Battery
battery.sch

Power
PMIC_ON_REQ
CONN_SD2_RST
SWIRE
AVDD_EN
power.sch

PMIC_ON_REQ
Comes from POR/Supervisory IC
but not the SoC
(PMIC_STBY_REQ is unavailable)
SD2_RST
SWIRE
AVDD_EN

Boot Config
BOOT_CFG00
BOOT_CFG01
BOOT_CFG02
BOOT_CFG03
BOOT_CFG04
BOOT_CFG05
BOOT_CFG06
BOOT_CFG07
BOOT_CFG08
BOOT_CFG09
BOOT_CFG10
BOOT_CFG11
BOOT_CFG12
BOOT_CFG13
BOOT_CFG14
BOOT_CFG15
BOOT_MODE0
BOOT_MODE1
boot.sch

SAI1_RXD0(GPIO4_IO02)
SAI1_RXD1(GPIO4_IO03)
SAI1_RXD2(GPIO4_IO04)
SAI1_RXD3(GPIO4_IO05)
SAI1_RXD4(GPIO4_IO06)
SAI1_RXD5(GPIO4_IO07)
SAI1_RXD6(GPIO4_IO08)
SAI1_RXD7(GPIO4_IO09)
SAI1_TXD0(GPIO4_IO12)
SAI1_TXD1(GPIO4_IO13)
SAI1_TXD2(GPIO4_IO14)
SAI1_TXD3(GPIO4_IO15)
SAI1_TXD4(GPIO4_IO16)
SAI1_TXD5(GPIO4_IO17)
SAI1_TXD6(GPIO4_IO18)
SAI1_TXD7(GPIO4_IO19)
BOOT_MODE0
BOOT_MODE1

Reset & Watchdog
GPIO1_IO02(WDOG)
POR_B
PMIC_ON_REQ
watchdog.sch

GPIO1_IO02(WDOG)
POR_B
PMIC_ON_REQ

RTC Battery
I2C2_SDA
I2C2_SCL
rtc.sch

I2C2_SDA
I2C2_SCL

UART Debug
UART1_TXD
UART1_RXD
uart.sch

UART1_TXD
UART1_RXD

JTAG
JTAG_TMS
JTAG_TCK
JTAG_TDO
JTAG_TDI
POR_B
JTAG_TRST
jtag.sch

JTAG_TMS
JTAG_TCK
JTAG_TDO
JTAG_TDI
POR_B
JTAG_TRST

uSD Card
CONN_SD2_DATA1
CONN_SD2_DATA0
CONN_SD2_CMD
CONN_SD2_DATA3
CONN_SD2_DATA2
CONN_SD2_CLK
CONN_SD2_CD_B
sd.sch

SD2_DATA1
SD2_DATA0
SD2_CMD
SD2_DATA3
SD2_DATA2
SD2_CLK
SD2_CD_B

USB
GPIO1_IO13(USB1_OTG_OC)
USB1_ID
usb.sch

GPIO1_IO13(USB1_OTG_OC)
USB1_ID

MIPI DSI
D0_P
D0_N
D1_P
D1_N
D2_P
D2_N
D3_P
D3_N
CLK_P
CLK_N
RESX
AVDD_EN
SWIRE
I2C2_SDA
I2C2_SCL
CAPTOUCH_INT
CAPTOUCH_RST
mipi_dsi.sch

DSI_DP0
DSI_DN0
DSI_DP1
DSI_DN1
DSI_DP2
DSI_DN2
DSI_DP3
DSI_DN3
DSI_CKP
DSI_CKN
DSI_BL_PWM
AVDD_EN
SWIRE
I2C2_SDA
I2C2_SCL
CAPTOUCH_INT
SAI1_RXD3(GPIO4_IO05)

Buttons & LED
SW_BACK
SW_VOLDN
SW_VOLUP
SW_HOME
ONOFF
GP_LED1
buttons_led.sch

SAI1_RXD4(GPIO4_IO06)
SAI1_TXD3(GPIO4_IO15)
SAI1_TXD6(GPIO4_IO18)
SAI1_TXD1(GPIO4_IO13)
ONOFF
SAI1_RXD1(GPIO4_IO03)

WWAN_M.2
CONFIG
WoWWAN
W_DISABLE1
RESET
UART_TX/LED
UART_RX/DPR
USB_D+
USB_D-
PCM_CLK/I2S_SCK
PCM_SYNC/I2S_FSC
PCM_IN/I2S_IN
PCM_OUT/I2S_OUT
wwan_m2.sch

SAI5_RXC(GPIO3_IO20)
GPIO3_IO08
WWAN_DISABLE
GPIO3_IO09
UART3_RXD
UART3_TXD
WWAN_USB_D+
WWAN_USB_D-
SAI1_TXD4(GPIO4_IO16)
SAI1_RXD6(GPIO4_IO08)
SAI1_RXD5(GPIO4_IO07)
SAI1_TXD5(GPIO4_IO17)

GPIO3_IO04
SAI6_TXC/RXC!!!
SAI6_TXFS/RXFS!!!
SAI6_TXD0!!!
SAI6_RXD0!!!

Audio
SAI2_RXD
SAI2_TXD
SAI2_TXFS
SAI2_TXC
SAI2_MCLK
audio.sch

SAI2_RXD
SAI2_TXD
SAI2_TXFS
SAI2_TXC
SAI2_MCLK

J1A
IMX8M-SOM
SD2_RST
SD2_DATA3
SD2_DATA2
SD2_DATA1
SD2_DATA0
SD2_CMD
SD2_CD_B
SD2_CLK
SAI2_TXFS
CAPTOUCH_INT
GND

J1C
IMX8M-SOM
BOOT_MODE0
BOOT_MODE1
JTAG_TDI
JTAG_TMS
JTAG_TRST
JTAG_TDO
JTAG_TCK
DSI_BL_PWM
GPIO1_IO02(WDOG)
SAI5_RXC(GPIO3_IO20)
SAI1_RXD0(GPIO4_IO02)
SAI1_RXD4(GPIO4_IO06)
SAI1_RXD3(GPIO4_IO05)
SAI1_RXD2(GPIO4_IO04)
SAI2_RXD
SAI1_RXD6(GPIO4_IO08)
SAI1_TXC
SAI1_RXD1(GPIO4_IO03)
SAI2_TXC
SAI2_MCLK

J1B
IMX8M-SOM
GPIO3_IO09
GPIO3_IO08
SOM_NVCC_3V3
SOM_VBAT_3V3
PWR_FLAG
NVCC_SD2_1V8_3V3
PWR_FLAG
DSI_DP2
DSI_DN2
DSI_DP0
DSI_DN0
DSI_CKN
DSI_CKP
DSI_DP1
DSI_DN1
DSI_DP3
DSI_DN3
VBAT???
C1 22uF
C2 22uF
C3 0.1uF
VBAT???
C4 0.1uF
C5 22uF
C6 22uF
GND

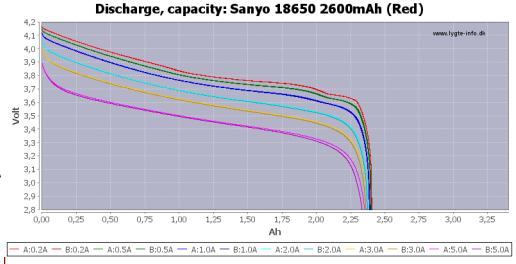
J1D
BASE_PER_3V3
R1 10k
R2 10k
SAI2_TXD
SAI1_RXD5(GPIO4_IO07)
SAI1_TXD0(GPIO4_IO12)
ONOFF
I2C2_SDA
SAI1_TXD1(GPIO4_IO13)
SAI1_TXD3(GPIO4_IO15)
SAI1_TXD4(GPIO4_IO16)
SAI1_TXD7(GPIO4_IO19)
UART3_TXD
SAI1_TXD5(GPIO4_IO17)
POR_B
UART1_RXD
SAI1_TXD2(GPIO4_IO14)
SAI1_TXD6(GPIO4_IO18)
UART3_RXD
UART1_TXD
SAI1_RXD7(GPIO4_IO09)
I2C2_SCL

Sheet: /
File: dvk-mx8m-bsb.sch

Title: DVK-MX8M-BSB

Size: A2	Date: 2018-04-16	Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7		Id: 1/14

Discharge, capacity: Sanyo 18650 2600mAh (Red)



Estimated remaining capacity

Voltage	AW 18650 2600mAh (Black)	Sanyo 18650 2600mAh (Red)	Panasonic CGR18650CH 2250mAh	Panasonic NCR18650A 3100mAh	Panasonic NCR18650B 3400mAh
4.2	100%	100%	100%	100%	100%
4.1	92%	92%	94%	94%	94%
4.0	78%	79%	85%	83%	84%
3.9	61%	63%	76%	73%	74%
3.8	43%	44%	66%	60%	62%
3.7	14%	15%	54%	52%	53%
3.6	3%	5%	26%	38%	39%
3.5	1%	2%	12%	20%	22%
3.4	0%	1%	5%	11%	13%
3.3	0%	0%	2%	1%	3%
3.2	0%	0%	0%	0%	0%

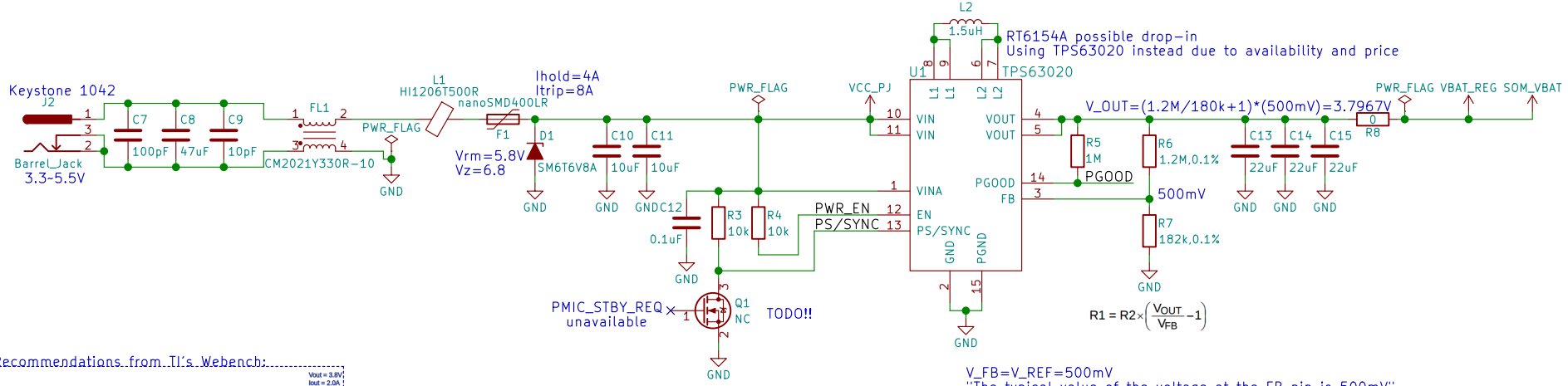
Measured 1 hour after discharge at 1A

⇒18650 batteries don't reach 3.3V until depleted

$$I_{PEAK} = \frac{Iout}{\eta \times (1 - D)} + \frac{Vin \times D}{2 \times f \times L}$$

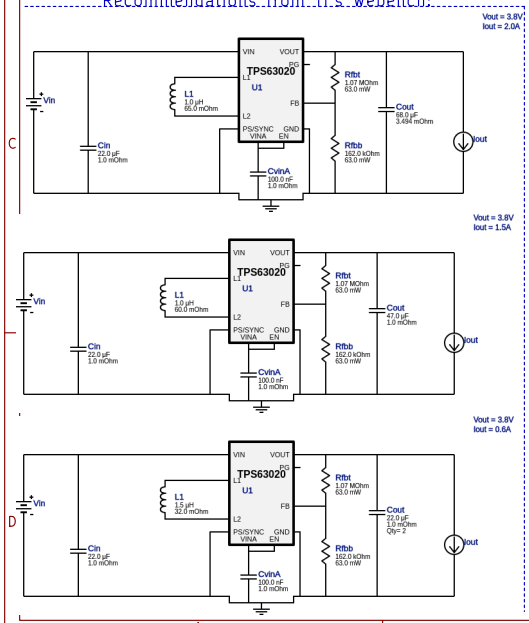
$$\frac{2A}{0.9\times\left(1-\left(\frac{3.7967V-3.0V}{3.7967V}\right)\right)}+\frac{3.0V\times\left(\frac{3.7967V-3.0V}{3.7967V}\right)}{2\times 2.4MHz\times 1.5uH}=2.899803756A$$

Calculated Ipeak≅2.9A
IL(sat)=4.4A @ 20% drop
ΔIL≅0.17A



V_FB=V_REF=500mV
"The typical value of the voltage at the FB pin is 500mV"
"It is recommended to keep the value for [R2] in the range of 200kΩ; lower than 500kΩ"
Their example application circuit uses 180k for R2, therefore:
R2≅200k±20k (±10%) or 180k-220k
Given this, V_OUT≅3.8V, 1.1188M≤R1≤1.452M
The most common value in this range is 1.2M
Making R2≅181.818k or roughly 182k

Recommendations from TI's Webench:



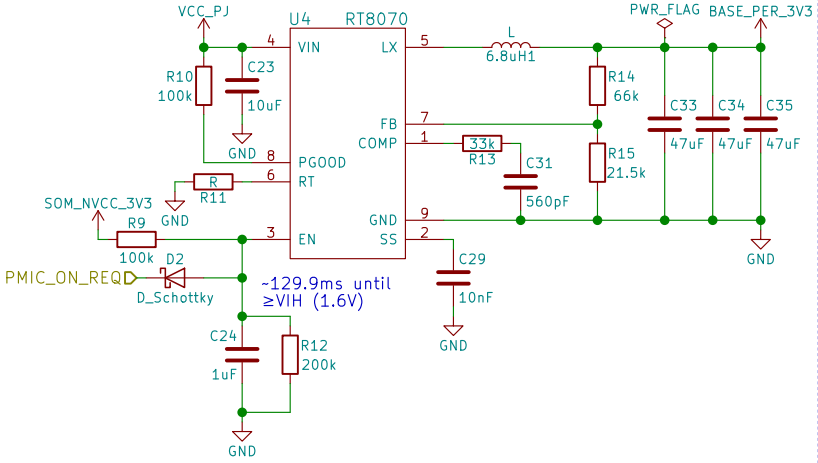
Sheet: /Battery/
File: battery.sch

Title: Battery

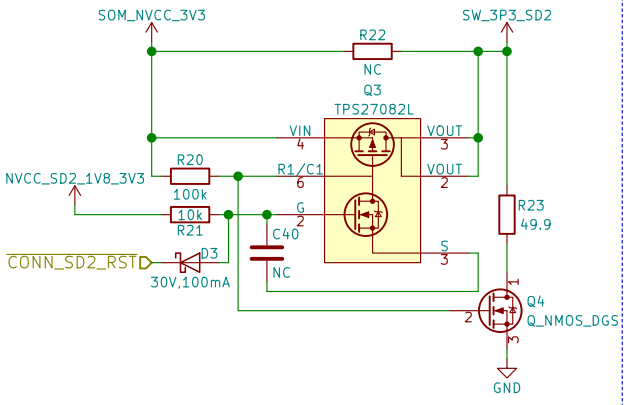
Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 2/14

3.3V/3A

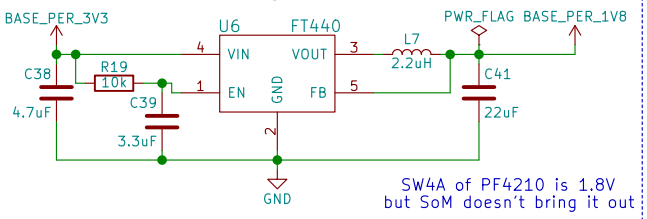
When VBAT can fall below 3.3V use TPS63020 instead!



SD POWER



1.8V/600mA



SW4A of PF4210 is 1.8V but SoM doesn't bring it out

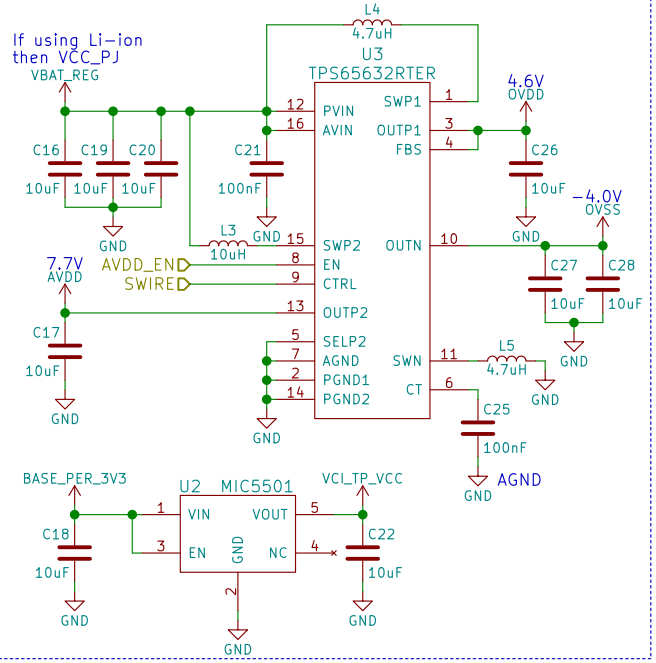
When VCC_PJ≅VBAT LDO can be tested

V_IH(typ)=1.0V≅30.3%×3.3V
t(0-30.3%)≈0.361RC
⇒0.361RC≈10ms
∴ R=10k
C=2.77uF≅3.3uF

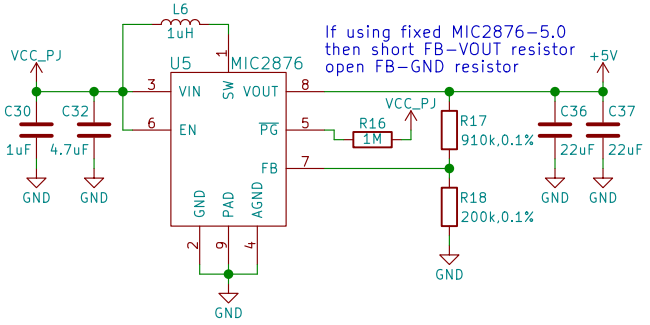
Buck instead of TLV70218 LDO saving up to ~100mW loss

LM3670MF-1.8 is much more expensive
ST1S12G18R is a drop-in

AMOLED POWER



5.0V/800mA

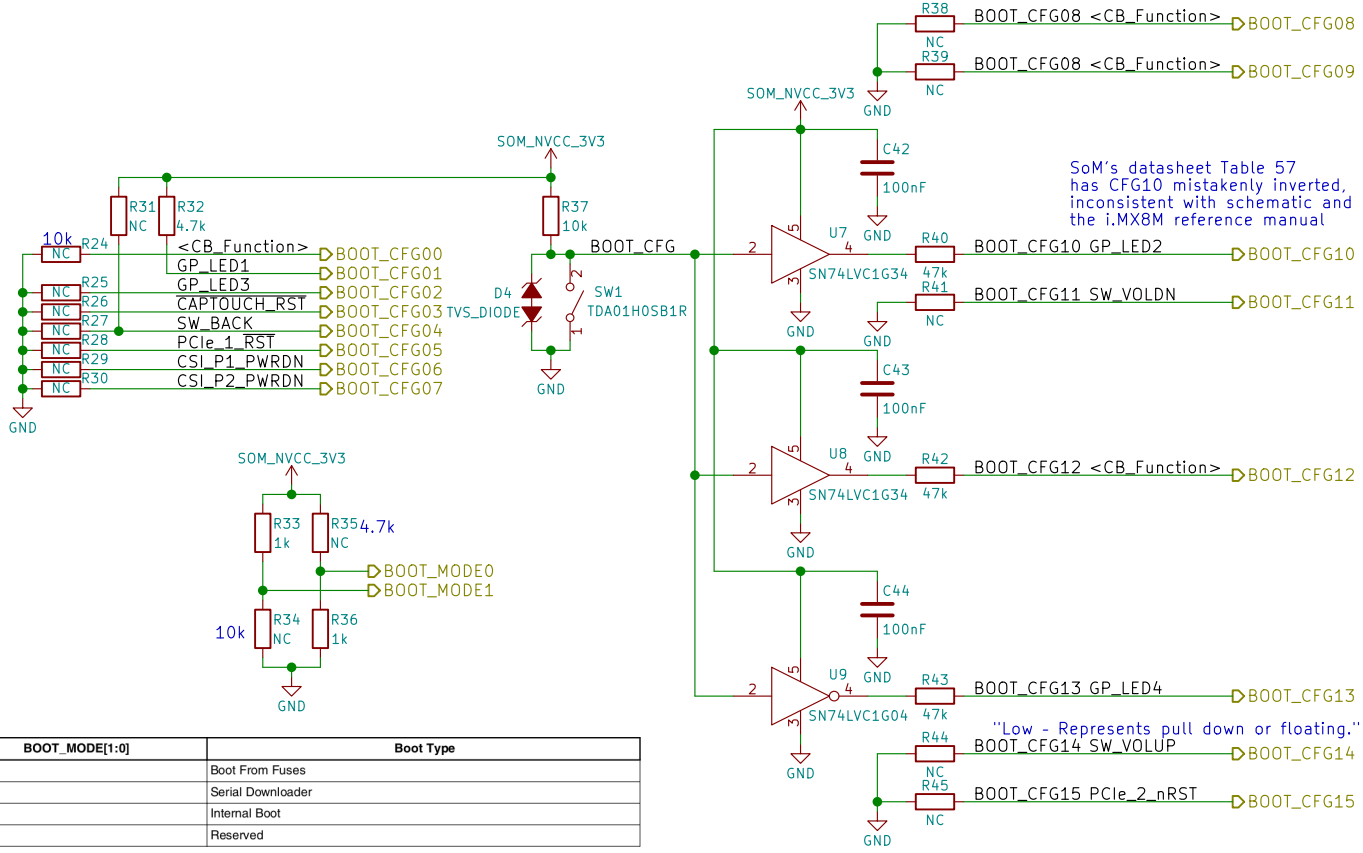


Cheaper, more efficient, smaller, and simpler than RT6150A
Explicitly mentions USB/smartphone application

Sheet: /Power/		
File: power.sch		
Title: Power		
Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 3/14

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

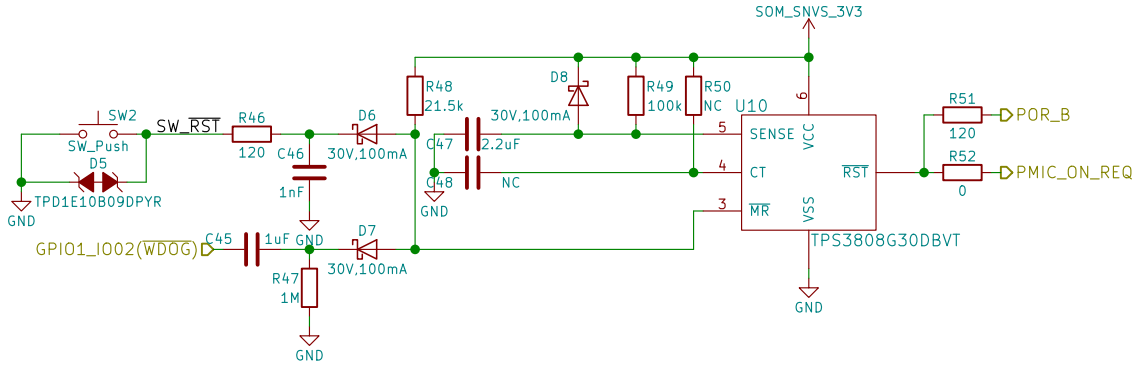


BOOT_MODE[1:0]	Boot Type
00	Boot From Fuses
01	Serial Downloader
10	Internal Boot
11	Reserved

Sheet: /Boot Config/
File: boot.sch

Title: Boot Configuration

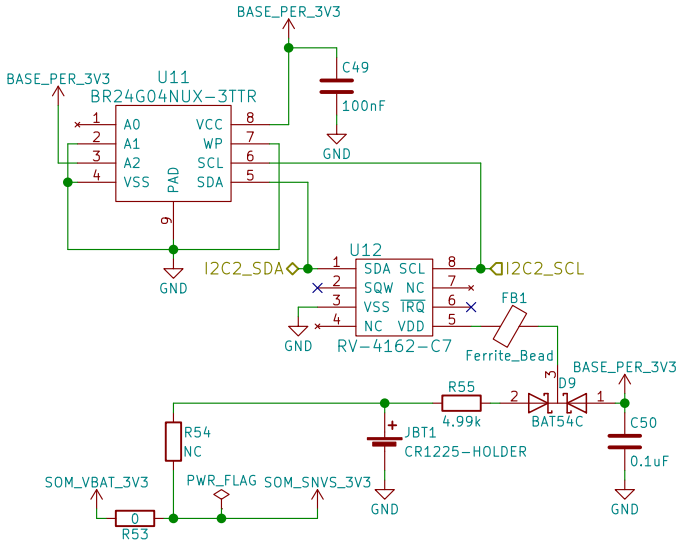
Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 4/14



Sheet: /Reset & Watchdog/
File: watchdog.sch

Title: Reset & Watchdog

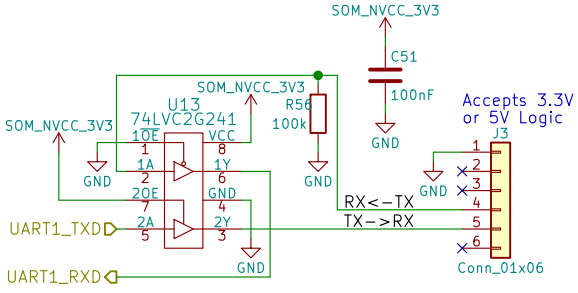
Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 5/14



Sheet: /RTC Battery/
File: rtc.sch

Title: RTC Battery

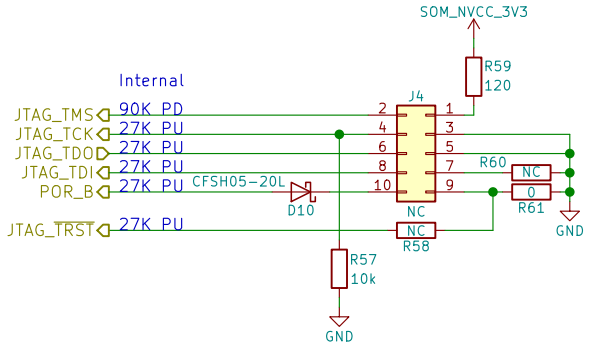
Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 6/14



Sheet: /UART Debug/
File: uart.sch

Title: UART Debug

Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 7/14



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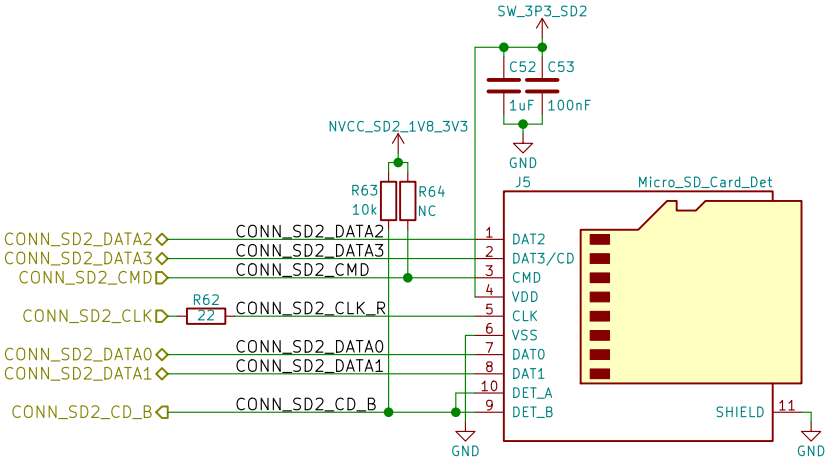
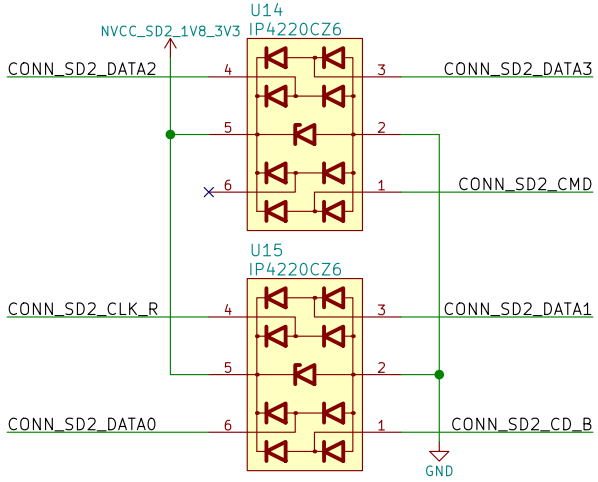
Purism SPC

Sheet: /JTAG/
File: jtag.sch

Title: JTAG

Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 8/14

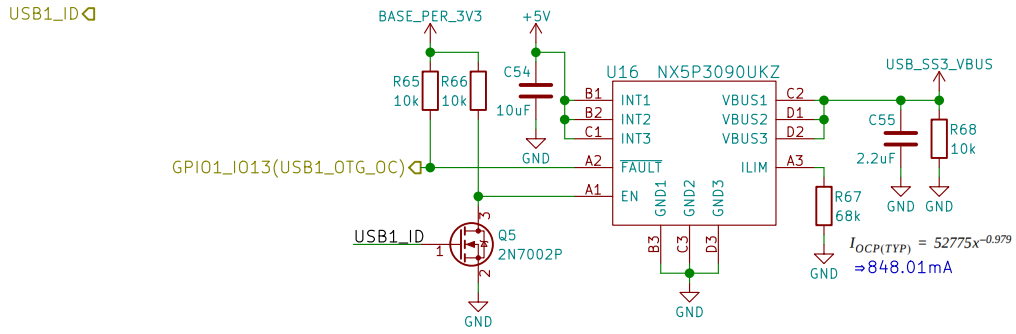




Sheet: /uSD Card/
File: sd.sch

Title: uSD Card

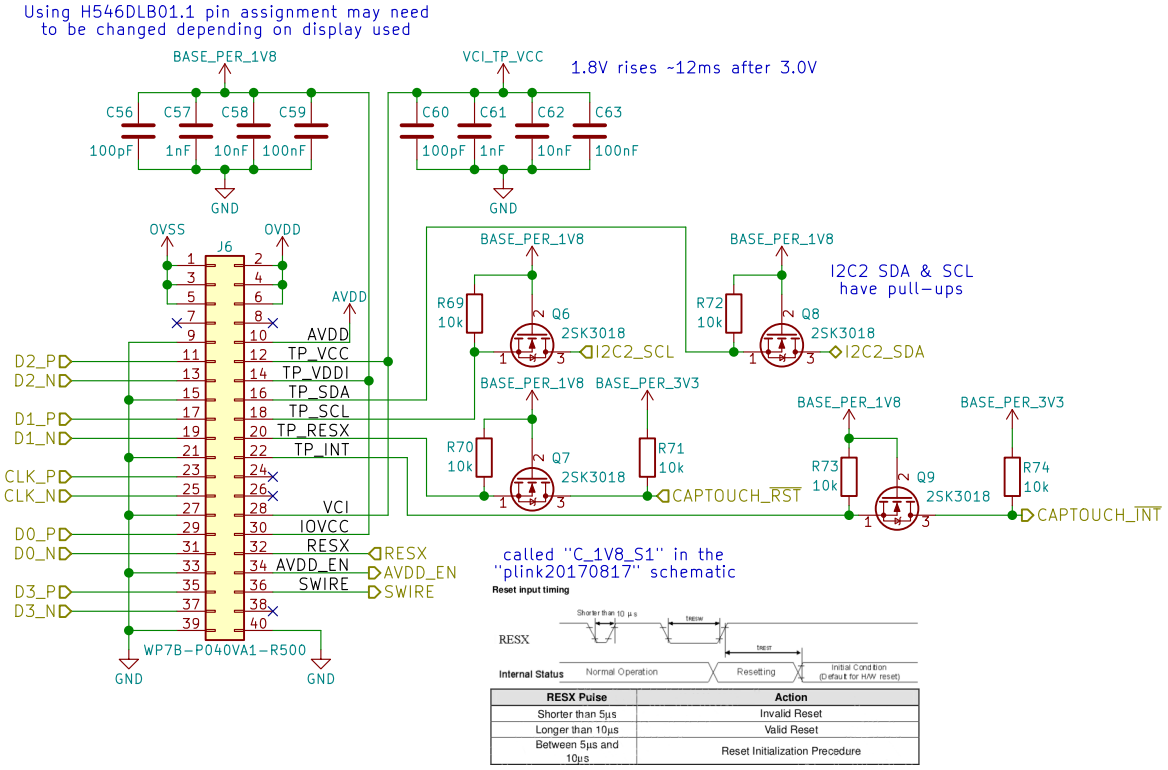
Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 9/14



Sheet: /USB/
File: usb.sch

Title: USB

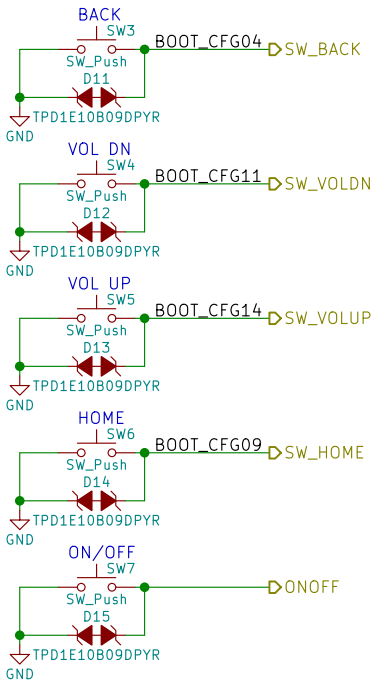
Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 10/14

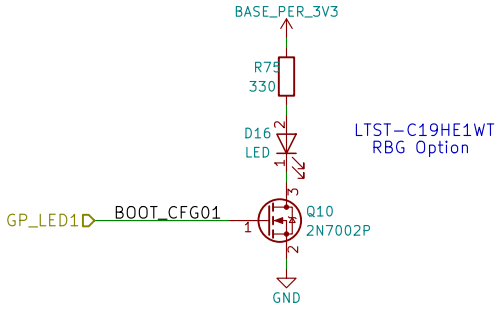


Sheet: /MIPI DSI/
File: mipi_dsi.sch

Title: MIPI DSI

Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 11/14





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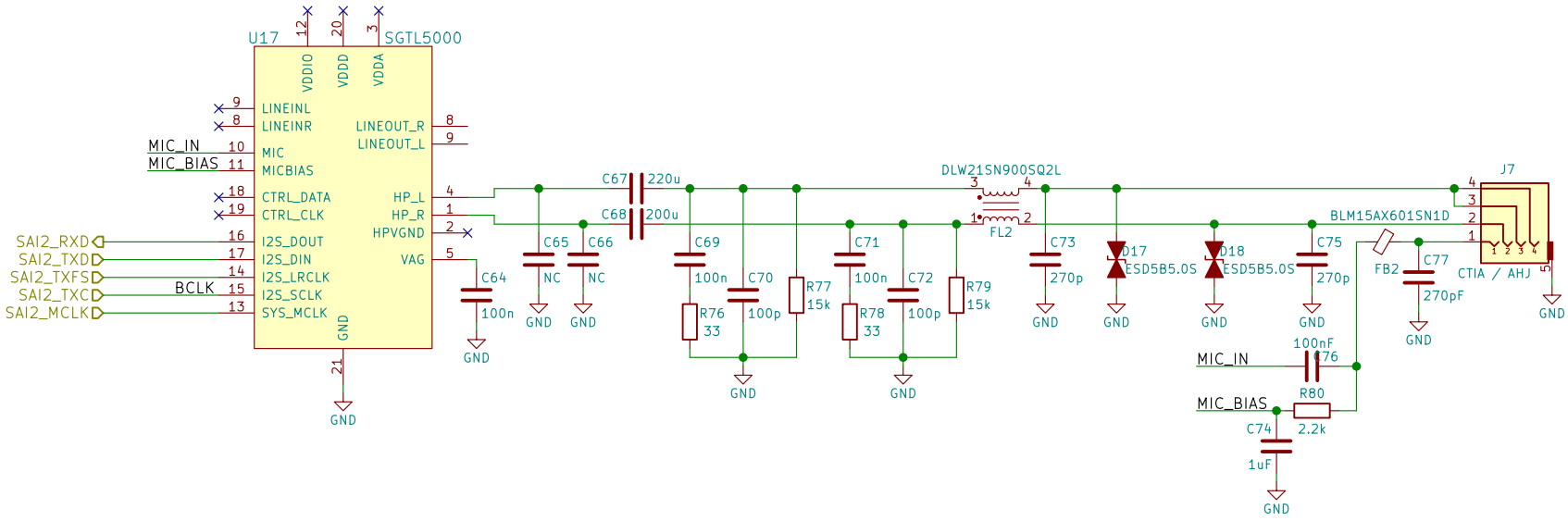
Purism SPC

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

Title: Buttons & LED

Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 12/14



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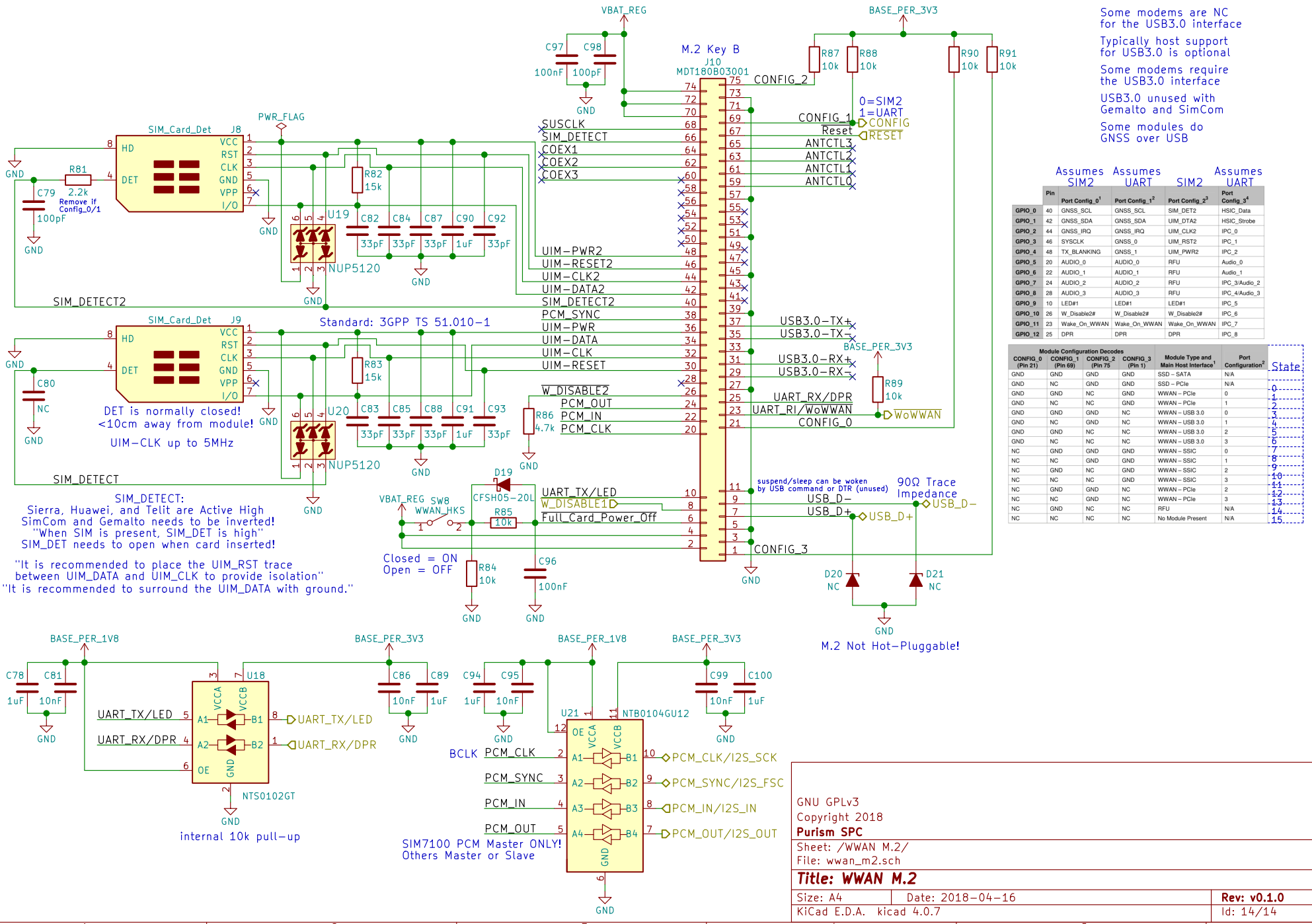
Purism SPC

Sheet: /Audio/
File: audio.sch

Title: Audio

Size: A4	Date: 2018-04-16	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 13/14



	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	HSIC_Data
GPIO_1	42	GNSS_SDA	GNSS_SDA	UIM_DTA2	HSIC_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	LED#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					
CONFIG_0 (Pin 21)	CONFIG_1 (Pin 69)	CONFIG_2 Pin 75	CONFIG_3 (Pin 1)	Module Type and Main Host Interface[1]	Port Configuration[2]
GND	GND	GND	GND	SSD – SATA	N/A
GND	NC	GND	GND	SSD – PCIe	N/A
GND	GND	NC	GND	WWAN – PCIe	0
GND	NC	NC	GND	WWAN – PCIe	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	GND	NC	GND	WWAN – SSIC	2
NC	NC	NC	GND	WWAN – SSIC	3
NC	GND	GND	NC	WWAN – PCIe	2
NC	NC	GND	NC	WWAN – PCIe	3
NC	GND	NC	NC	RFU	N/A
NC	NC	NC	NC	No Module Present	N/A

State: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Sheet: /WWAN M.2/
File: wwan_m2.sch

Title: WWAN M.2

Size: A4 | Date: 2018-04-16 | **Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7 | Id: 14/14