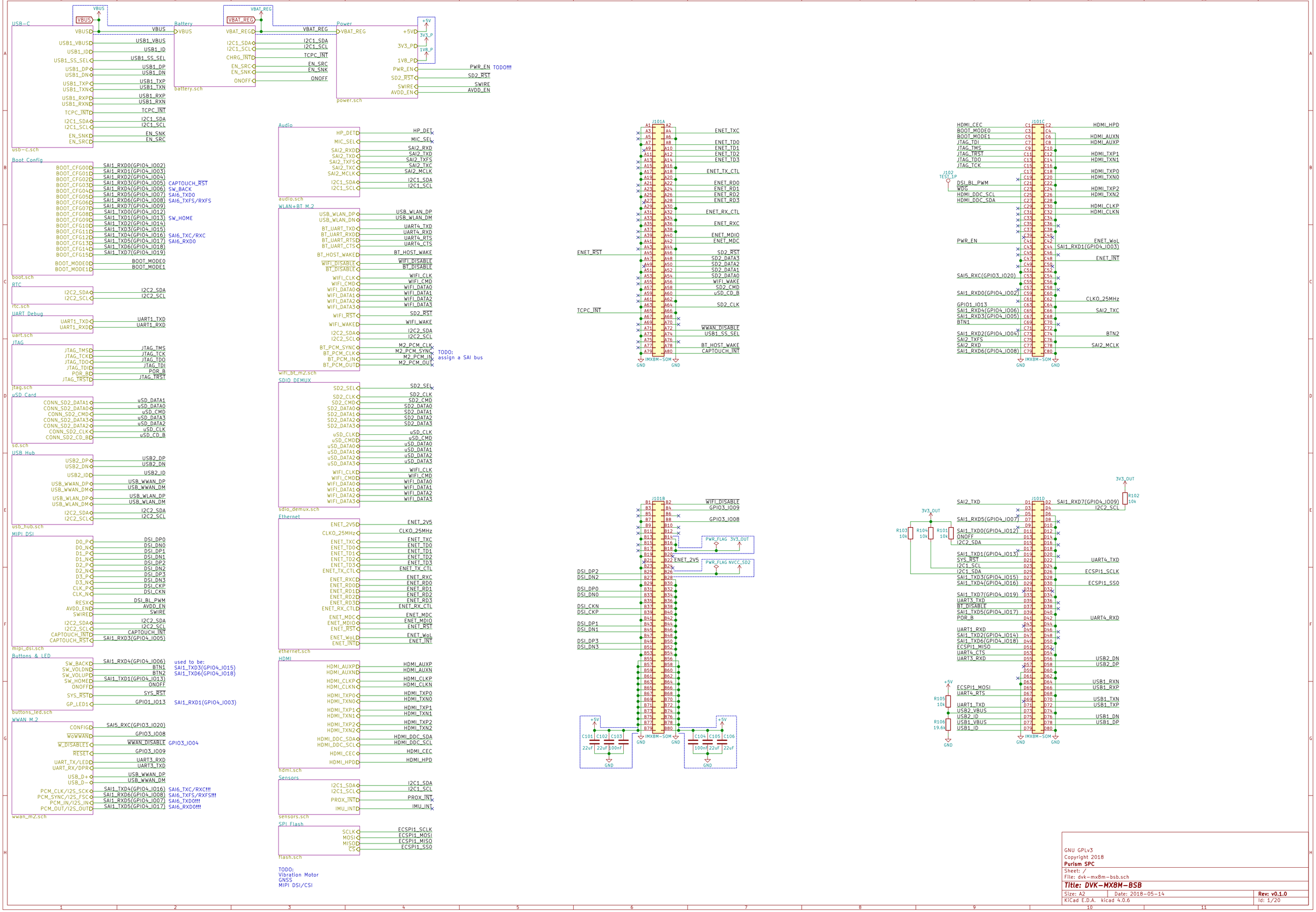
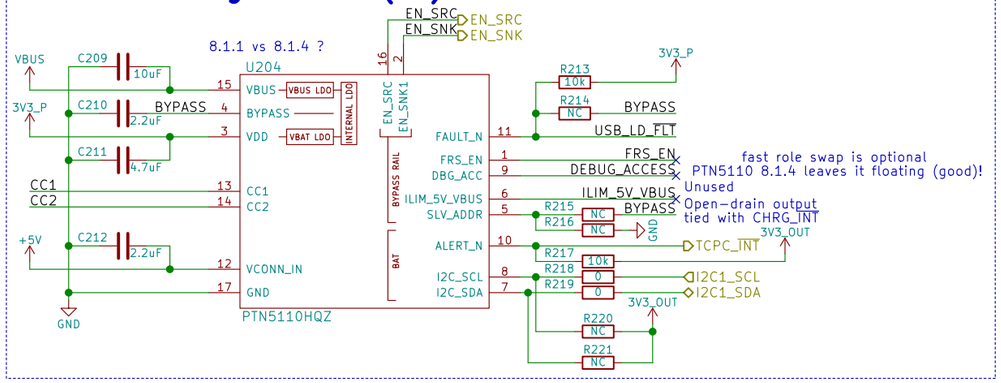
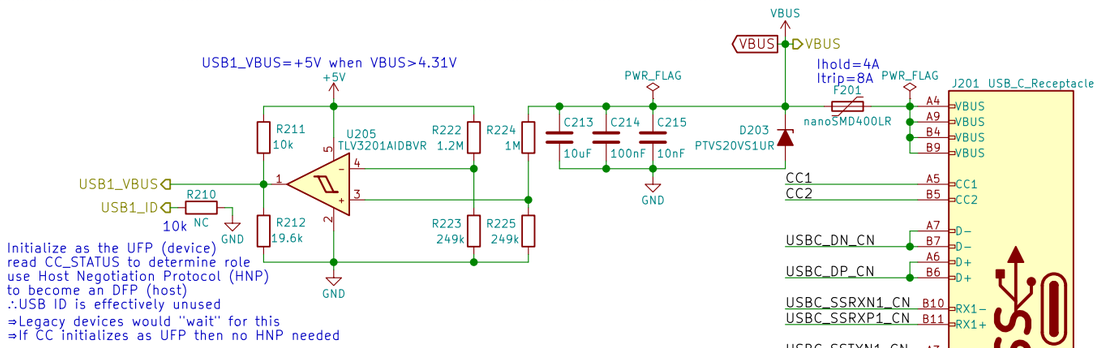
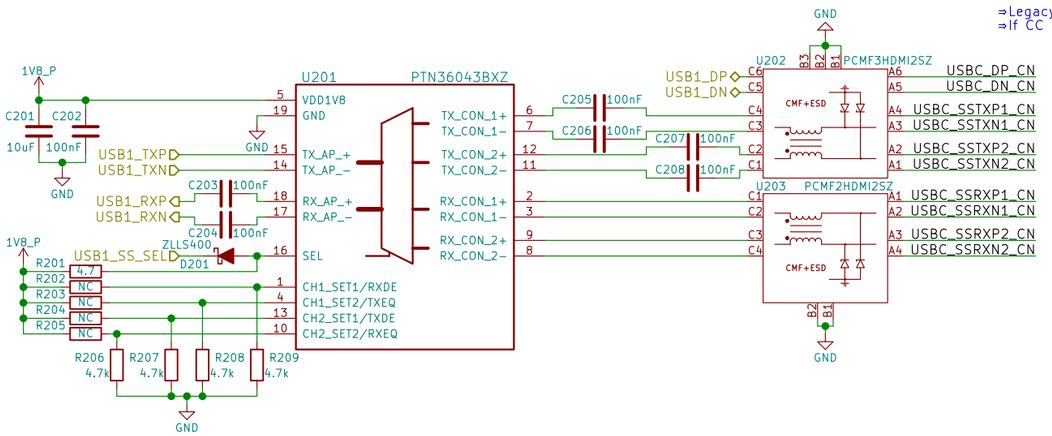

USB-C
VBUS
USB1_VBUS
USB1_ID
USB1_SS_SEL
USB1_DP
USB1_DN
USB1_TXP
USB1_TXN
USB1_RXP
USB1_RXN
TCPC_INT
I2C1_SDA
I2C1_SCL
EN_SNK
EN_SRC
usb-c.sch
Battery
battery.sch
Power
+5V
3V3_P
1V8_P
PWR_EN
SD2_RST
SWIRE
AVDD_EN
power.sch
Boot Config
BOOT_CFG00
BOOT_CFG01
BOOT_CFG02
BOOT_CFG03
BOOT_CFG04
BOOT_CFG05
BOOT_CFG06
BOOT_CFG07
BOOT_CFG08
BOOT_CFG09
BOOT_CFG10
BOOT_CFG11
BOOT_CFG12
BOOT_CFG13
BOOT_CFG14
BOOT_CFG15
SAI1_RXD0(GPIO4_IO02)
SAI1_RXD1(GPIO4_IO03)
SAI1_RXD2(GPIO4_IO04)
SAI1_RXD3(GPIO4_IO05)
CAPTOUCH_RST
SAI1_RXD4(GPIO4_IO06)
SW_BACK
SAI1_RXD5(GPIO4_IO07)
SAI6_TXD0
SAI1_RXD6(GPIO4_IO08)
SAI6_TXFS/RXFS
SAI1_RXD7(GPIO4_IO09)
SAI1_TXD0(GPIO4_IO12)
SAI1_TXD1(GPIO4_IO13)
SW_HOME
SAI1_TXD2(GPIO4_IO14)
SAI1_TXD3(GPIO4_IO15)
SAI1_TXD4(GPIO4_IO16)
SAI6_TXC/RXC
SAI1_TXD5(GPIO4_IO17)
SAI6_RXD0
SAI1_TXD6(GPIO4_IO18)
SAI1_TXD7(GPIO4_IO19)
BOOT_MODE0
BOOT_MODE1
boot.sch
RTC
I2C2_SDA
I2C2_SCL
rtc.sch
UART Debug
UART1_TXD
UART1_RXD
uart.sch
JTAG
JTAG_TMS
JTAG_TCK
JTAG_TDO
JTAG_TDI
POR_B
JTAG_TRST
jtag.sch
uSD Card
CONN_SD2_DATA1
CONN_SD2_DATA0
CONN_SD2_CMD
CONN_SD2_DATA3
CONN_SD2_DATA2
CONN_SD2_CLK
CONN_SD2_CD_B
uSD_DATA1
uSD_DATA0
uSD_CMD
uSD_DATA3
uSD_DATA2
uSD_CLK
uSD_CD_B
sd.sch
USB Hub
USB2_DP
USB2_DN
USB2_ID
USB_WWAN_DP
USB_WWAN_DM
USB_WLAN_DP
USB_WLAN_DM
usb_hub.sch
MIPI DSI
D0_P
D0_N
D1_P
D1_N
D2_P
D2_N
D3_P
D3_N
CLK_P
CLK_N
DSI_DP0
DSI_DN0
DSI_DP1
DSI_DN1
DSI_DP2
DSI_DN2
DSI_DP3
DSI_DN3
DSI_CKP
DSI_CKN
RESX
DSI_BL_PWM
AVDD_EN
SWIRE
I2C2_SDA
I2C2_SCL
CAPTOUCH_INT
CAPTOUCH_RST
mipi_dsi.sch
Buttons & LED
SW_BACK
SW_VOLDN
SW_VOLUP
SW_HOME
ONOFF
SYS_RST
GP_LED1
BTN1
BTN2
ONOFF
GPIO1_IO13
used to be:
SAI1_TXD3(GPIO4_IO15)
SAI1_TXD6(GPIO4_IO18)
SAI1_RXD1(GPIO4_IO03)
buttons_led.sch
WWAN M.2
CONFIG0
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
SAI5_RXC(GPIO3_IO20)
GPIO3_IO08
WWAN_DISABLE
GPIO3_IO04
GPIO3_IO09
UART3_RXD
UART3_TXD
USB_WWAN_DP
USB_WWAN_DM
SAI1_TXD4(GPIO4_IO16)
SAI1_RXD6(GPIO4_IO08)
SAI1_RXD5(GPIO4_IO07)
SAI1_TXD5(GPIO4_IO17)
SAI6_TXC/RXC!!!
SAI6_TXFS/RXFS!!!
SAI6_TXD0!!!
SAI6_RXD0!!!
wwan_m2.sch
Audio
HP_DET
MIC_SEL
SAI2_RXD
SAI2_TXD
SAI2_TXFS
SAI2_TXC
SAI2_MCLK
audio.sch
WLAN+BT M.2
USB_WLAN_DP
USB_WLAN_DM
BT_UART_TXD
BT_UART_RXD
BT_UART_RTS
BT_UART_CTS
BT_HOST_WAKE
WIFI_DISABLE
BT_DISABLE
WIFI_CLK
WIFI_CMD
WIFI_DATA0
WIFI_DATA1
WIFI_DATA2
WIFI_DATA3
WIFI_RST
WIFI_WAKE
BT_PCM_SYNC
BT_PCM_CLK
BT_PCM_IN
BT_PCM_OUT
UART4_TXD
UART4_RXD
UART4_RTS
UART4_CTS
M2_PCM_CLK
M2_PCM_SYNC
M2_PCM_IN
M2_PCM_OUT
TODO:
assign a SAI bus
wifi_bt_m2.sch
SDIO DEMUX
SD2_SEL
SD2_CLK
SD2_CMD
SD2_DATA0
SD2_DATA1
SD2_DATA2
SD2_DATA3
uSD_CLK
uSD_CMD
uSD_DATA0
uSD_DATA1
uSD_DATA2
uSD_DATA3
WIFI_CLK
WIFI_CMD
WIFI_DATA0
WIFI_DATA1
WIFI_DATA2
WIFI_DATA3
sdio_demux.sch
Ethernet
ENET_2V5
CLKO_25MHz
ENET_TXC
ENET_TD0
ENET_TD1
ENET_TD2
ENET_TD3
ENET_TX_CTL
ENET_RXC
ENET_RD0
ENET_RD1
ENET_RD2
ENET_RD3
ENET_RX_CTL
ENET_MDC
ENET_MDIO
ENET_RST
ENET_WoL
ENET_INT
ethernet.sch
HDMI
HDMI_AUXP
HDMI_AUXN
HDMI_CLKP
HDMI_CLKN
HDMI_TXP0
HDMI_TXN0
HDMI_TXP1
HDMI_TXN1
HDMI_TXP2
HDMI_TXN2
HDMI_DDC_SDA
HDMI_DDC_SCL
HDMI_CEC
HDMI_HPD
hdmi.sch
Sensors
I2C1_SDA
I2C1_SCL
PROX_INT
IMU_INT
sensors.sch
SPI Flash
SCLK
MOSI
MISO
CS
ECSPI1_SCLK
ECSPI1_MOSI
ECSPI1_MISO
ECSPI1_SS0
flash.sch
TODO:
Vibration Motor
GNSS
MIPI DSI/CSI
J101A
ENET_TXC
ENET_TD0
ENET_TD1
ENET_TD2
ENET_TD3
ENET_TX_CTL
ENET_RXC
ENET_RD0
ENET_RD1
ENET_RD2
ENET_RD3
ENET_RX_CTL
ENET_MDIO
ENET_MDC
SD2_RST
SD2_DATA3
SD2_DATA2
SD2_DATA1
SD2_DATA0
WIFI_WAKE
SD2_CMD
uSD_CD_B
SD2_CLK
WWAN_DISABLE
USB1_SS_SEL
BT_HOST_WAKE
CAPTOUCH_INT
ENET_RST
TCPC_INT
IMX8M-SOM
GND
J101B
WIFI_DISABLE
GPIO3_IO09
GPIO3_IO08
PWR_FLAG 3V3_OUT
ENET_2V5
PWR_FLAG NVCC_SD2
DSI_DP2
DSI_DN2
DSI_DP0
DSI_DN0
DSI_CKN
DSI_CKP
DSI_DP1
DSI_DN1
DSI_DP3
DSI_DN3
+5V
C101
C102
C103
22uF
22uF
100nF
C104
C105
C106
100nF
22uF
22uF
J101C
HDMI_CEC
BOOT_MODE0
BOOT_MODE1
JTAG_TDI
JTAG_TMS
JTAG_TRST
JTAG_TDO
JTAG_TCK
DSI_BL_PWM
WDG
HDMI_DDC_SCL
HDMI_DDC_SDA
PWR_EN
SAI5_RXC(GPIO3_IO20)
SAI1_RXD0(GPIO4_IO02)
GPIO1_IO13
SAI1_RXD4(GPIO4_IO06)
SAI1_RXD3(GPIO4_IO05)
BTN1
SAI1_RXD2(GPIO4_IO04)
SAI2_TXFS
SAI2_RXD
SAI1_RXD6(GPIO4_IO08)
HDMI_HPD
HDMI_AUXN
HDMI_AUXP
HDMI_TXP1
HDMI_TXN1
HDMI_TXP0
HDMI_TXN0
HDMI_CLKN
HDMI_CLKP
ENET_WoL
SAI1_RXD1(GPIO4_IO03)
ENET_INT
CLKO_25MHz
SAI2_MCLK
BTN2
J102
TEST_1P
J101D
SAI2_TXD
SAI1_RXD7(GPIO4_IO09)
I2C2_SCL
3V3_OUT
R102
10k
R103
10k
R104
10k
R101
10k
SAI1_RXD5(GPIO4_IO07)
SAI1_TXD0(GPIO4_IO12)
ONOFF
I2C2_SDA
SAI1_TXD1(GPIO4_IO13)
SYS_RST
I2C1_SCL
I2C1_SDA
SAI1_TXD3(GPIO4_IO15)
SAI1_TXD4(GPIO4_IO16)
SAI1_TXD7(GPIO4_IO19)
UART3_TXD
BT_DISABLE
SAI1_TXD5(GPIO4_IO17)
POR_B
UART1_RXD
SAI1_TXD2(GPIO4_IO14)
SAI1_TXD6(GPIO4_IO18)
ECSPI1_MISO
UART4_CTS
UART3_RXD
UART4_TXD
ECSPI1_SCLK
ECSPI1_SS0
UART4_RXD
USB2_DN
USB2_DP
+5V
R105
10k
R106
19.6k
ECSPI1_MOSI
UART4_RTS
UART1_TXD
USB2_VBUS
USB2_ID
USB1_VBUS
USB1_ID
USB1_RXN
USB1_TXP
USB1_TXN
USB1_RXP
USB1_DP
USB1_DN
USB2_DP
USB2_DN
USB2_ID
USB_WWAN_DP
USB_WWAN_DM
USB_WLAN_DP
USB_WLAN_DM
I2C2_SDA
I2C2_SCL
EN_SNK
EN_SRC
GNU GPLv3
Copyright 2018
Purism SPC
Sheet: /
File: dvk-mx8m-bsb.sch
Title: DVK-MX8M-BSB
Size: A2
Date: 2018-05-14
Rev: v0.1.0
KiCad E.D.A. kicad 4.0.6
Id: 1/20

"Under dead battery operation, PTN5110 applies voltage clamps to both CC pins so that the system may receive power as a Sink. To support platforms with buck-boost configuration, PTN5110 asserts EN_SNK1 pin based on validity of VBUS voltage (facilitates 5 V VBUS sinking)."

USB-C Config Channel (CC) and PD Role Controller

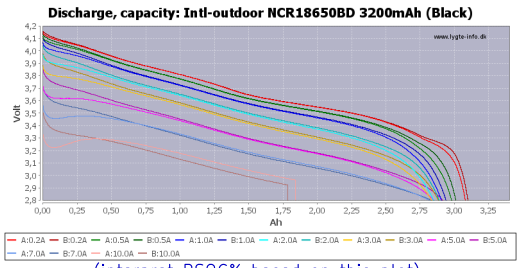






Sheet: /USB-C/		
File: usb-c.sch		
Title: USB Type C		
Size: A3	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 2/20

Battery Charge Controller



(interpret RSOC% based on this plot)

use AUTO_DPDM_EN
to auto-detect IINLIM

1.658≤ILIM≤2.063
ILIM(nom)≅1.859
3.9≤VIN≤14

U301 BQ25896

I(Lsat)=7A

3.5~4.25V

~110uF

Default LOW:
adapter source

Open-drain output
tied with TCPC_INT

If enough I/O is available then
separate CHRG_INT & TCPC_INT

This disables charging
but maybe not VBUS->VOUT
if PTN5110HQ's FAULT_STATUS[6]==1
(Force Off VBUS bit) then set EN_HiZ=1
EN_HiZ may be auto-set when in hiccup

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)

BC1.2 is not mandated by PD spec
ICO used to determine max current
Also negotiated from CC pins (I2C)

Ihold=3.5A
Itrip=6.3A
Ttrip(max)=5s@8A

VBAT(DPL)=2.15~2.5V

NCR18650BD is recommended

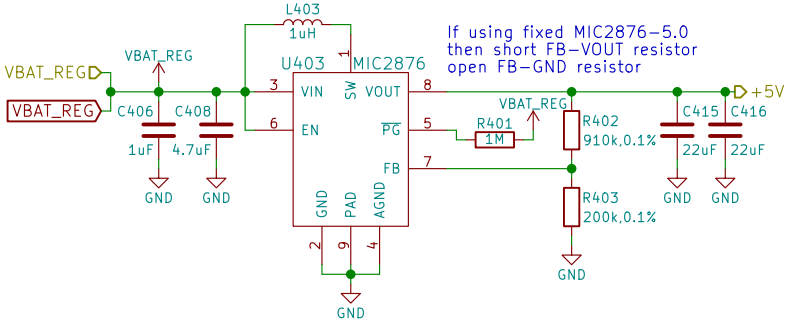
VBAT(nom)=REG06[7:2]
VBAT(default_max_ovp)=(REG06[7:2]×1.005)×1.04=4.3982016V
REG06[7:2]=010111⇒VBAT(max_ovp)=4.3814784
BQ29705 provides 4.425V as OVP!!!

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/tiducl1/tiducl1.pdf
schematic: http://www.ti.com/lit/df/tidrp70/tidrp70.pdf
(PTC may be good enough)

Sheet: /Battery/		
File: battery.sch		
Title: Battery		
Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 3/20

5.0V/3.8A

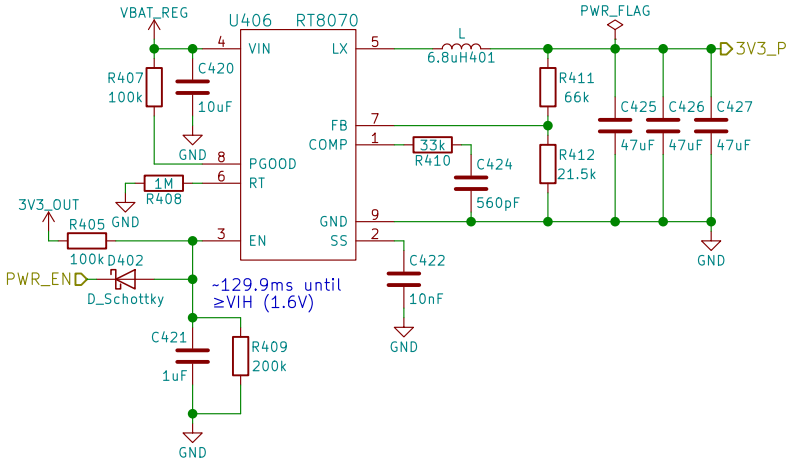


If using fixed MIC2876-5.0
then short FB-VOUT resistor
open FB-GND resistor

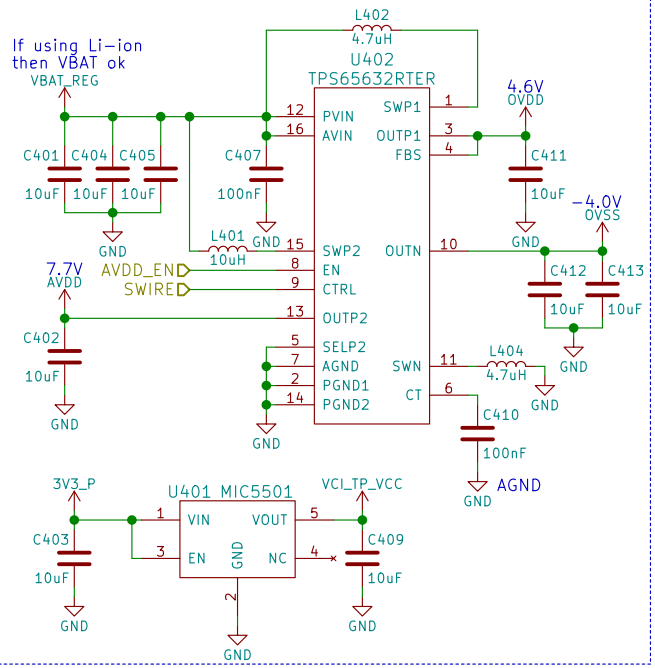
Cheaper, more efficient, smaller, and simpler than RT6150A
Explicitly mentions USB/smartphone application

3.3V/3A

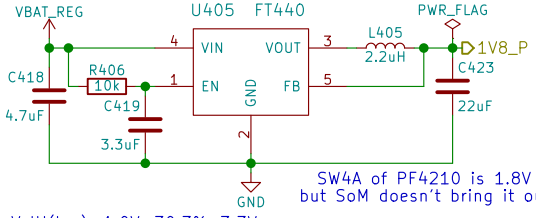
When VBAT can fall below
3.3V use TPS63020 instead!



AMOLED POWER



1.8V/600mA

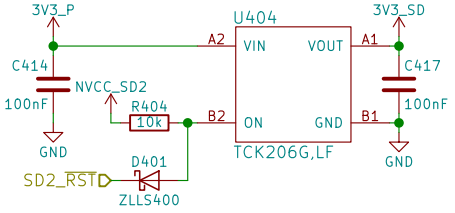


SW4A of PF4210 is 1.8V
but SoM doesn't bring it out

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

SD POWER



TODO:
add parallel 100nF bulk caps!
& spread all over the power plane

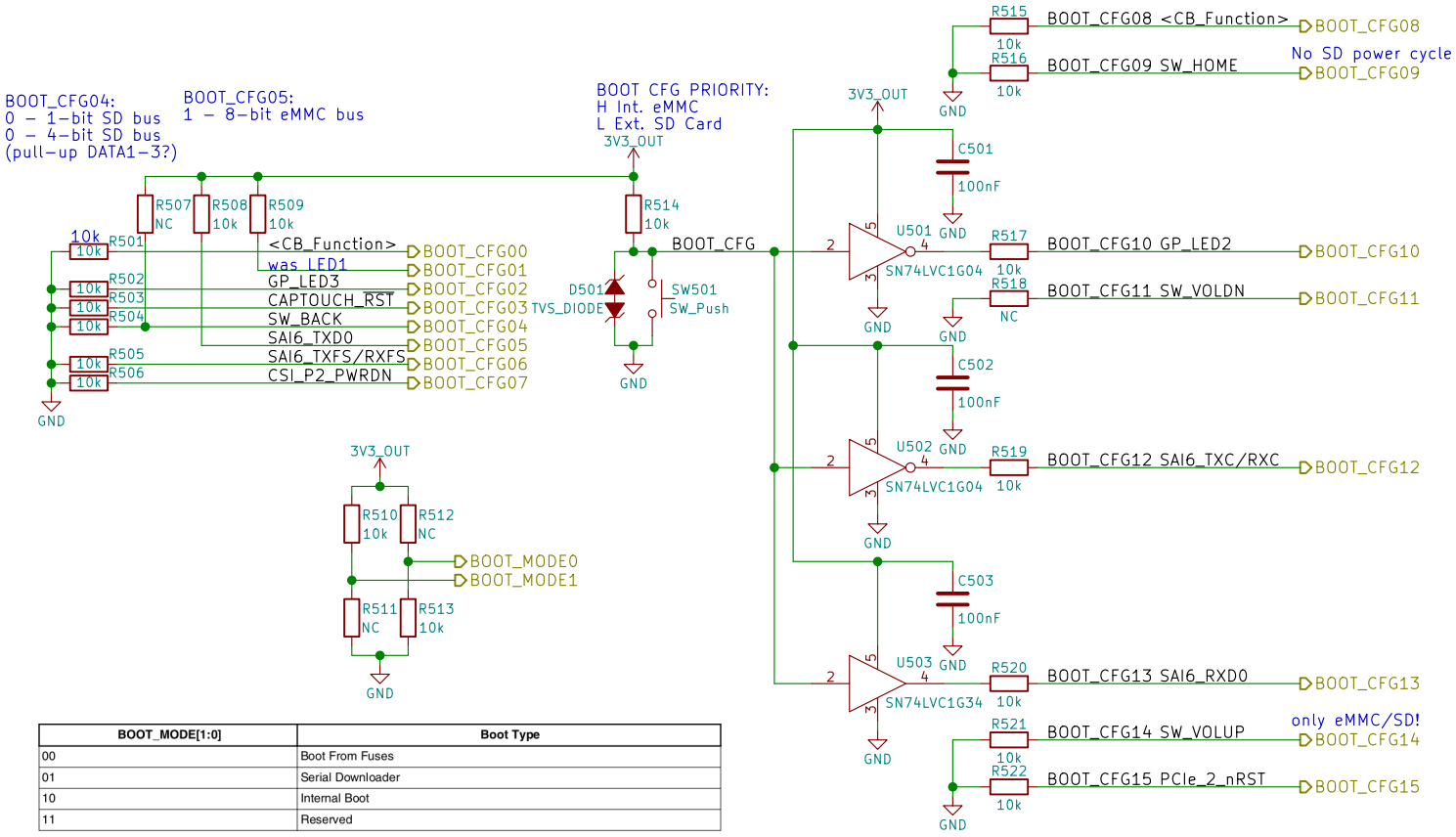
Sheet: /Power/
File: power.sch

Title: Power

Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 4/20

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

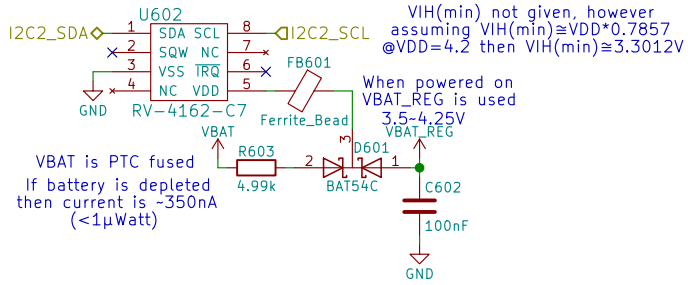


BOOT_MODE[1:0]	Boot Type
00	Boot From Fuses
01	Serial Downloader
10	Internal Boot
11	Reserved

Sheet: /Boot Config/
File: boot.sch

Title: Boot Configuration

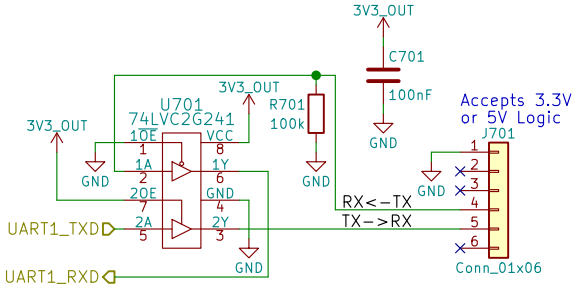
Size: A4	Date: 2018–05–14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 5/20



Sheet: /RTC/
File: rtc.sch

Title: RTC

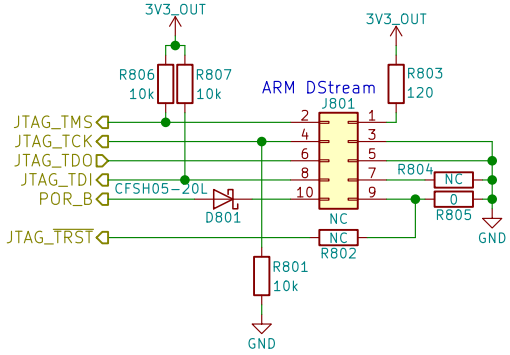
Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 6/20



Sheet: /UART Debug/
File: uart.sch

Title: UART Debug

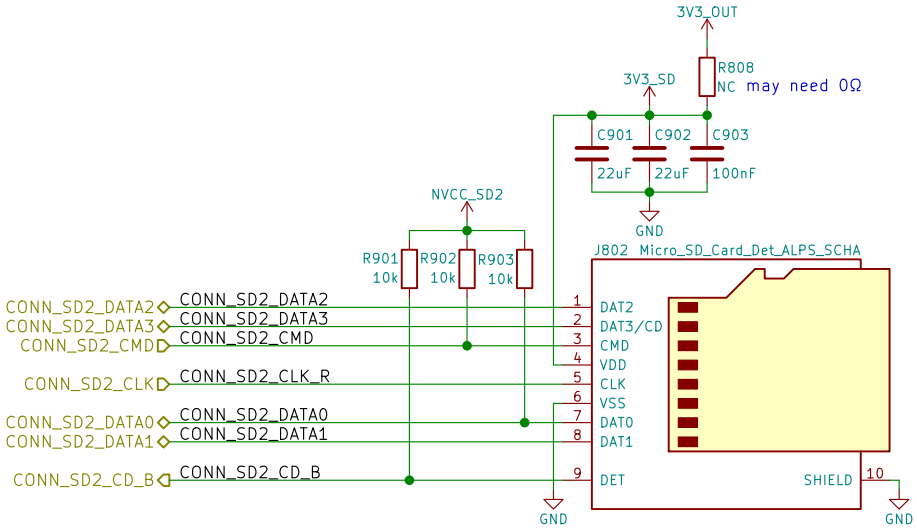
Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 7/20

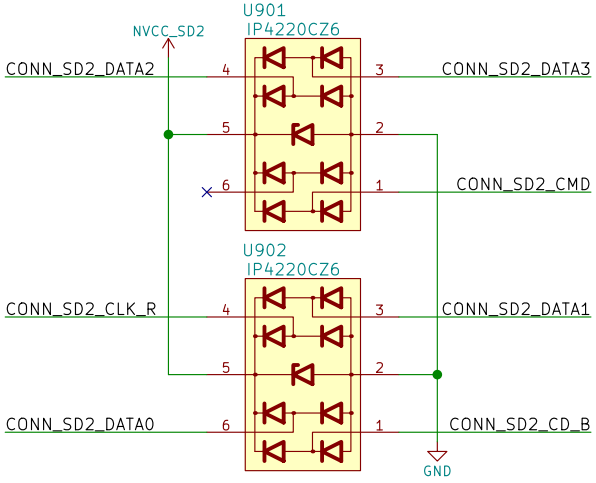


Sheet: /JTAG/
File: jtag.sch

Title: JTAG

Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 8/20



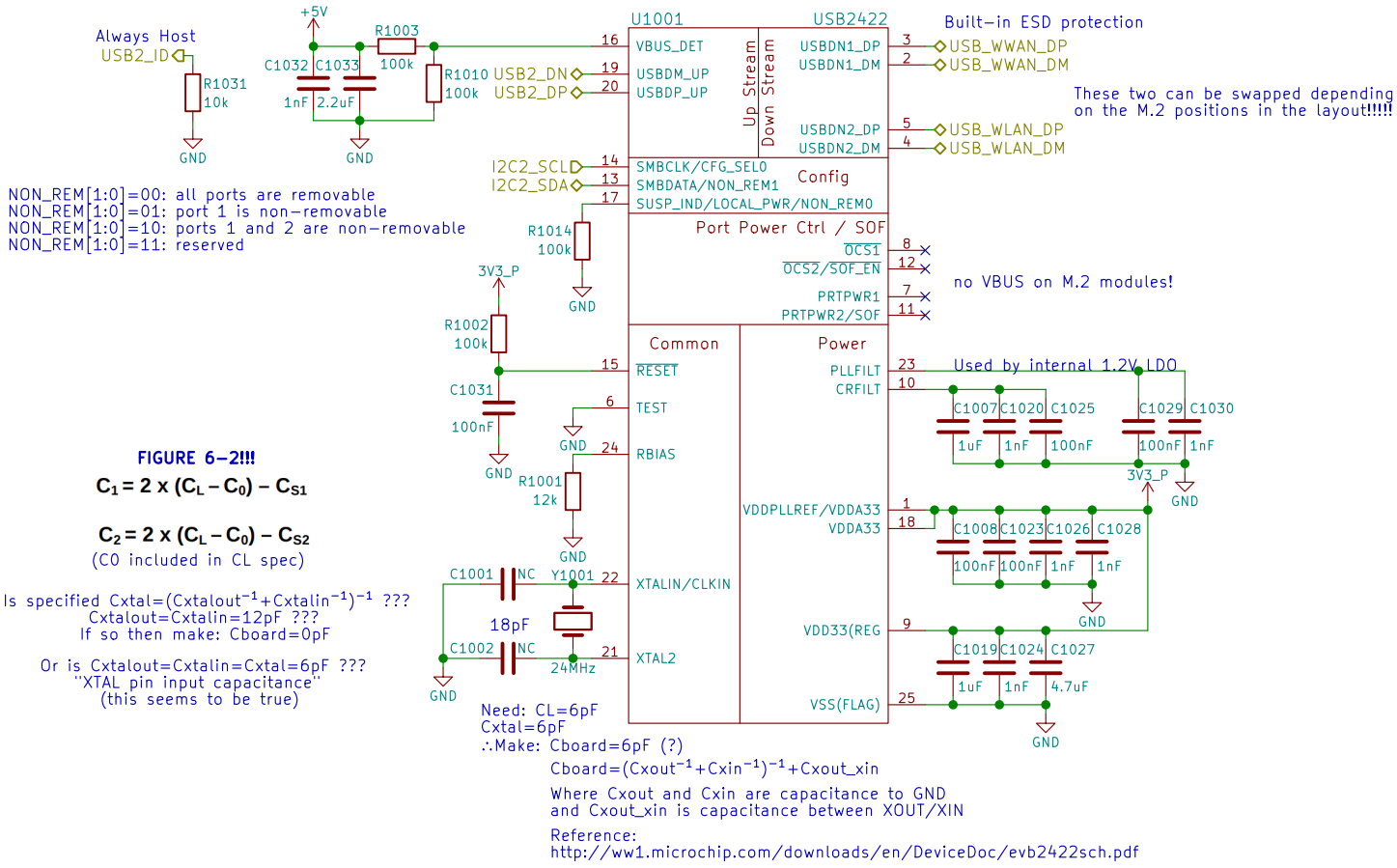


Sheet: /uSD Card/
File: sd.sch

Title: uSD Card

Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 9/20

TODO:
Use USB4640???



NON_REM[1:0]=00: all ports are removable
NON_REM[1:0]=01: port 1 is non-removable
NON_REM[1:0]=10: ports 1 and 2 are non-removable
NON_REM[1:0]=11: reserved

FIGURE 6-2!!!

$$C_1 = 2 \times (C_L - C_0) - C_{S1}$$

$$C_2 = 2 \times (C_L - C_0) - C_{S2}$$

(C0 included in CL spec)

Is specified Cxtal=$(Cxtalout^{-1}+Cxtalin^{-1})^{-1}$???
Cxtalout=Cxtalin=12pF ???
If so then make: Cboard=0pF

Or is Cxtalout=Cxtalin=Cxtal=6pF ???
"XTAL pin input capacitance"
(this seems to be true)

Need: CL=6pF
Cxtal=6pF
∴Make: Cboard=6pF (?)
Cboard=$(Cxout^{-1}+Cxin^{-1})^{-1}+Cxout\_xin$

Where Cxout and Cxin are capacitance to GND
and Cxout_xin is capacitance between XOUT/XIN

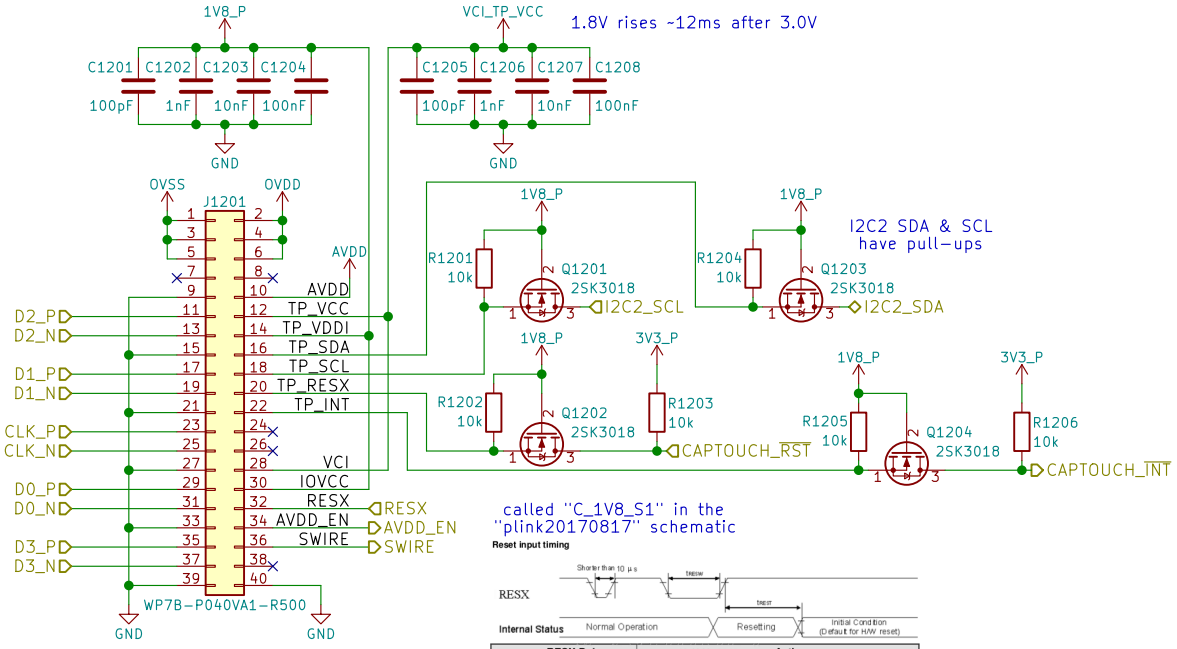
Reference:
http://ww1.microchip.com/downloads/en/DeviceDoc/evb2422sch.pdf

Sheet: /USB Hub/
File: usb_hub.sch

Title:

Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 10/20

Using H546DLB01.1 pin assignment may need
to be changed depending on display used



called "C_1V8_S1" in the
"plink20170817" schematic

Reset input timing

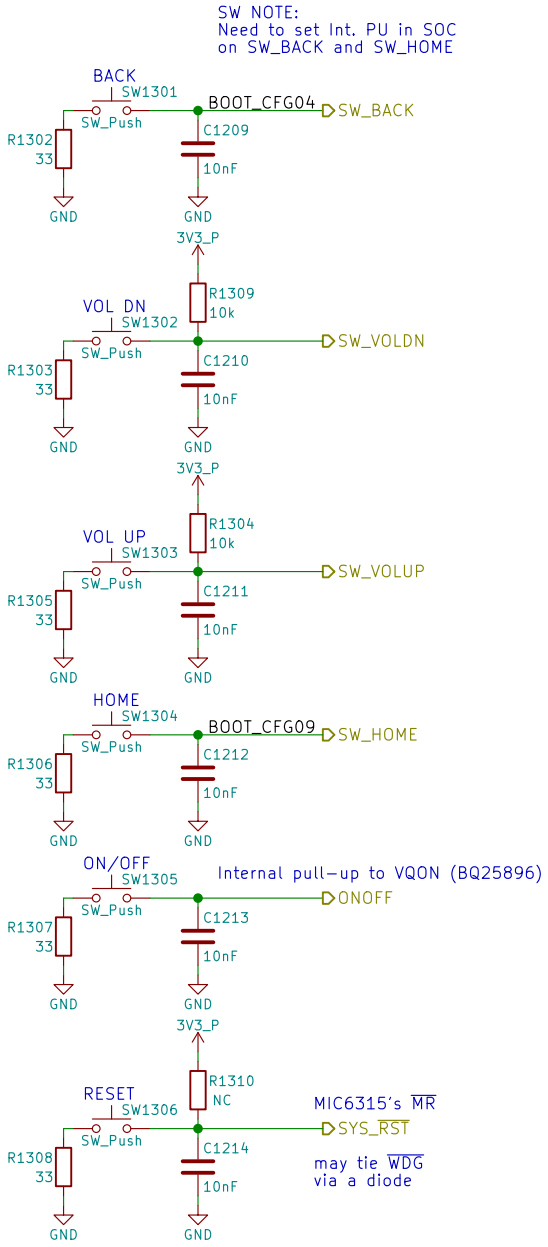
RESX Puise	Action
Shorter than 5µs	Invalid Reset
Longer than 10µs	Valid Reset
Between 5µs and 10µs	Reset Initialization Precedure

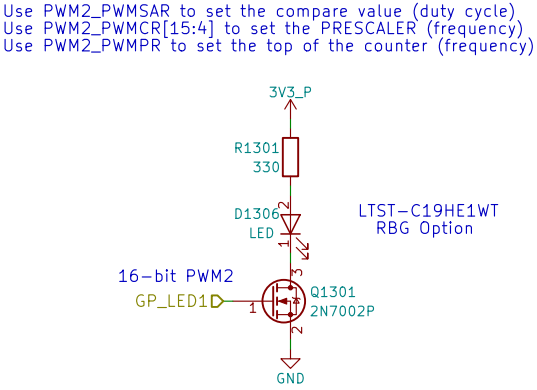
TODO: low power state signal??

Sheet: /MIPI DSI/
File: mipi_dsi.sch

Title: MIPI DSI

Size: A4 | Date: 2018-05-14 | **Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6 | Id: 11/20

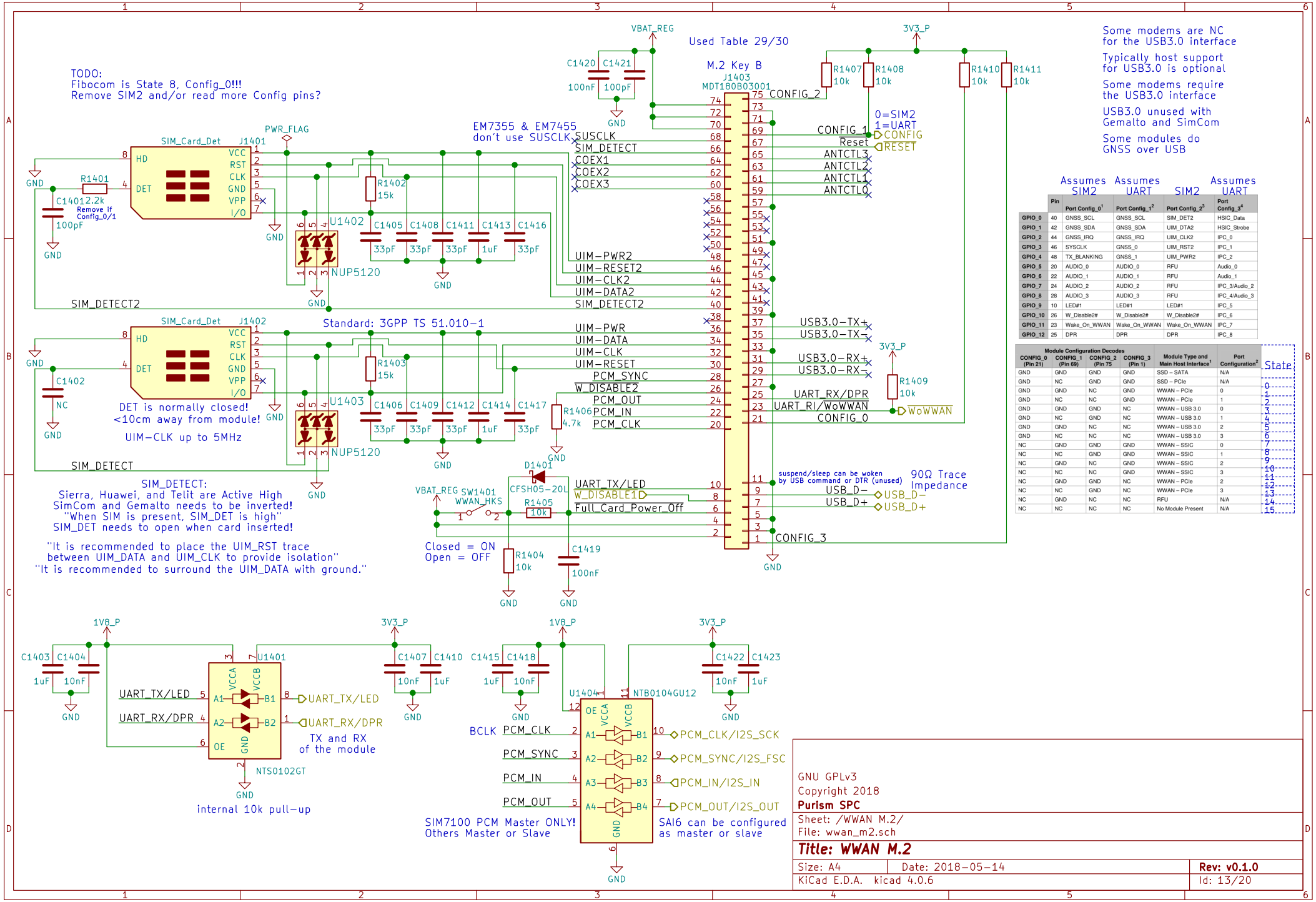




Sheet: /Buttons & LED/
File: buttons_led.sch

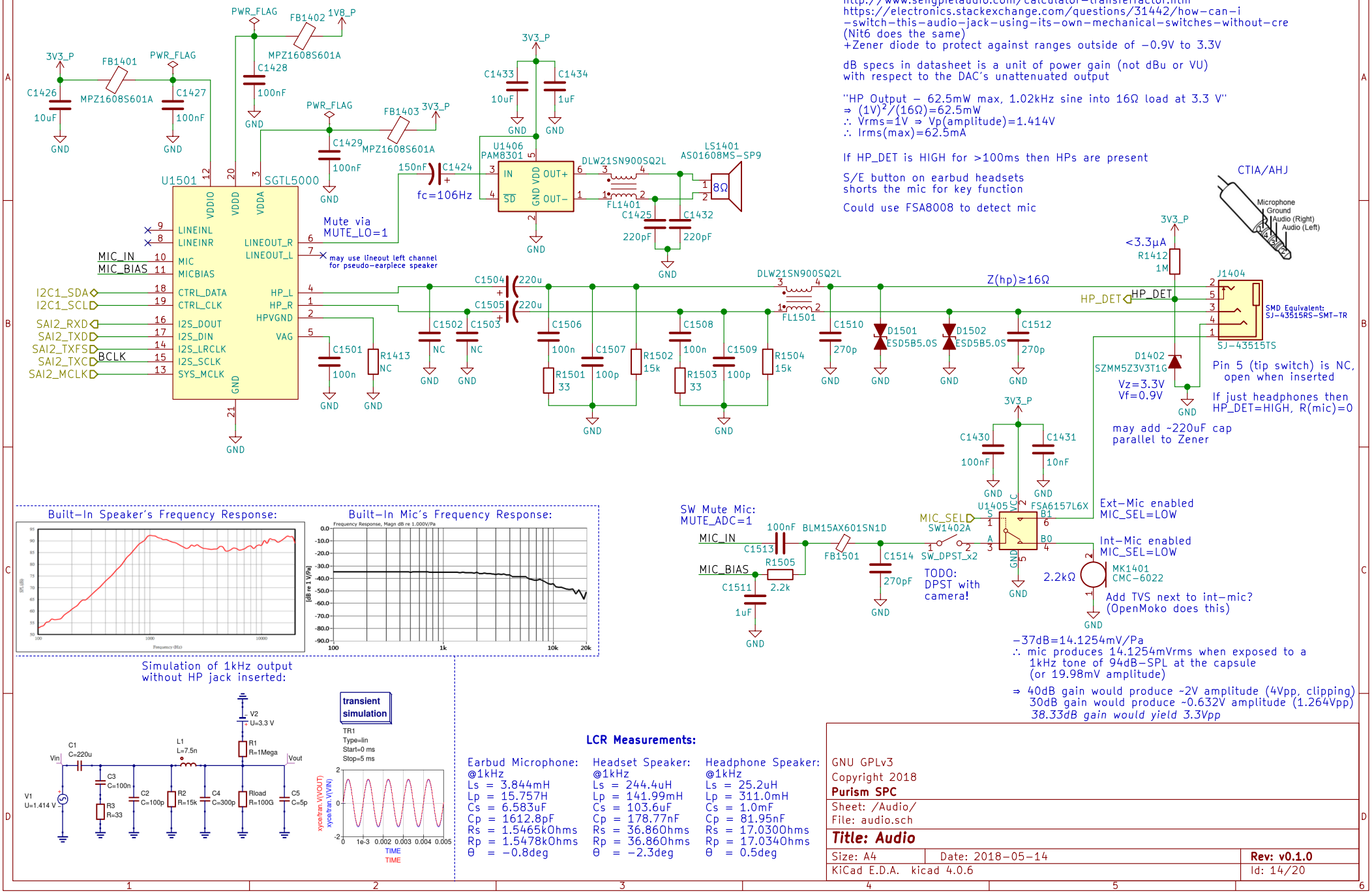
Title: Buttons & LED

Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 12/20



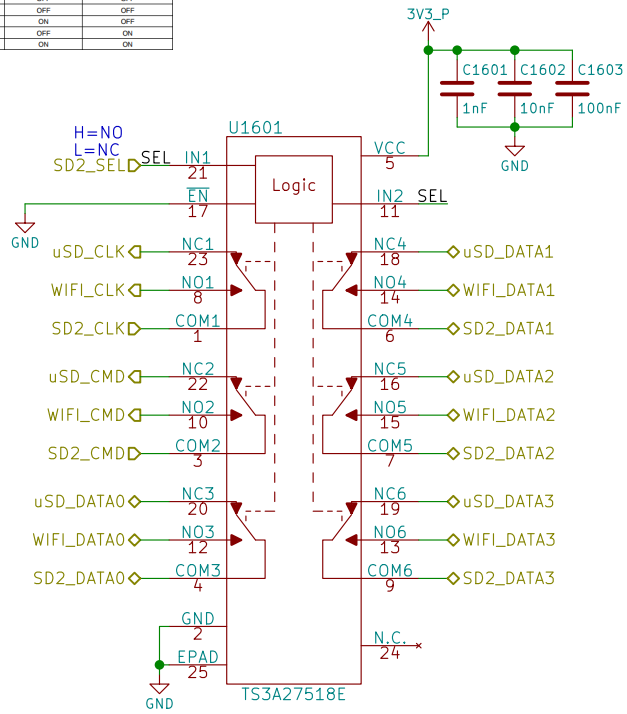
	Pin	Port Config_0[1]	Port Config_1[2]	Port Config_2[3]	Port Config_3[4]
GPIO_0	40	GNSS_SCL	GNSS_SCL	SIM_DET2	HSIC_Data
GPIO_1	42	GNSS_SDA	GNSS_SDA	UIM_DTA2	HSIC_Strobe
GPIO_2	44	GNSS_IRQ	GNSS_IRQ	UIM_CLK2	IPC_0
GPIO_3	46	SYSCLK	GNSS_0	UIM_RST2	IPC_1
GPIO_4	48	TX_BLANKING	GNSS_1	UIM_PWR2	IPC_2
GPIO_5	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						State
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	0
GND	NC	NC	GND	WWAN – PCIe	1	1
GND	GND	GND	NC	WWAN – USB 3.0	0	2
GND	NC	GND	NC	WWAN – USB 3.0	1	3
GND	GND	NC	NC	WWAN – USB 3.0	2	4
GND	NC	NC	NC	WWAN – USB 3.0	3	5
NC	GND	GND	GND	WWAN – SSIC	0	6
NC	NC	GND	GND	WWAN – SSIC	1	7
NC	GND	NC	GND	WWAN – SSIC	2	8
NC	NC	NC	GND	WWAN – SSIC	3	9
NC	GND	GND	NC	WWAN – PCIe	2	10
NC	NC	GND	NC	WWAN – PCIe	3	11
NC	GND	NC	NC	RFU	N/A	12
NC	NC	NC	NC	No Module Present	N/A	13
						14
						15


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"
⇒ (1V)²/(16Ω)=62.5mW
∴ Vrms=1V ⇒ Vp(amplitude)=1.414V
∴ Irms(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
U1501
SGTL5000
Mute via
MUTE_LO=1
may use lineout left channel
for pseudo-earpiece speaker
U1406
PAM8301
fc=106Hz
LS1401
AS01608MS-SP9
CTIA/AHJ
Microphone
Ground
Audio (Right)
Audio (Left)
<3.3µA
Z(hp)≥16Ω
HP_DET
J1404
SJ-43515TS
SMD Equivalent:
SJ-43515RS-SMT-TR
Pin 5 (tip switch) is NC,
open when inserted
If just headphones then
HP_DET=HIGH, R(mic)=0
D1402
SZMM5Z3V3T1G
Vz=3.3V
Vf=0.9V
may add ~220uF cap
parallel to Zener
Built-In Speaker's Frequency Response:
Built-In Mic's Frequency Response:
Frequency Response, Magn dB re 1.000V/Pa
SW Mute Mic:
MUTE_ADC=1
U1405
FSA6157L6X
MIC_SEL
SW1402A
SW_DPST_x2
Ext-Mic enabled
MIC_SEL=LOW
Int-Mic enabled
MIC_SEL=LOW
TODO:
DPST with
camera!
MK1401
CMC-6022
Add TVS next to int-mic?
(OpenMoko does this)
-37dB=14.1254mV/Pa
∴ mic produces 14.1254mVrms when exposed to a
1kHz tone of 94dB-SPL at the capsule
(or 19.98mV amplitude)
⇒ 40dB gain would produce ~2V amplitude (4Vpp, clipping)
30dB gain would produce ~0.632V amplitude (1.264Vpp)
38.33dB gain would yield 3.3Vpp
Simulation of 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
θ = -0.8deg
Headset Speaker:
@1kHz
Ls = 244.4uH
Lp = 141.99mH
Cs = 103.6uF
Cp = 178.77nF
Rs = 36.860hms
Rp = 36.860hms
θ = -2.3deg
Headphone Speaker:
@1kHz
Ls = 25.2uH
Lp = 311.0mH
Cs = 1.0mF
Cp = 81.95nF
Rs = 17.0300hms
Rp = 17.0340hms
θ = 0.5deg
GNU GPLv3
Copyright 2018
Purism SPC
Sheet: /Audio/
File: audio.sch
Title: Audio
Size: A4
Date: 2018-05-14
Rev: v0.1.0
KiCad E.D.A. kicad 4.0.6
Id: 14/20

Can swap around signals in the layout:

EN	IN1	IN2	NC1/2/3 TO COM1/2/3, COM1/2/3 TO NC1/2/3	NC4/5/6 TO COM4/5/6, COM4/5/6 TO NC4/5/6	NO1/2/3 TO COM1/2/3, COM1/2/3 TO NO1/2/3	NO4/5/6 TO COM4/5/6, COM4/5/6 TO NO4/5/6
H	X	X	OFF	OFF	OFF	OFF
L	L	L	ON	ON	OFF	OFF
L	H	L	OFF	OFF	ON	OFF
L	L	H	ON	OFF	OFF	ON
L	H	H	OFF	OFF	ON	ON

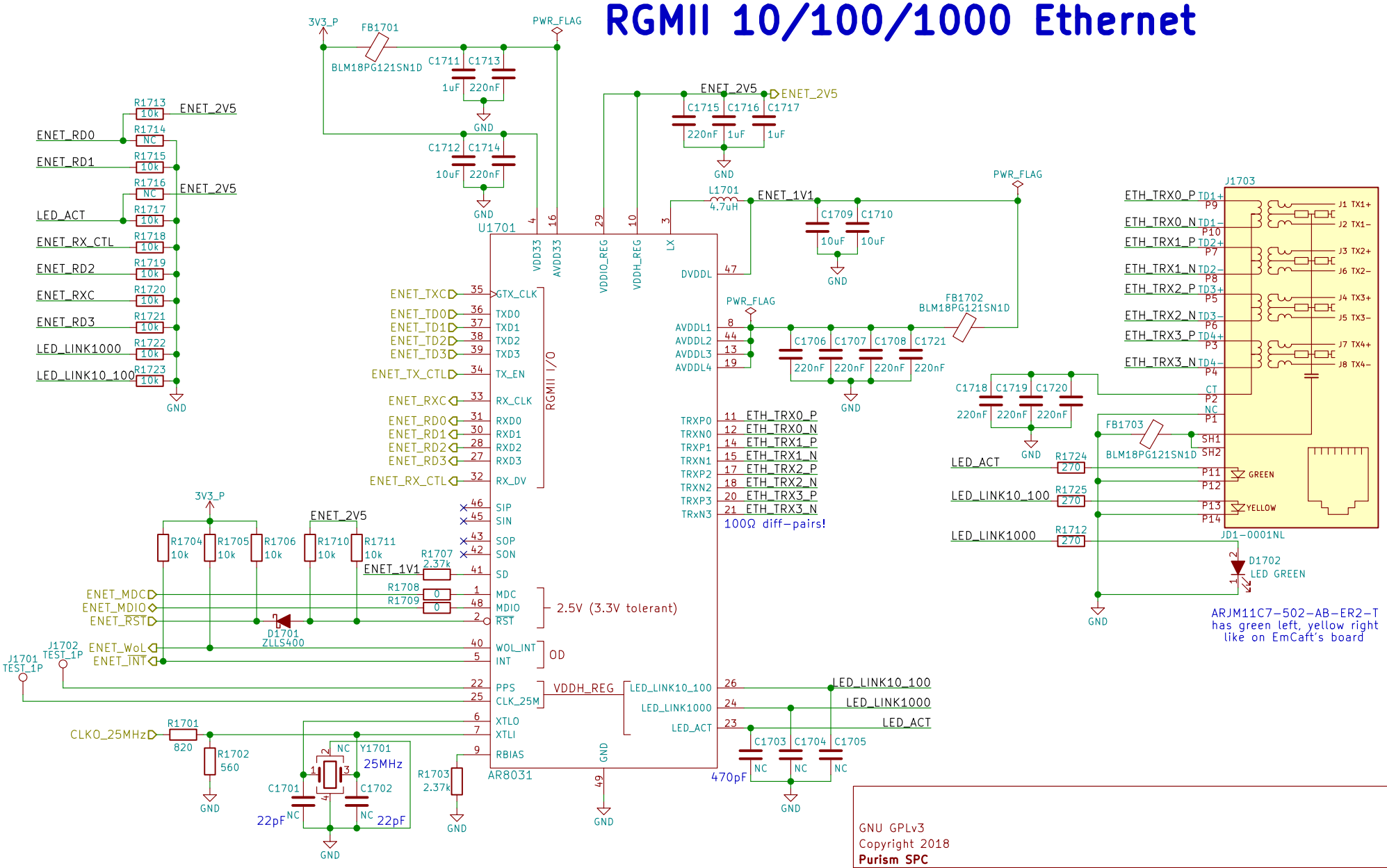


Sheet: /SDIO DEMUX/
File: sdio_demux.sch

Title: SDIO Demultiplexer

Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 15/20

RGMII 10/100/1000 Ethernet



Sheet: /Ethernet/	
File: ethernet.sch	
Title: Ethernet	
Size: A4	Date: 2018-05-14
KiCad E.D.A. kicad 4.0.6	Id: 16/20

Rev: v0.1.0

6.2 M.2 Signal Directions

RS9116 NC:
RTS, CTS, BT_HOST_WAKE

RS9116 datasheet says
no WIFI_WAKE
but the schematic has it

Module: Table 23
Socket: Table 46

RedPine RS9116 MB0
Requires +5V on
Pin 54 for USB!

J1502

M.2_Key_E

USB_WLAN_DP
USB_WLAN_DN
WIFI_CLK
WIFI_CMD
WIFI_DATA0
WIFI_DATA1
WIFI_DATA2
WIFI_DATA3
WIFI_WAKE
WIFI_RST
W_DISABLE1

M2_PCM_CLK
M2_PCM_SYNC
M2_PCM_IN
M2_PCM_OUT
BT_HOST_WAKE
BT_UART_RXD
BT_UART_TXD
BT_UART_RTS
BT_UART_CTS
RS9116 SUSCLK
is a GPIO (unused)
SUSCLK
W_DISABLE2
W_DISABLE1
M2_I2C_SDA
M2_I2C_SCL

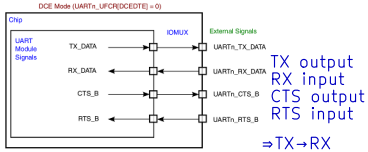
3V3_P
1V8_P
GND

R1506 10k
D1503 ZLLS400
D1504 ZLLS400

SoC's RX
Module's TX

SoC's TX
Module's RX

UARTn_UFCR[DCEDTE]=0 on POR



TX output
RX input
CTS output
RTS input

⇒TX→RX
RX←TX
CTS→CTS
RTS←RTS

i.MX8M in DCE mode has
CTS output, RTS input

TODO:
Pin 54 on RS9116 is USB_VBUS Sink!!!

U1502A 74AUP2G00
U1502B 74AUP2G00

BT_DISABLE
WIFI_DISABLE

D1505 CFSH05-20L
Closed = ON (*_DISABLE HIGH)
Open = OFF

SW1501 WWAN_HKS
R1508 10k
C1515 100nF
R1510 10k

R1507 10k
R1509 10k
Q1501 FDV301N
Q1502 FDV301N

TODO!!!
verify if translators
with PWR_EN is needed!

M2_I2C_SDA ⇔ I2C2_SDA
M2_I2C_SCL ⇔ I2C2_SCL

RS9116 has SCL as output
⇒master?
(only device on I2C2 bus)

U1702 NTB0104GU12

C1722 1uF
C1723 10nF
C1724 10nF
C1725 1uF

BT_UART_RXD ⇔ BT_UART_RXD
BT_UART_TXD ⇔ BT_UART_TXD
BT_UART_RTS ⇔ BT_UART_RTS
BT_UART_CTS ⇔ BT_UART_CTS

RX, TX, RTS, CTS
of the SoC

internal 10k pull-up

U1504 NTB0104GU12

C1520 1uF
C1521 10nF
C1522 10nF
C1523 1uF

BCLK M2_PCM_CLK ⇔ BT_PCM_CLK
M2_PCM_SYNC ⇔ BT_PCM_SYNC
M2_PCM_IN ⇔ BT_PCM_IN
M2_PCM_OUT ⇔ BT_PCM_OUT

configure as slave

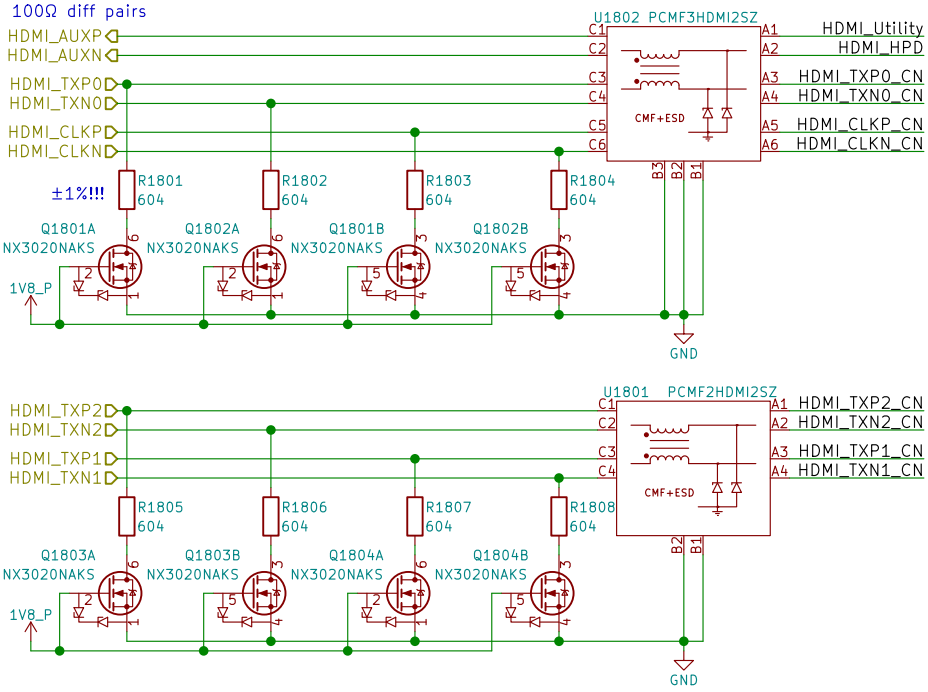
Sheet: /WLAN+BT M.2/
File: wifi_bt_m2.sch

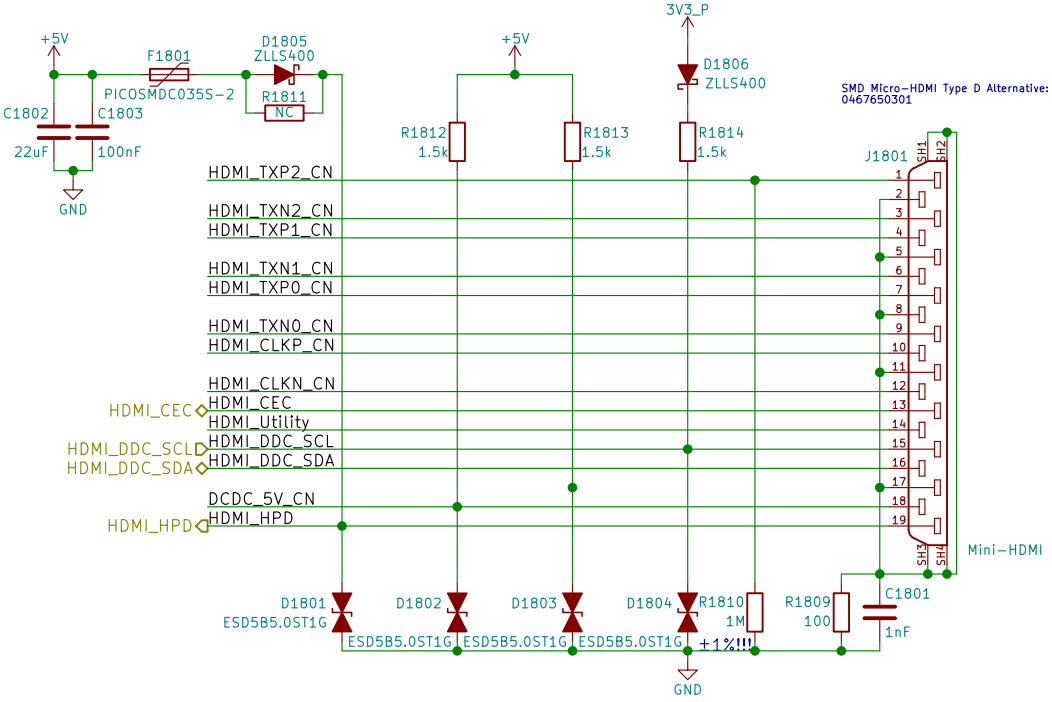
Title: WLAN+BT M.2

Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 17/20

HD3SS460 can be used for DP over USB-C

Layout Note:
May need swap some signals
due to micro-HDMI pinout diff
depending on pin location/routing



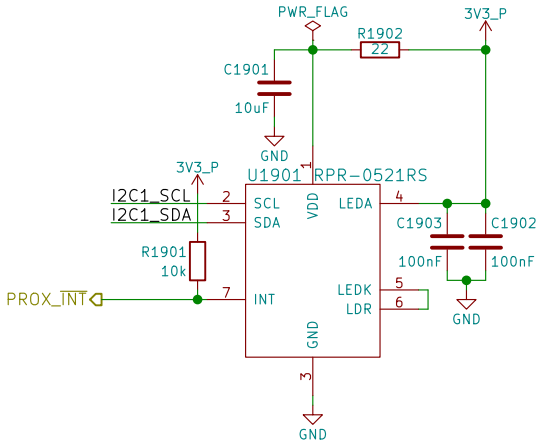


Sheet: /HDMI/
File: hdmi.sch

Title: HDMI

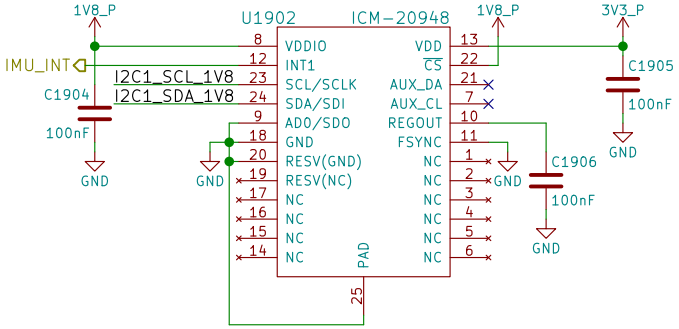
Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 18/20

Proximity & Ambient Light



Reference:
http://www.rohm.com/web/global/sensor-shield-support/ps-als-sensor

9-Axis IMU



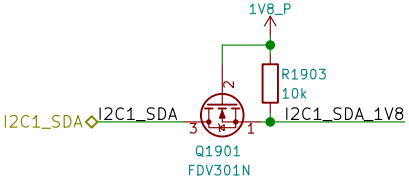
Reference:
https://store.invensense.com/datasheets/invensense/AN-IVS-0001EVB-00%20v1%202.pdf

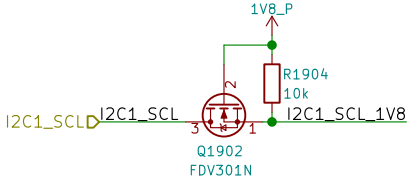
AD0 sets the slave address's LSB (110100X)

INT1_ACTL sets if IMU_INT
is active-high or active-low

"FSYNC - Connect to GND if unused"

I2C's VIH=1.8V





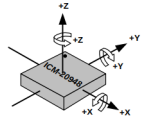


Figure 12. Orientation of Axes of Sensitivity and Polarity of Rotation

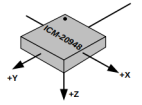
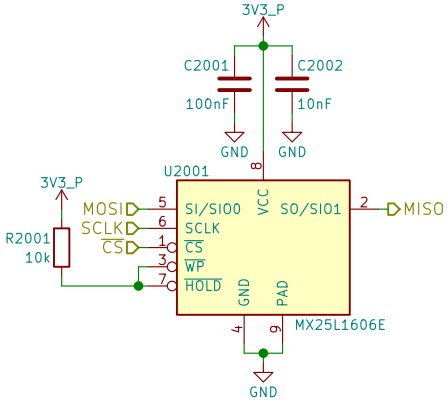


Figure 13. Orientation of Axes of Sensitivity for Magnetometer

Sheet: /Sensors/
File: sensors.sch

Title: Sensors

Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 19/20



Sheet: /SPI Flash/
File: flash.sch

Title: SPI NOR Flash

Size: A4	Date: 2018-05-14	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.6		Id: 20/20