.5465kOhms
Rp = 1.5478kOhms
 $\theta = -0.8\text{deg}$

Headset Speaker:
@1kHz
Ls = 244.4uH
Lp = 141.99mH
Cs = 103.6uF
Cp = 178.77nF
Rs = 36.86Ohms
Rp = 36.86Ohms
 $\theta = -2.3\text{deg}$

Earbud Speaker:
@1kHz
Ls = 25.2uH
Lp = 311.0mH
Cs = 1.0mF
Cp = 81.95nF
Rs = 17.030Ohms
Rp = 17.034Ohms
 $\theta = 0.5\text{deg}$

Audio



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Sheet: /Audio/
File: audio.sch

Size: A4	Date: 2018-06-18
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eric.kuzmenko@puri.sm

angus.ainslie@puri.sm

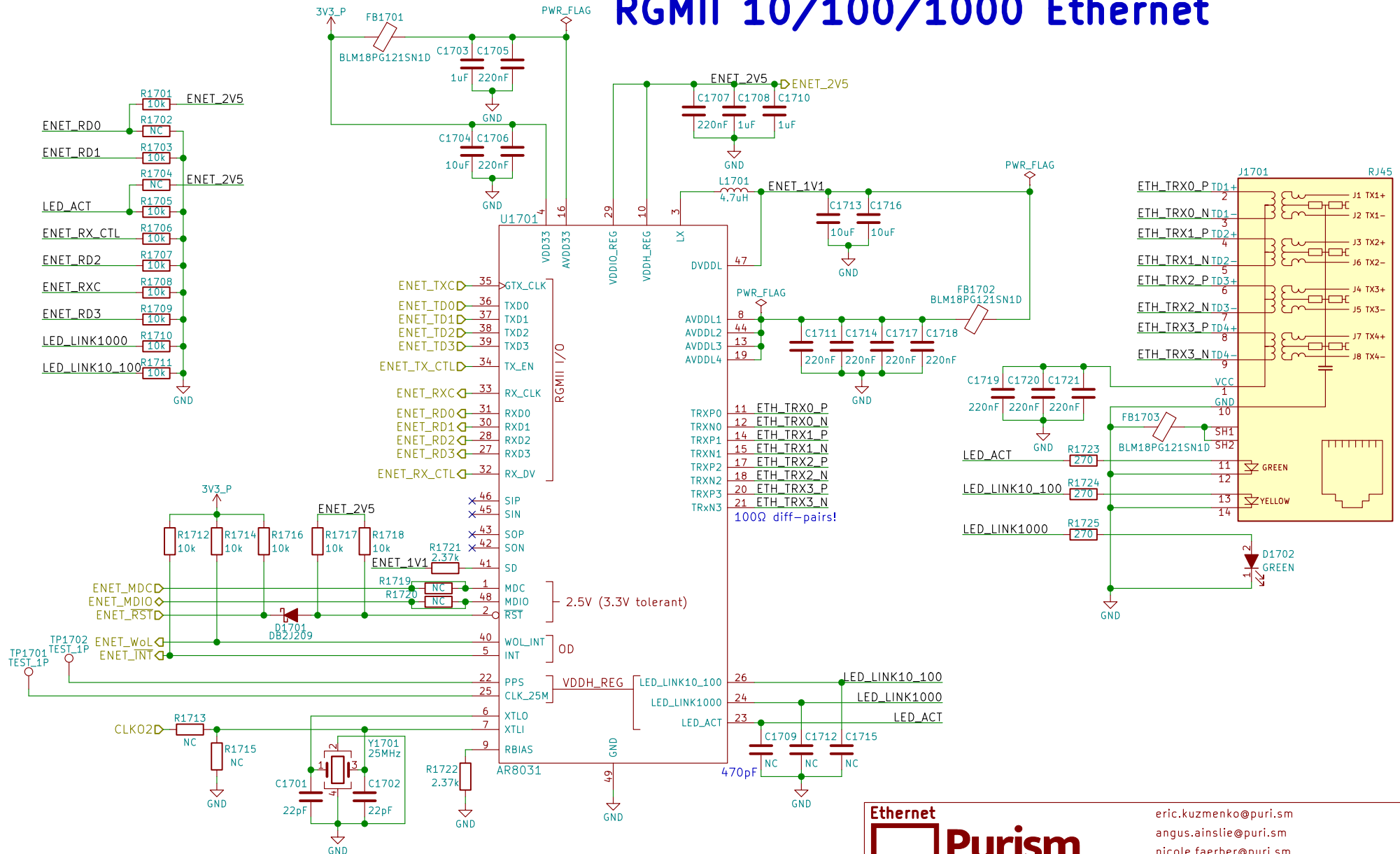
nicole.faerber@puri.sm

christian.schilmoeller@puri.sm

Rev: v0.1.0

Id: 16/24

RGMII 10/100/1000 Ethernet



Ethernet

Purism

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Sheet: /Ethernet/
File: ethernet.sch

Size: A4 Date: 2018-06-18
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angus.ainslie@puri.sm

nicole.farber@puri.sm

christian.schilmoeller@puri.sm

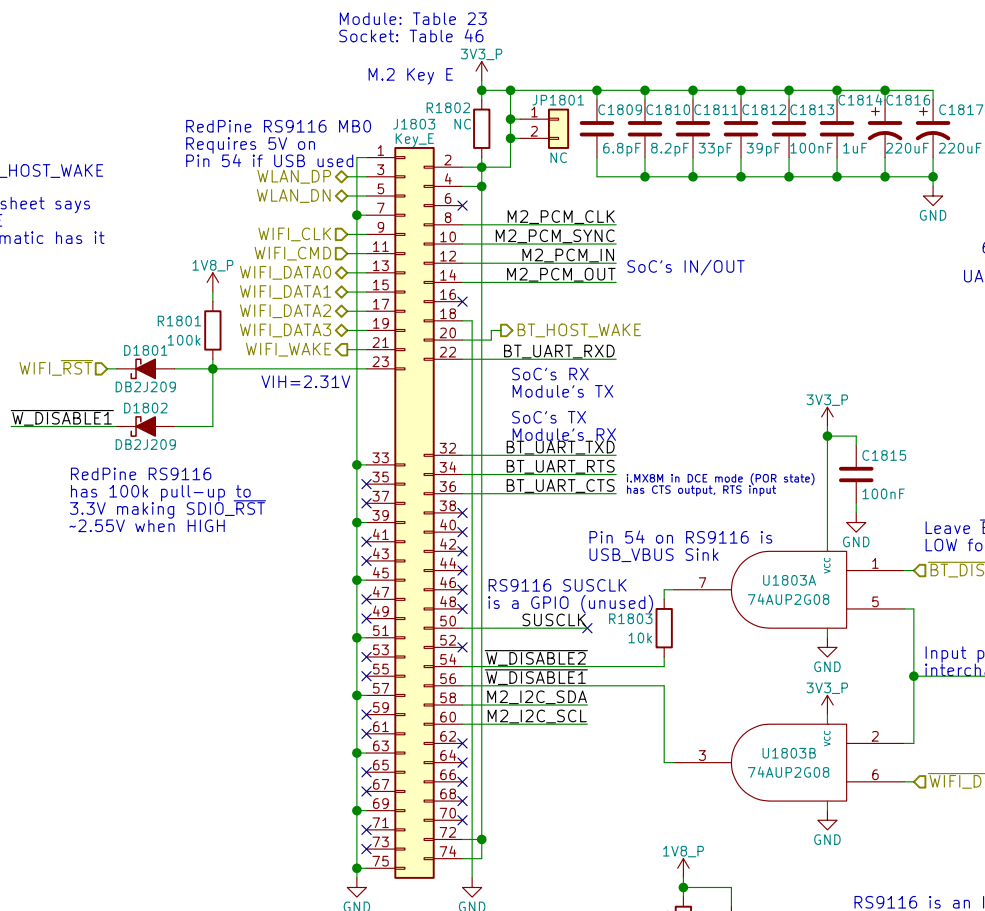
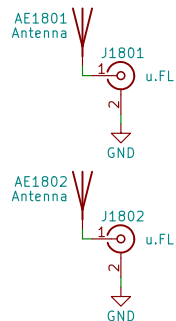
Rev: v0.1.0

Id: 17/24

WLAN+BT M.2

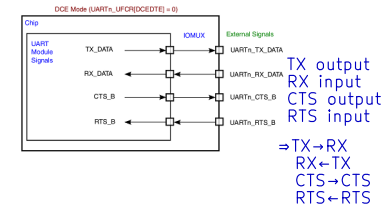
```
RS9116 NC:
RTS, CTS, BT_HOST_WAKE
```

RS9116 datasheet says
no WIFI_WAKE
but the schematic has it

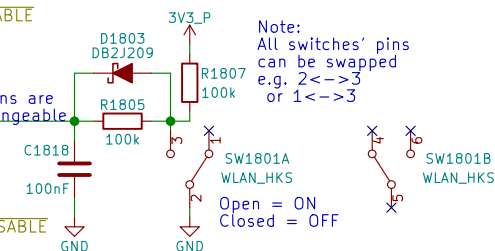


6.2 M.2 Signal Directions

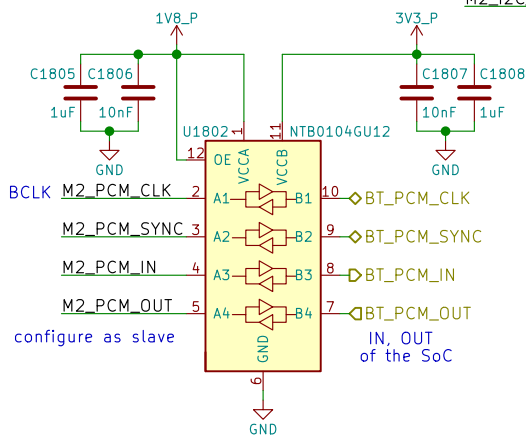
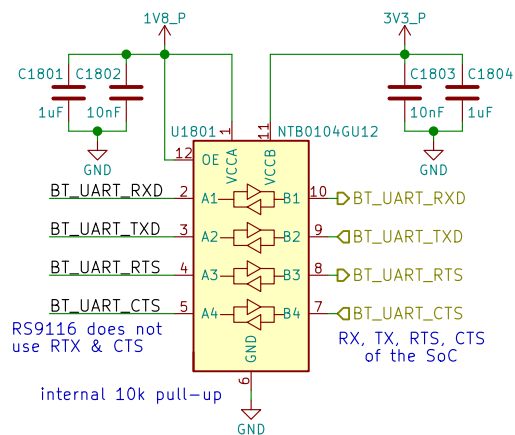
UARTn_UFCR[DCEDTE]=0 on POR



Note:
All switches' pins
can be swapped
e.g. 2 \leftrightarrow 3
or 1 \leftrightarrow 3



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

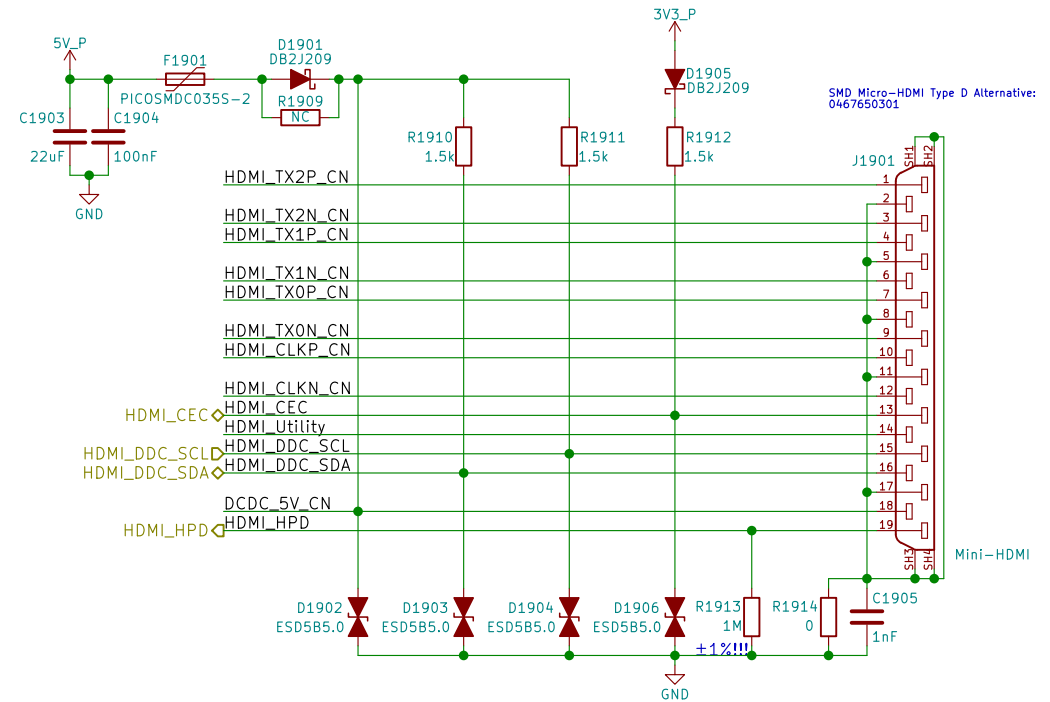
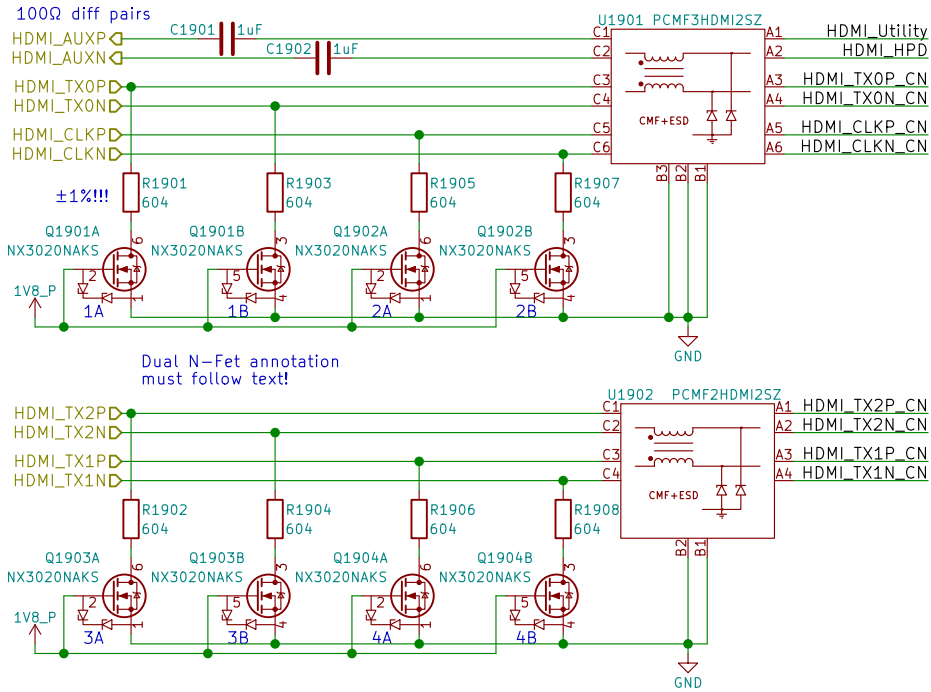


WLAN+BT M.2  Purism		eric.kuzmenko@puri.sm angus.ainslie@puri.sm nicole.ferber@puri.sm christian.schilmoeller@puri.sm
Copyright 2018 GNU GPLv3		
Sheet: /WLAN+BT M.2/ File: wifi_bt_m2.sch		
Size: A4	Date: 2018-06-18	Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7		Id: 18/24

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

nicole.farber@puri.sm

christian.schilmoeller@puri.sm

1

B



C

D

1

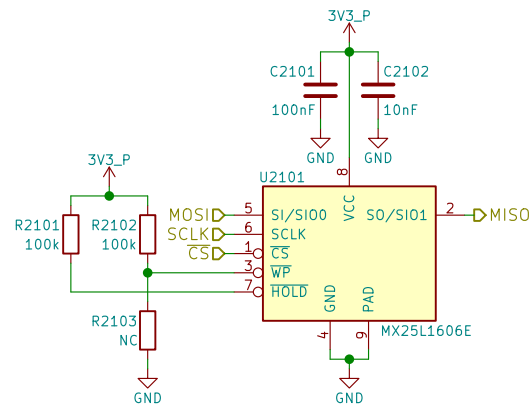


1



Id: 20/24

SPI NOR Flash



SPI NOR Flash



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Sheet: /SPI Flash/
File: flash.sch

Size: A4 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: 21/24

The schematic diagram illustrates the electrical connections for the Smart Card module. It features a USB module (U2201) and a Smart Card component (J2201).

USB Module (U2201) Connections:

- Smartcard DP:** Connected to USB_DP (pin 11).
- Smartcard DN:** Connected to USB_DM (pin 10).
- 5V_P:** Connected to VDD5 (pin 1) and VDD33 (pin 12).
- Smart Card (SC1):**
 - SC1_VCC:** Connected to GND (pin 7).
 - SC1_RST:** Connected to GND (pin 6).
 - SC1_CLK:** Connected to GND (pin 5).
 - SC1_I/O:** Connected to GND (pin 4).
 - SC1_C4:** Connected to GND (pin 3).
 - SC1_C8:** Connected to GND (pin 2).
 - SC1_PRSTN/JTAG_TMS:** Connected to GND (pin 8).
 - RESET Misc./JTAG:** Connected to JTAG_TDI (pin 15).
 - TEST:** Connected to SC1ED_ACT/JTAG_TDO (pin 14).
 - SC1ED_ACT/JTAG_TDO:** Connected to JTAG_TDO (pin 13).
 - JTAG_CLK:** Connected to JTAG_CLK (pin 17).
 - VSS(flag):** Connected to GND (pin 16).

Smart Card Component (J2201) Connections:

- VCC:** Connected to 5V_P.
- RST:** Connected to GND.
- CLK:** Connected to GND.
- GND:** Connected to GND.
- VPP:** Connected to GND.
- I/O:** Connected to GND.
- DET:** Connected to SW2 (Normally Open).
- C8:** Connected to C8.
- C4:** Connected to C4.
- SCH:** Connected to SW1 (Normally Open).
- GND1:** Connected to GND.
- GND2:** Connected to GND.

Resistors and Capacitors:

- R2201:** 100k, connected to 5V_P and GND.
- C2201:** 100nF, connected to 5V_P and GND.
- C2202:** 1uF, connected to 5V_P and GND.
- C2203:** 1uF, connected to GND and GND.
- R2202:** 0, connected to GND and GND.
- R2203:** 33, connected to GND and GND.

ISO/IEC 7816

Smart Card



Purism

christian.schilmoeller@puri.sm

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

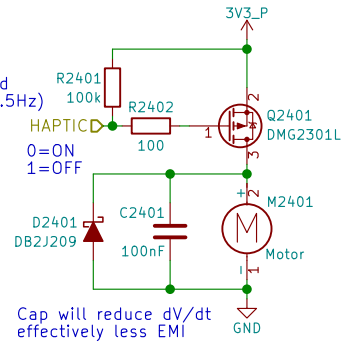
eric.kuzmenko@puri.sm
angus.ainstlie@puri.sm
nicole.farber@puri.sm
christian.schilmoeller@puri.sm

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
 (not connected to either pin)
 => could connect housing to GND

Cheaper Motor Connector:
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

Motor Datasheet:
<https://cloud.puri.sm/s/z8JR6DJ4KrJYzoW>

Motor PN:
 BY0820Z021L20

Haptic/Vibration Motor



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Sheet: /Haptic Motor/
 File: haptic.sch

Size: A4 Date: 2018-06-18

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eric.kuzmenko@puri.sm

angus.ainstlie@puri.sm

nicole.farber@puri.sm

christian.schilmoeller@puri.sm

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