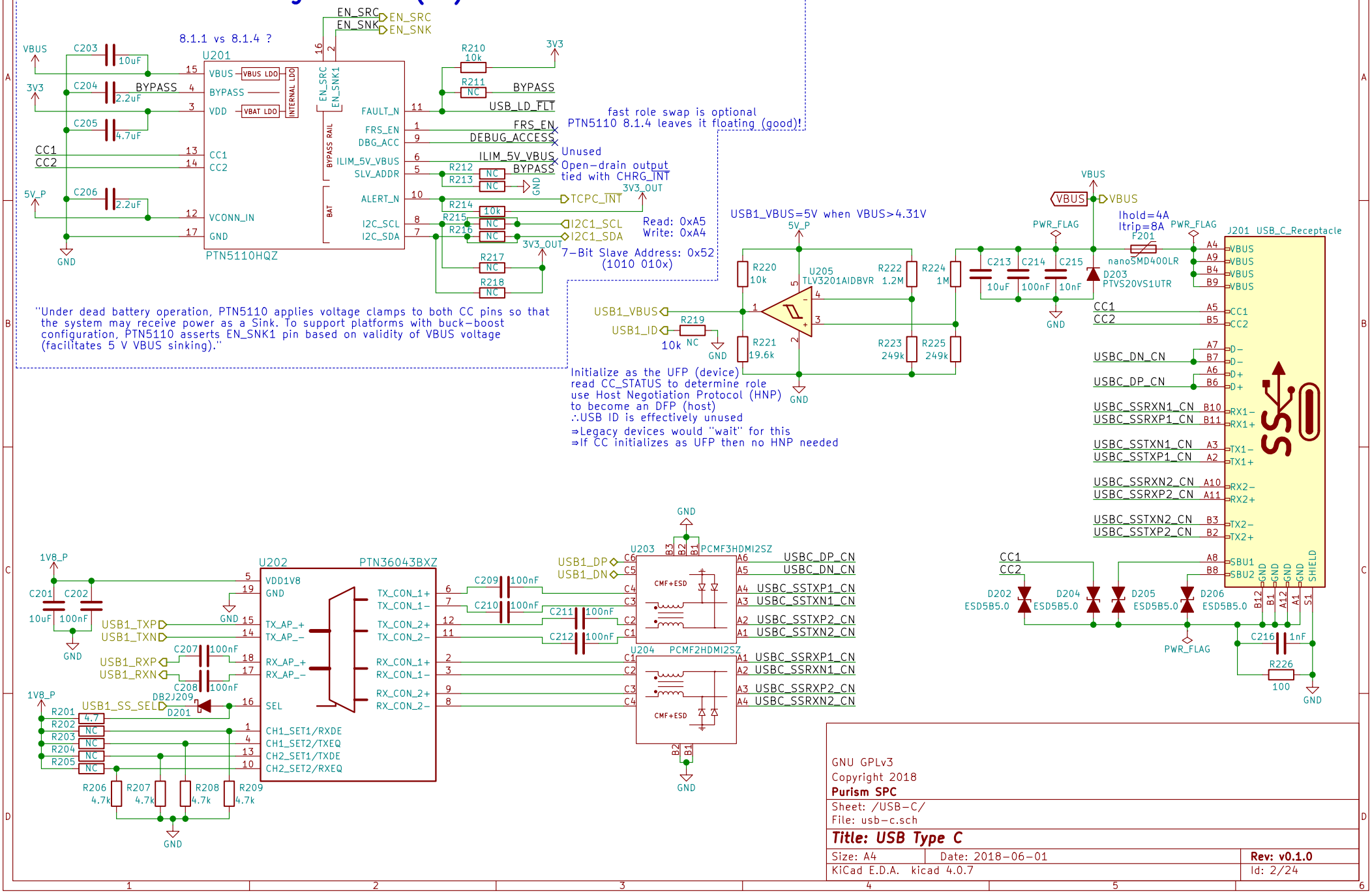
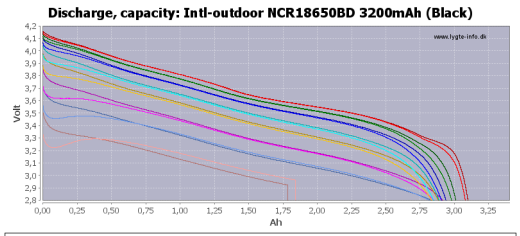
USB-C
usb-c.sch
Battery
battery.sch
Power
power.sch
Boot Config
boot.sch
RTC
rtc.sch
UART Debug
uart.sch
JTAG
jtag.sch
uSD Card
sd.sch
MIPI
mipi.sch
Buttons & LED
buttons_led.sch
WWAN_M.2
wwan_m2.sch
Audio
audio.sch
WLAN+BT M.2
wifi_bt_m2.sch
USB Hub + SDIO Bridge
usb_hub_sdio.sch
Ethernet
ethernet.sch
HDMI
hdmi.sch
Sensors
sensors.sch
SPI Flash
flash.sch
Smart Card
smartcard.sch
GNSS
gnss.sch
Haptic Motor
haptic.sch
Alternate Functions:
CAPTOUCH_RST
SAI6_TXD0
SAI6_TXFS/RXFS
SAI6_TXC/RXC
SAI6_RXD0
GPIO3_IO08
GPIO3_IO04
GPIO3_IO09
GPIO5_IO03 (was PWM3)
GPIO5_IO05 (was PWM1)
GPIO3_IO20
GPIO1_IO12 (was IR_CAP)
GPIO3_IO19 (was LED1)
TODO:
GNSS
MIPI CSI/DSI
Spare GPIO:
GPIO1_IO05 (was CSI_P2_PWDN)
GPIO3_IO25
GPIO that can be swapped around:
GPIO1_IO05 (was CSI_P2_PWDN)
GPIO1_IO12 (was IR_CAP)
GPIO3_IO19 (was LED1)
GPIO3_IO20
GPIO3_IO25
GPIO5_IO03 (was PWM3)
GPIO5_IO05 (was PWM1)
3V3_OUT is sourced from PMIC's 3A NVCC_3P3/BUCK6 and is supplying the SoC's H7 ball 'NVCC_I2C'
Note: Some I2C devices require SDA/SCL to be high before powering them
GND
IMX8M-SOM
J101A
J101B
J101C
J101D
J102
TEST_1P
R101 2.2k
R102 2.2k
R103 10k
R104 19.6k
R105 10k
R106 10k
C101 22uF
C102 22uF
C103 100nF
C104 100nF
C105 22uF
C106 22uF
PWR_FLAG 3V3_OUT
PWR_FLAG 3V3_SNVS
GNU GPLv3
Copyright 2018
Purism SPC
Sheet: /
File: dvk-mx8m-bsb.sch
Title: DVK-MX8M-BSB
Size: A2
Date: 2018-06-01
Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7
Id: 1/24

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



Sheet: /USB-C/	
File: usb-c.sch	
Title: USB Type C	
Size: A4	Date: 2018-06-01
KiCad E.D.A. kicad 4.0.7	**Rev: v0.1.0**
	Id: 2/24

Battery Charge Controller



(interpret RSOC% based on this plot)

Drawing ~333.33mA, or consuming <1.2W, should give close to 10 hours going from 100% to 0% charge

use AUTO_DPDM_EN to auto-detect IINLIM

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

7-bit Slave Address: 0x6B (1101 011x)

U301 BQ25896

I(Lsat)=7A

Default LOW: adapter source

Open-drain output tied with TCPC_INT

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

Read: 0xD7
Write: 0xD6

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

NCR18650B meets requirements

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)=REG[6:0]=2048mA (reduce to ~1.6A [0011001])

reference design: http://www.ti.com/lit/ug/sluuba2b/sluuba2b.pdf

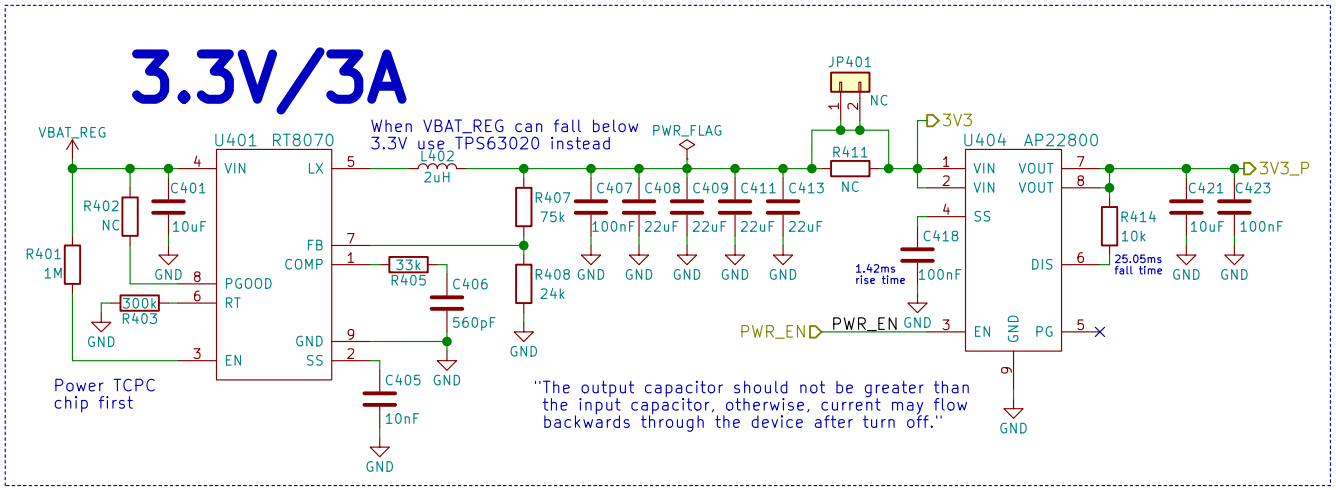
may want to include BQ29705 protection as in:
http://www.ti.com/lit/ug/tiducl1/tiducl1.pdf
schematic: http://www.ti.com/lit/df/tidrp70/tidrp70.pdf
(PTC may be good enough)

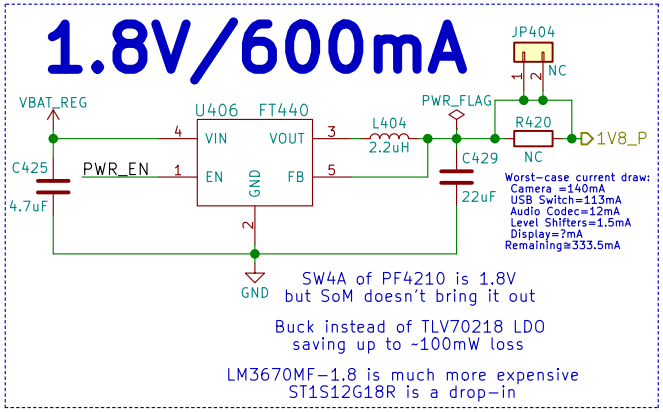
TODO:
Keystone 1042 footprint???

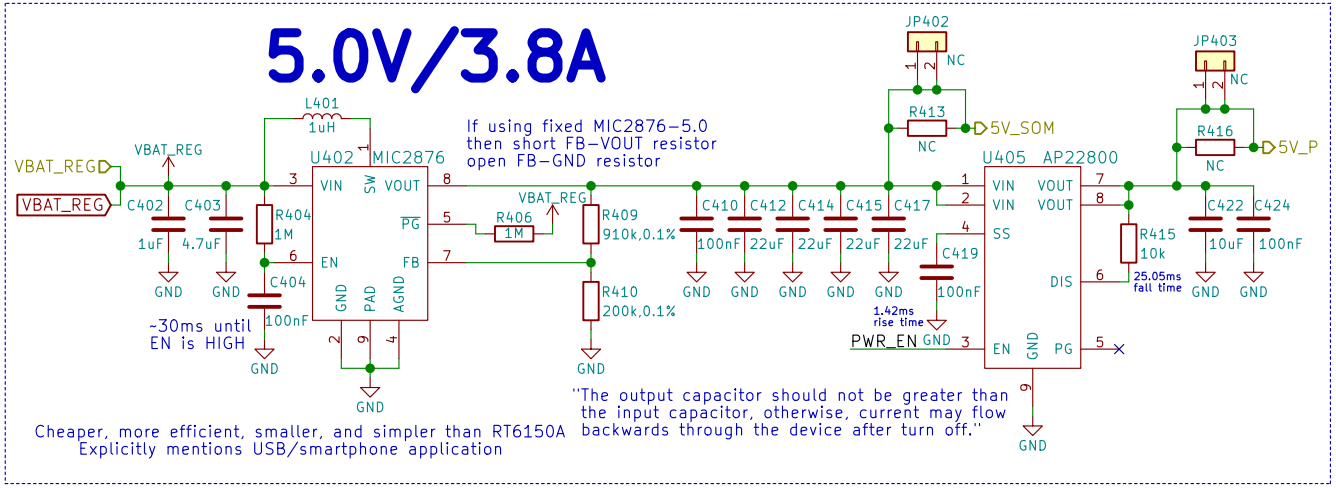
Battery holder gives ~1mm clearance underneath the battery
Thermistor is 1.1±0.15mm thick, should fit fine with stack-up

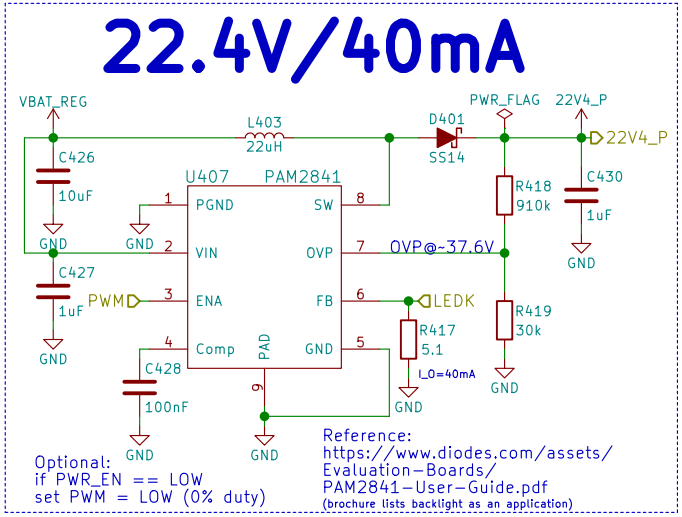
Battery holder seems to fit up to ~68.88mm long batteries
need to test 18650 protected cells which are ~69.35mm long

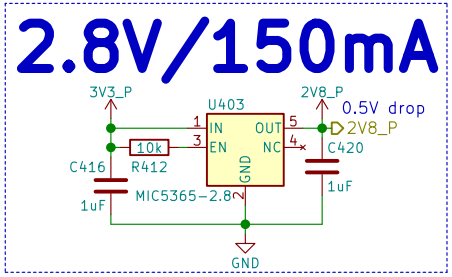
Sheet: /Battery/		
File: battery.sch		
Title: Battery		
Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 3/24





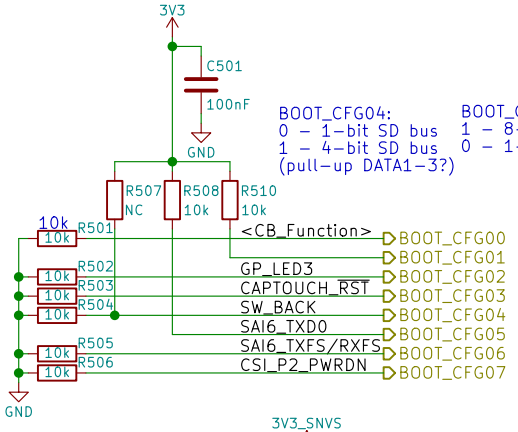


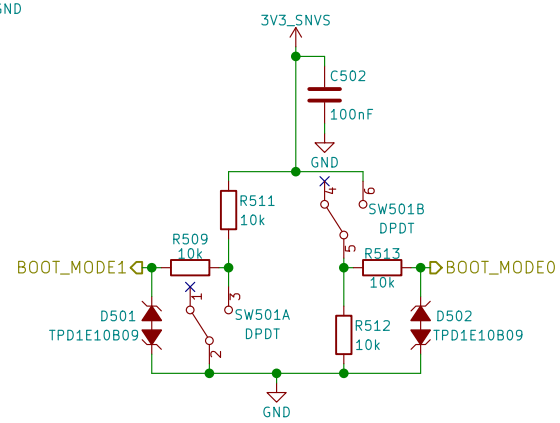




TODO:
add parallel 100nF bulk caps!
& spread all over the power plane

Sheet: /Power/		
File: power.sch		
Title: Power		
Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 4/24





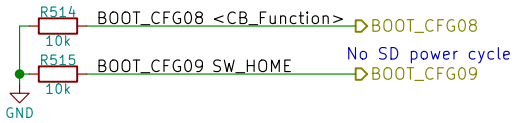
2–>1: eMMC
2–>3: USB (Serial Downloader)

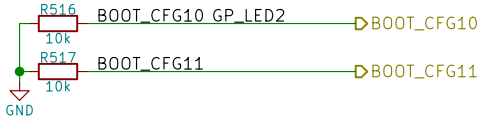
BOOT_MODE[1:0]	Boot Type
00	Boot From Fuses
01	Serial Downloader
10	Internal Boot
11	Reserved

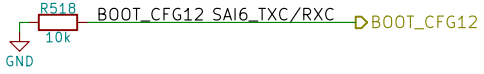
Only eMMC

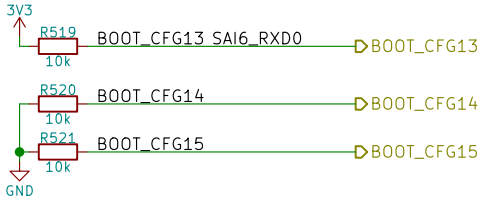
BOOT_CFG[14:12]	Boot device
001	SD/eSD
010	MMC/eMMC
011	NAND

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





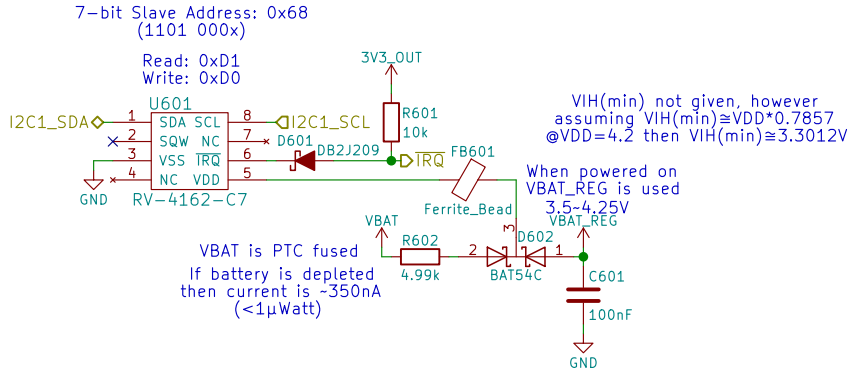




Sheet: /Boot Config/
File: boot.sch

Title: Boot Configuration

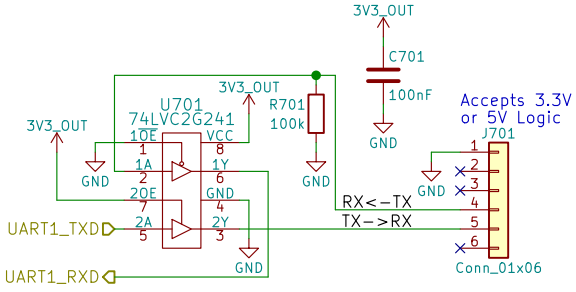
Size: A4	Date: 2018–06–01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 5/24



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

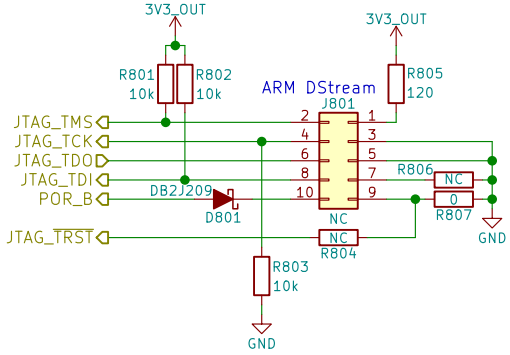
Sheet: /RTC/		
File: rtc.sch		
Title: RTC		
Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 6/24



Sheet: /UART Debug/
File: uart.sch

Title: UART Debug

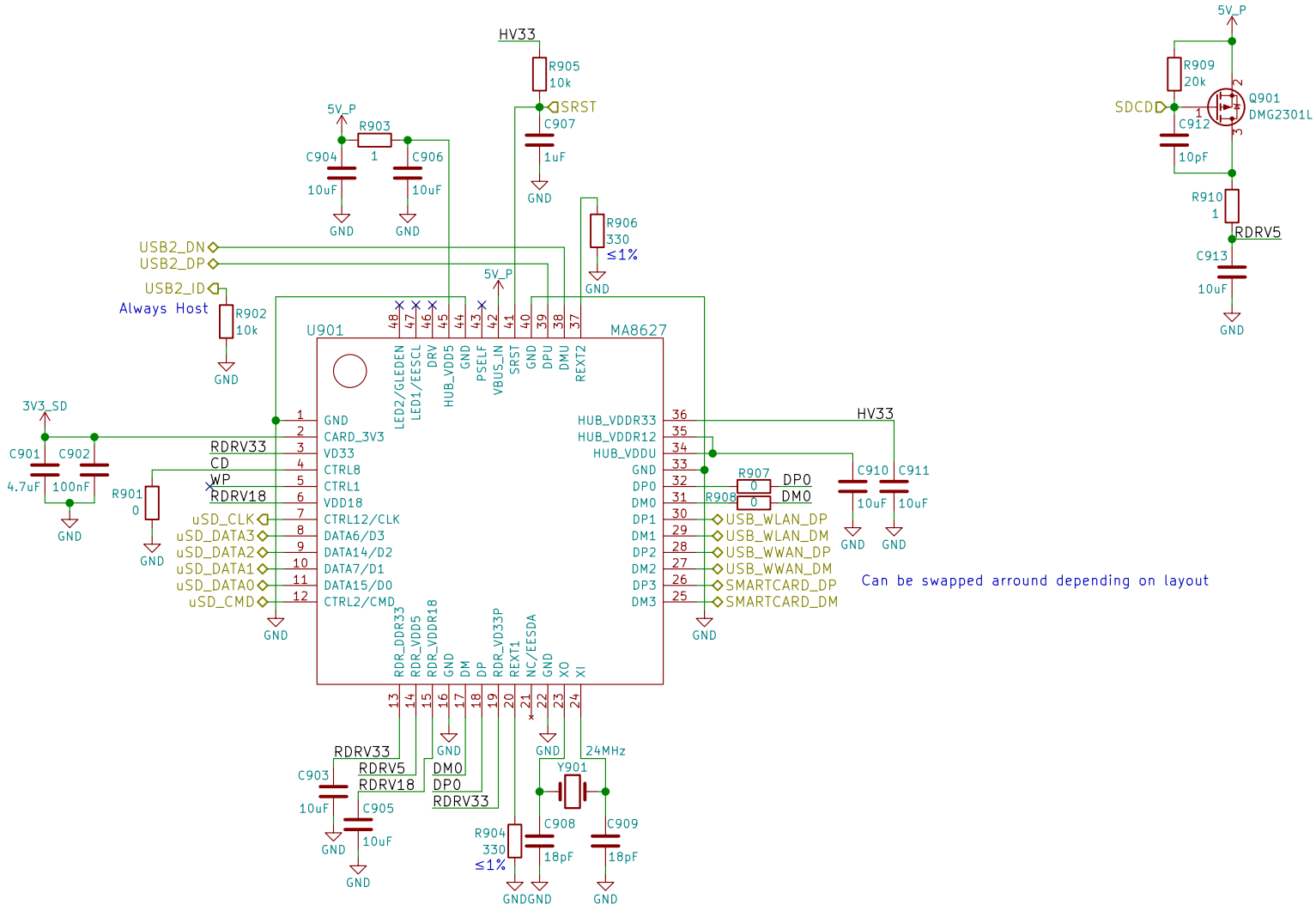
Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 7/24



Sheet: /JTAG/
File: jtag.sch

Title: JTAG

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 8/24

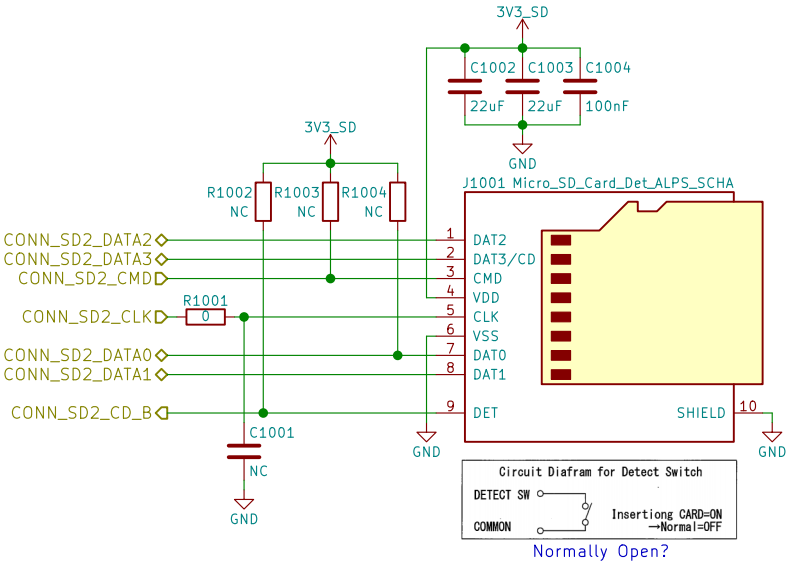


GNU GPLv3
Copyright 2018
Purism SPC

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

Title:

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 9/24

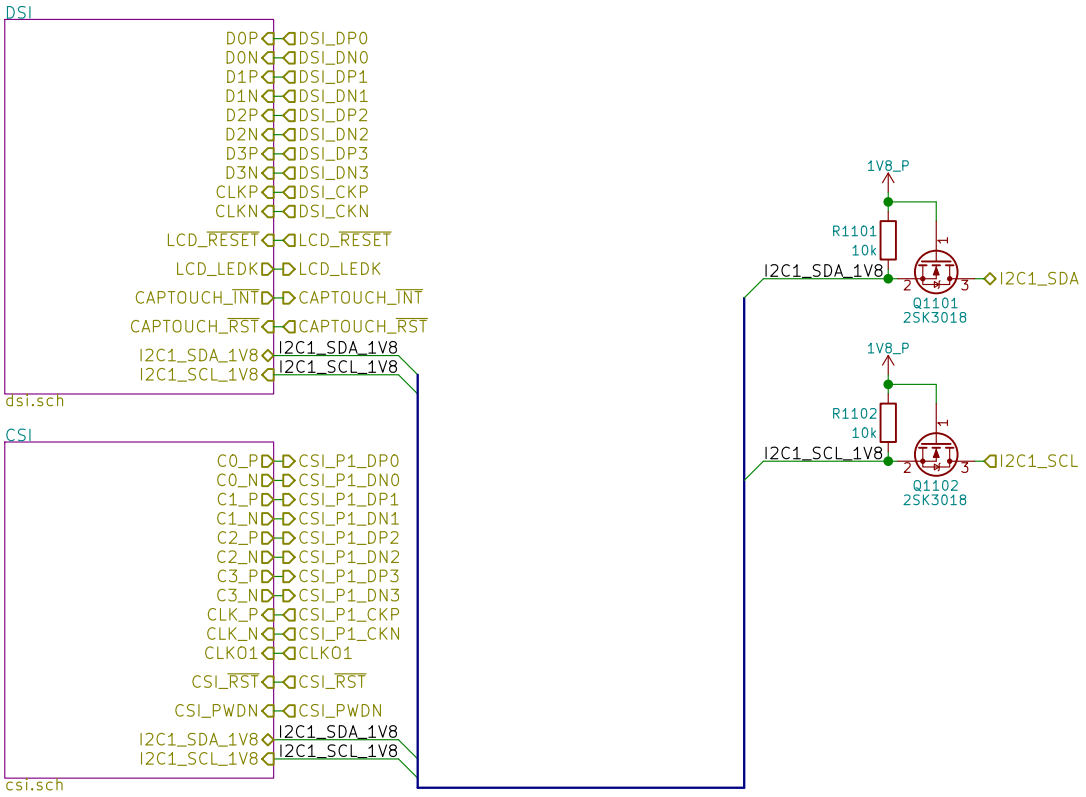


Purism SPC

Sheet: /uSD Card/
File: sd.sch

Title: uSD Card

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 10/24



Sheet: /MIPI/
File: mipi.sch

Title:

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 11/24

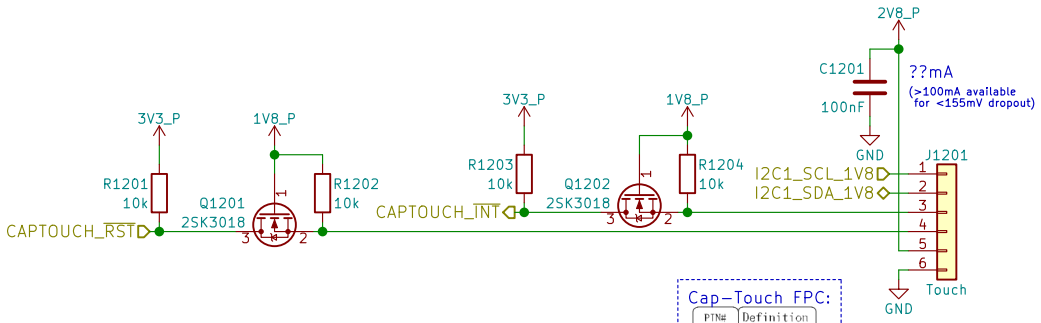
LCD PN:
Shenzhen Jinghong Electronics Co., Ltd.
JH057N00900

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



Cap-Touch FPC:

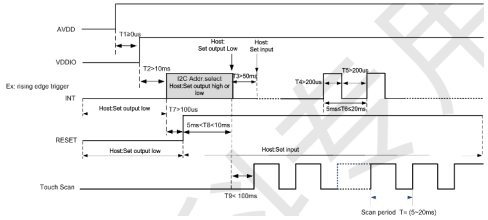
PIN#	Definition
1	SCL
2	SDA
3	INT
4	RESET
5	VDD2.85
6	GND

Front: Back:

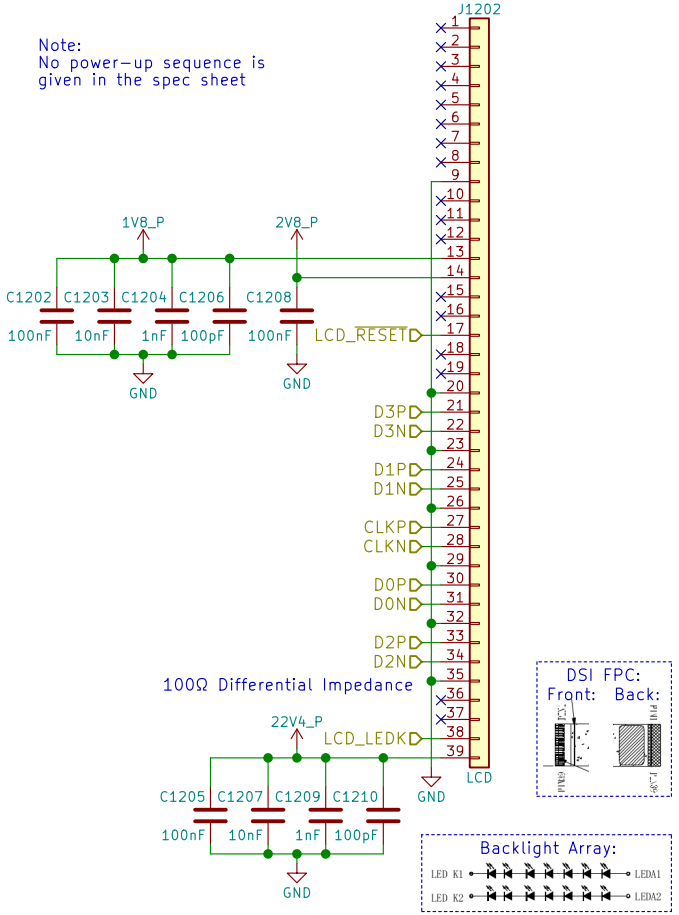
The upper 7 bits are the address,
and bit 0 is used to select read or write.
GT5688 has two slave device addresses to choose from:

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:



TODO:
Verify if INT and RESET are active-LOW

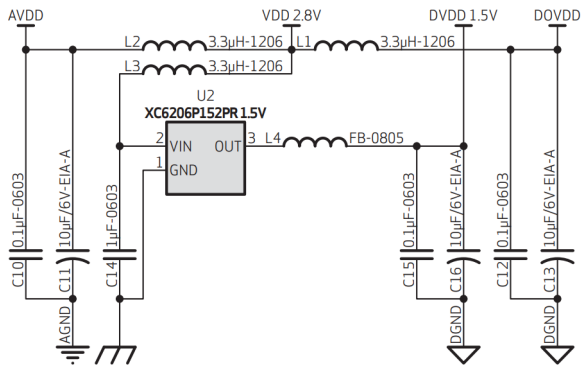


Sheet: /MIPI/DSI/
File: dsi.sch

Title: MIPI DSI

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 12/24

Using Internal DVDD 1.5V Regulator:



2.7 POWER UP SEQUENCE

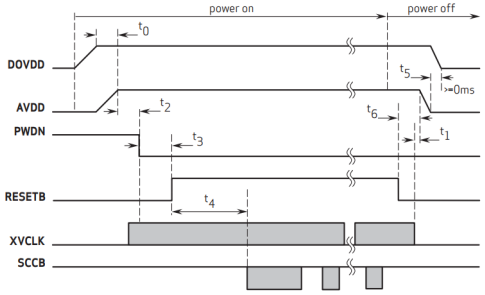
Based on the system power configuration (1.8V or 2.8V for I/O power, using external DVDD or internal DVDD, requiring access to the I2C during power up period or not), the power up sequence will differ. If 1.8V is used for I/O power, using the internal DVDD is preferred. If 2.8V is used for I/O power,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

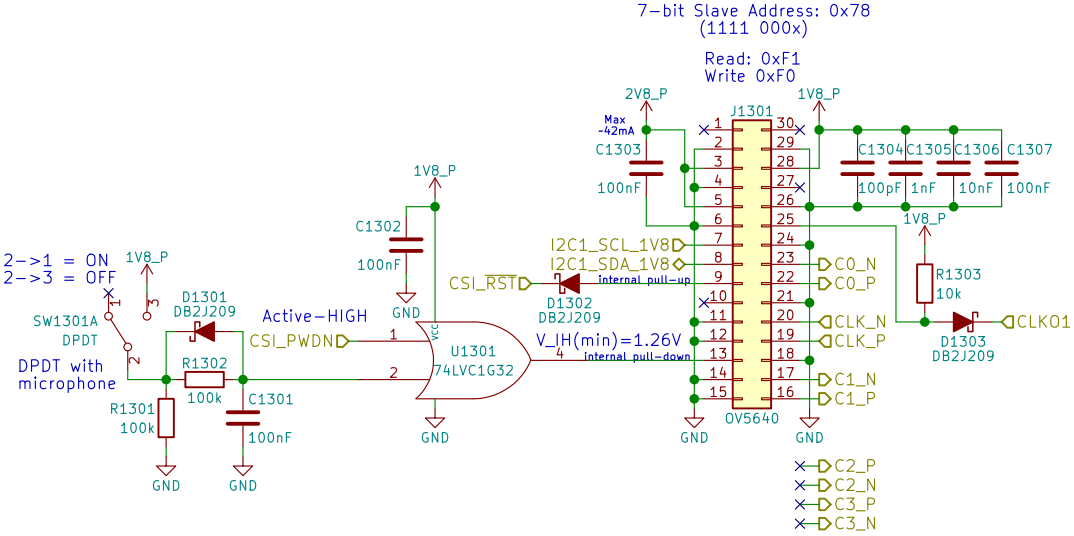
1. when DOVDD and AVDD are turned ON, make sure DOVDD becomes stable before AVDD becomes stable
2. PWDN is active high with an asynchronized design (does not need clock)
3. PWDN pin tied to digital ground if it is not controlled.
4. if PWDN pin is controlled as below, for PWDN to go low, power must first 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



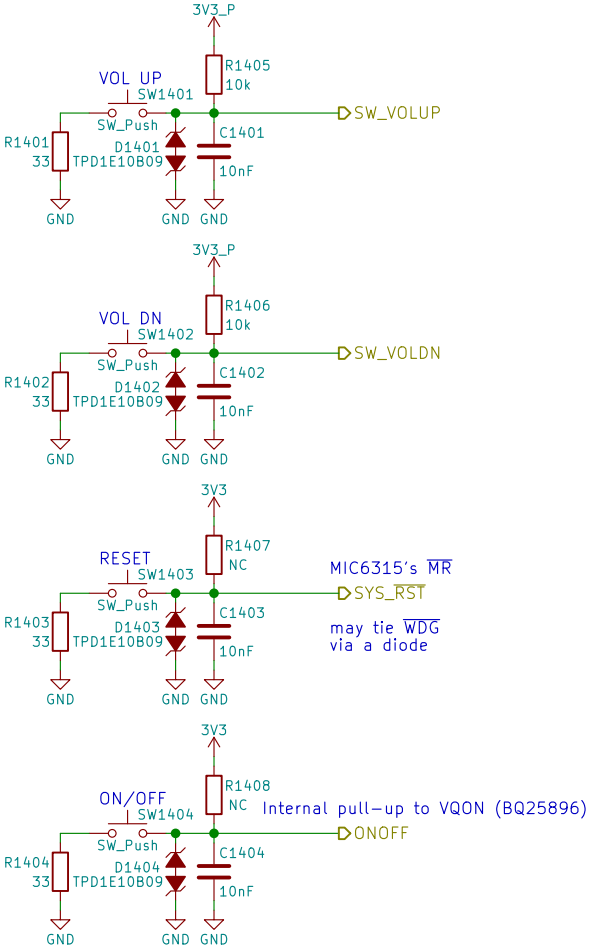
note
- t_0 ≥ 0ms, delay from DOVDD stable to AVDD stable, it is recommended to power up AVDD shortly after DOVDD has been powered up
- t_1 ≥ 0ms, delay from XVCLK off to AVDD off
- t_2 ≥ 5ms, delay from AVDD stable to sensor power up stable, PWDN can be pulled low after this point, XVCLK can be turned on after power on
- t_3 ≥ 1ms, delay from sensor power up stable to RESETB pull up
- t_4 ≥ 20ms, delay from RESETB pull high to SCCB initialization
- t_5 ≥ 0ms, delay from AVDD off to DOVDD off
- t_6 ≥ 0ms, delay from RESETB pull low to AVDD off

S640_DS_2.2

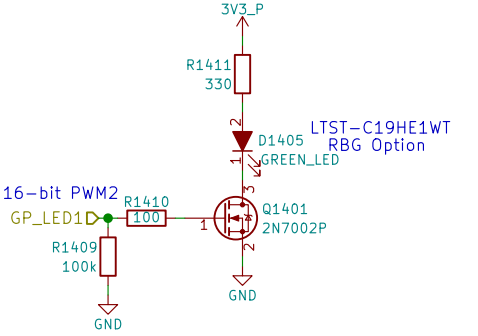


OV5640 CMOS Image Sensor Datasheet:
https://cdn.sparkfun.com/datasheets/Sensors/LightImaging/OV5640_datasheet.pdf

Sheet: /MIPI/CSI/		
File: csi.sch		
Title:		
Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 13/24



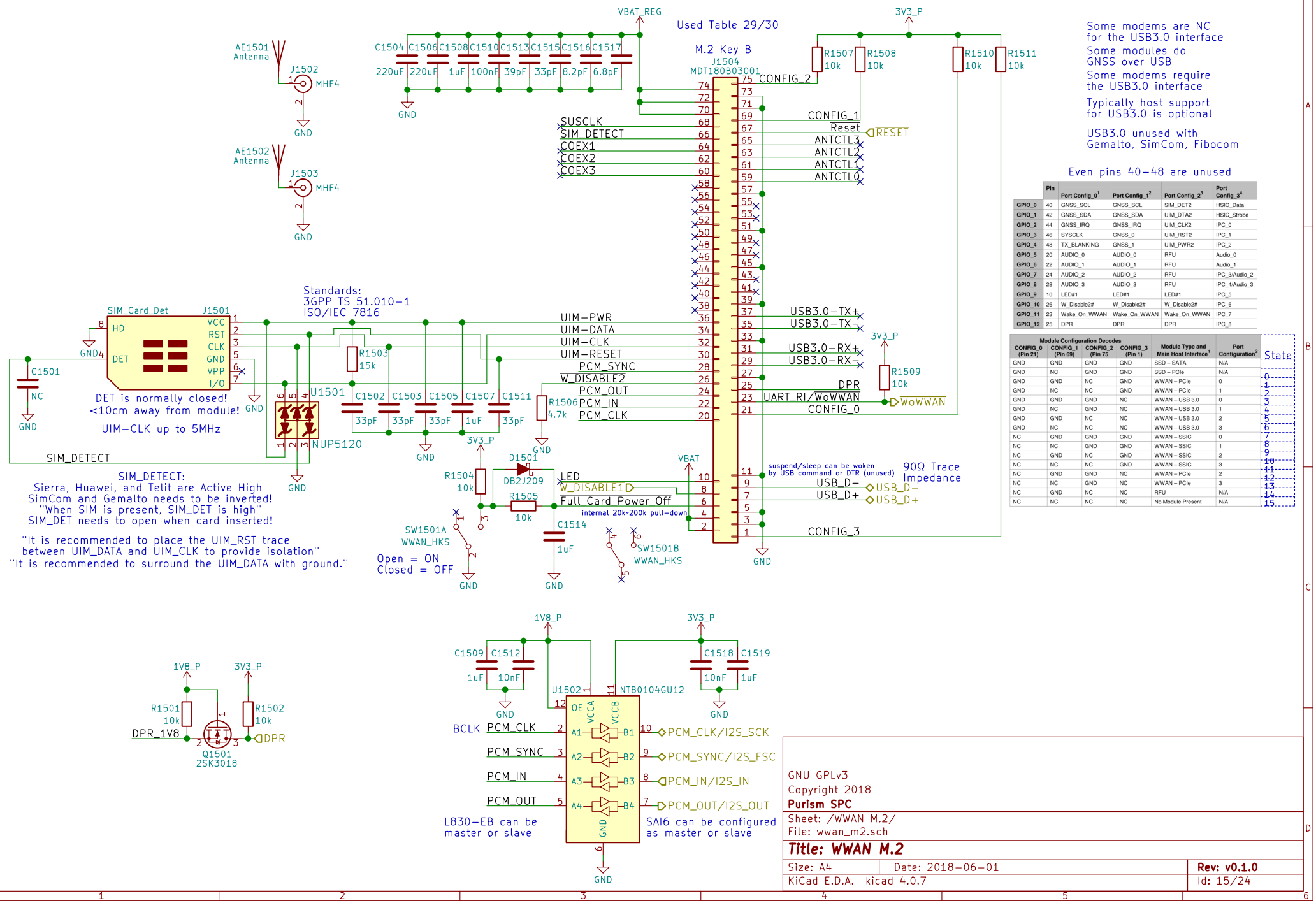
Use PWM2_PWMSAR to set the compare value (duty cycle)
Use PWM2_PWMCR[15:4] to set the PRESCALER (frequency)
Use PWM2_PWMPR to set the top of the counter (frequency)



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

Title: Buttons & LED

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 14/24



	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

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

Title: WWAN M.2

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 15/24

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

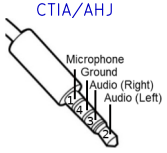
"HP Output – 62.5mW max, 1.02kHz sine into 16Ω load at 3.3 V"
⇒ $(1V)^2/(16Ω)=62.5mW$
∴ Vrms=1V ⇒ Vp(amplitude)=1.414V
∴ Irms(max)=62.5mA

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

CTIA/AHJ



7-bit Slave Address: 0x0A
(0001 010x)
Read: 0x15
Write: 0x14

Mute via
MUTE_LO=1

may use lineout left channel
for pseudo-earpiece speaker

fc=106Hz

<3.3µA

Z(hp)≥16Ω

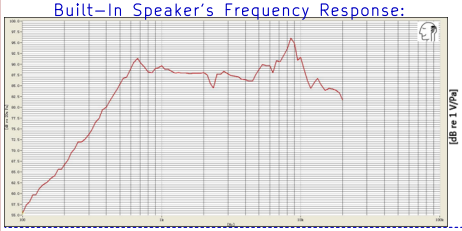
Pin 5 (tip switch) is NC,
open when inserted

If just headphones then
HP_DET=HIGH, R(mic)=0

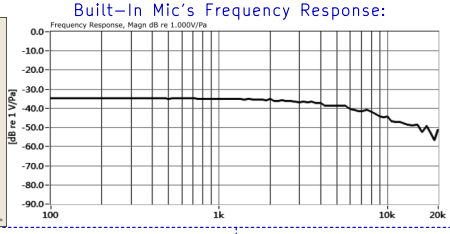
may add ~220uF cap
parallel to Zener

Vz=3.3V
Vf=0.9V

Built-In Speaker's Frequency Response:



Built-In Mic's Frequency Response:



SW Mute Mic:
MUTE_ADC=1

Ext-Mic enabled
MIC_SEL=LOW

Int-Mic enabled
MIC_SEL=LOW

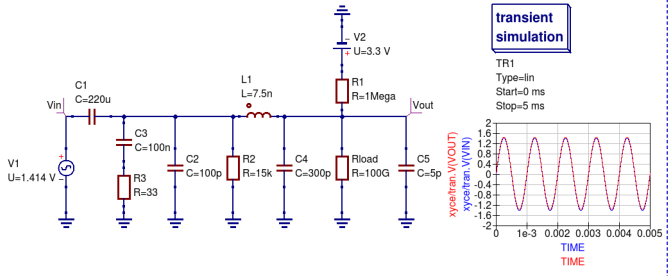
DPDT with
camera
5->4 = ON
5->6 = OFF

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 HP_DET @ 1kHz output
without HP jack inserted:



LCR Measurements:

Earbud Microphone:	Headset Speaker:	Earbud Speaker:
@1kHz	@1kHz	@1kHz
Ls = 3.844mH	Ls = 244.4uH	Ls = 25.2uH
Lp = 15.757H	Lp = 141.99mH	Lp = 311.0mH
Cs = 6.583uF	Cs = 103.6uF	Cs = 1.0mF
Cp = 1612.8pF	Cp = 178.77nF	Cp = 81.95nF
Rs = 1.5465kOhms	Rs = 36.860hms	Rs = 17.0300hms
Rp = 1.5478kOhms	Rp = 36.860hms	Rp = 17.0340hms
θ = −0.8deg	θ = −2.3deg	θ = 0.5deg

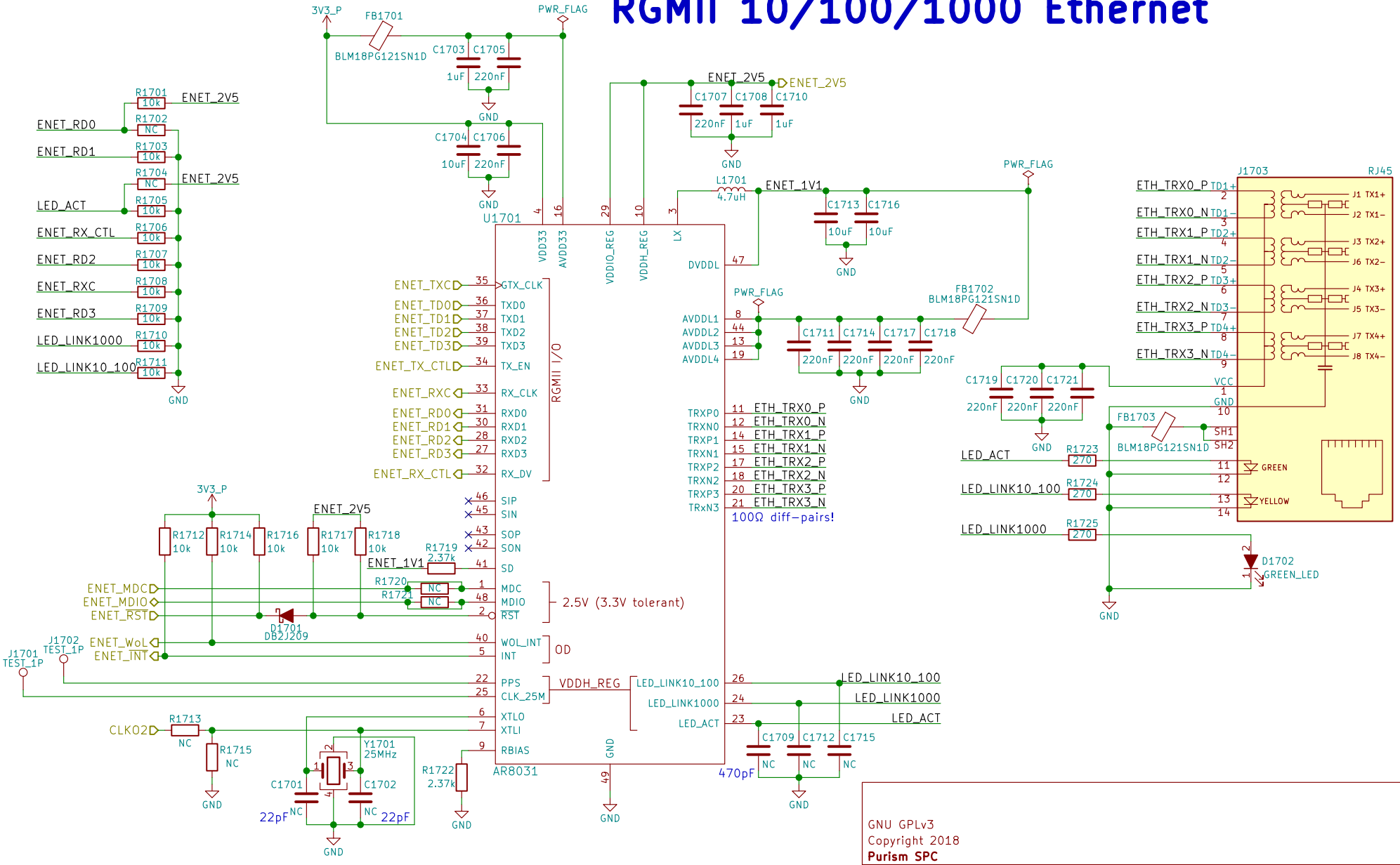
Purism SPC

Sheet: /Audio/
File: audio.sch

Title: Audio

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 16/24

RGMII 10/100/1000 Ethernet



GNU GPLv3
Copyright 2018
Purism SPC

Sheet: /Ethernet/
File: ethernet.sch

Title: Ethernet

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 17/24

Module: Table 23
Socket: Table 46

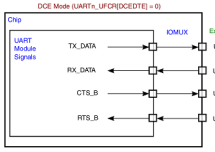
RS9116 NC:
RTS, CTS, BT_HOST_WAKE

RS9116 datasheet says
no WIFI_WAKE
but the schematic has it

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

6.2 M.2 Signal Directions

UARTn_UFCR[DCEDTE]=0 on POR



TX output
RX input
CTS output
RTS input

⇒TX→RX
RX←TX
CTS→CTS
RTS←RTS

AE1801 Antenna
J1801 MHF4
AE1802 Antenna
J1802 MHF4

J1803 M.2_Key_E

SoC's IN/OUT
M2_PCM_CLK
M2_PCM_SYNC
M2_PCM_IN
M2_PCM_OUT

USB_WLAN_DP
USB_WLAN_DN
WIFI_CLK
WIFI_CMD
WIFI_DATA0
WIFI_DATA1
WIFI_DATA2
WIFI_DATA3
WIFI_WAKE
BT_HOST_WAKE
BT_UART_RXD
SoC's RX
Module's TX
SoC's TX
Module's RX
BT_UART_TXD
BT_UART_RTS
BT_UART_CTS
i.MX8M in DCE mode (POR state)
has CTS output, RTS input

R1802 NC
JP1801 NC
R1801 100k
D1801 DB2J209
D1802 DB2J209
WIFI_RST
W_DISABLE1
VIH=2.31V

RedPine RS9116
has 100k pull-up to
3.3V making SDIO_RST
~2.55V when HIGH

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

RS9116 SUSCLK
is a GPIO (unused)
SUSCLK
R1803 10k
W_DISABLE2
W_DISABLE1
M2_I2C_SDA
M2_I2C_SCL

U1803A 74AUP2G08
U1803B 74AUP2G08
BT_DISABLE
WIFI_DISABLE
C1809 100nF
C1810 100nF
D1803 DB2J209
R1805 100k
R1807 100k
SW1801A WLAN_HKS
SW1801B WLAN_HKS
Open = ON
Closed = OFF

R1804 10k
R1806 10k
Q1801 2SK3018
Q1802 2SK3018
RS9116 is an I2C master
⇒its SCL is an output
(ok bc only device on I2C2)
I2C2_SDA
I2C2_SCL

U1801 NTB0104GU12
C1801 1uF
C1802 10nF
C1803 10nF
C1804 1uF
BT_UART_RXD
BT_UART_TXD
BT_UART_RTS
BT_UART_CTS
RS9116 does not
use RTX & CTS
internal 10k pull-up
RX, TX, RTS, CTS
of the SoC

U1802 NTB0104GU12
C1805 1uF
C1806 10nF
C1807 10nF
C1808 1uF
BCLK
M2_PCM_CLK
M2_PCM_SYNC
M2_PCM_IN
M2_PCM_OUT
BT_PCM_CLK
BT_PCM_SYNC
BT_PCM_IN
BT_PCM_OUT
configure as slave
IN, OUT
of the SoC

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

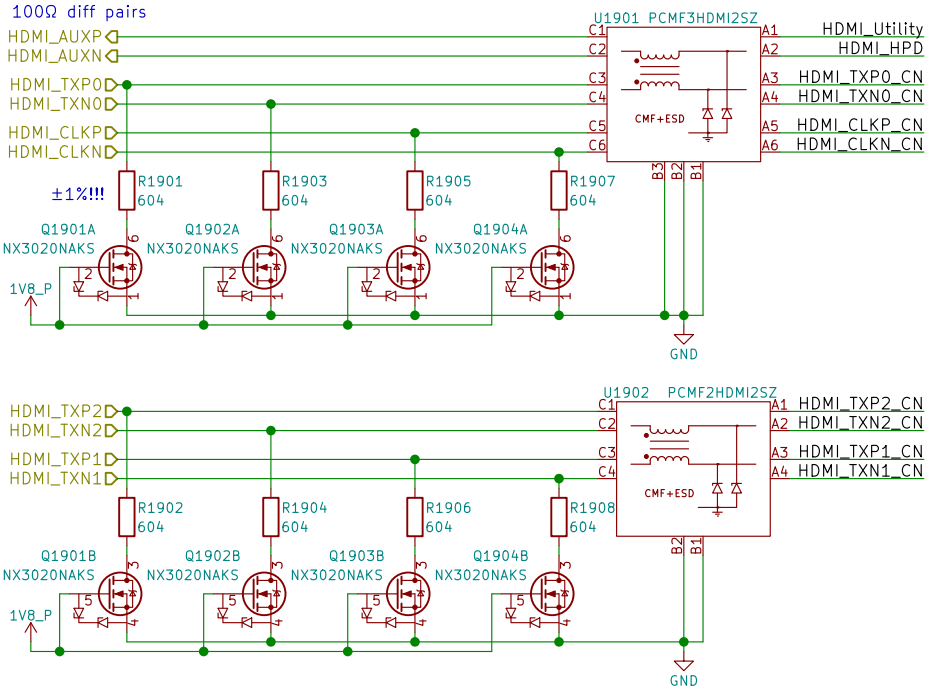
Title: WLAN+BT M.2

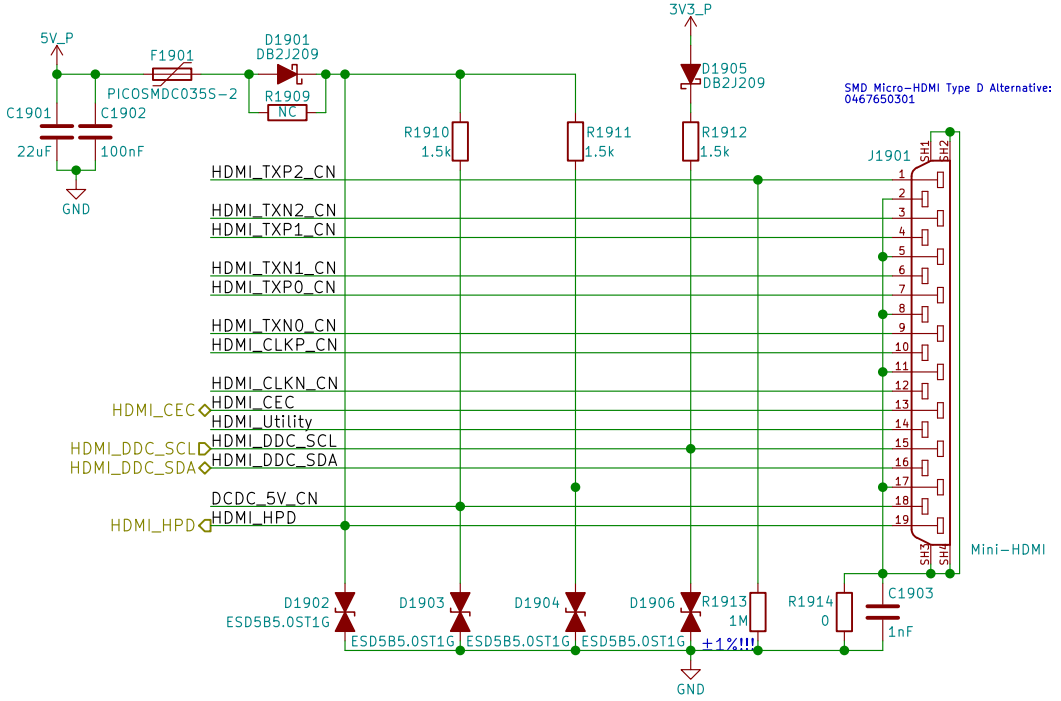
Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 18/24

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

100Ω diff pairs



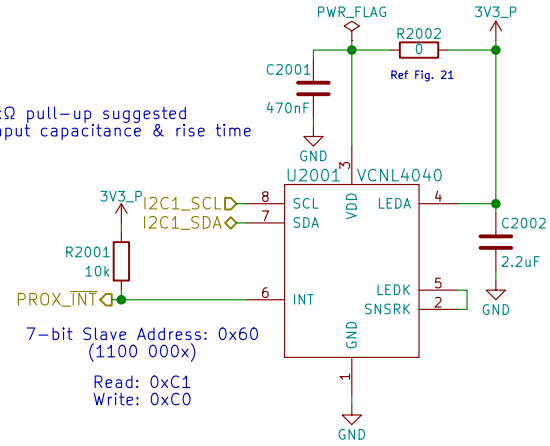


Sheet: /HDMI/
File: hdmi.sch

Title: HDMI

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 19/24

Proximity & Ambient Light



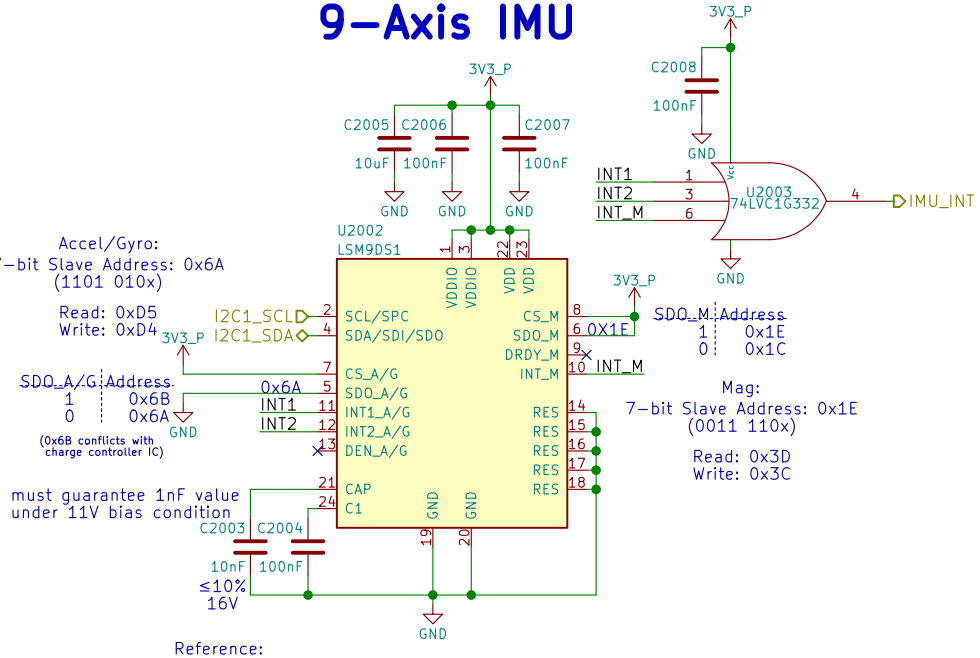
Note:
I2C 2.2kΩ pull-up suggested
check input capacitance & rise time

7-bit Slave Address: 0x60
(1100 000x)

Read: 0xC1
Write: 0xC0

Reference:
https://www.vishay.com/docs/84307/designingvcnl4040.pdf
http://www.vishay.com/docs/84931/vcnl4040sensorboardfiles.pdf

9-Axis IMU



Accel/Gyro:
7-bit Slave Address: 0x6A
(1101 010x)

Read: 0xD5
Write: 0xD4

SDO_A/G Address
1 0x6B
0 0x6A
(0x6B conflicts with charge controller IC)

must guarantee 1nF value
under 11V bias condition

SDO_M Address
1 0x1E
0 0x1C

Mag:
7-bit Slave Address: 0x1E
(0011 110x)

Read: 0x3D
Write: 0x3C

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

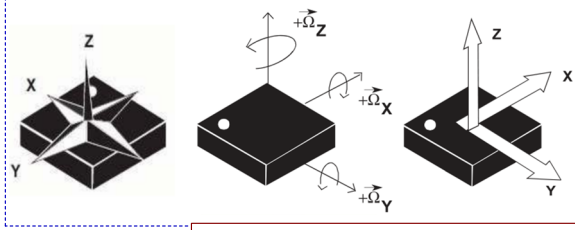


Table 19. Accelerometer and gyroscope SAD+Read/Write patterns

Command	SAD[6:1]	SAD[0] = SA0	R/W	SAD+R/W
Read	110101	0	1	11010101 (D5h)
Write	110101	0	0	11010100 (D4h)
Read	110101	1	1	11010111 (D7h)
Write	110101	1	0	11010110 (D6h)

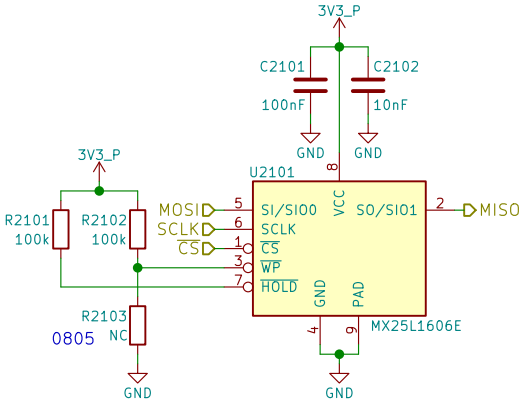
Table 20. Magnetic sensor SAD+Read/Write patterns

Command	SAD[6:2]	SAD[1] = SDO/SA1	SAD[0]	R/W	SAD+R/W
Read	00111	0	0	1	00111001 (39h)
Write	00111	0	0	0	00111000 (38h)
Read	00111	1	0	1	00111101 (3Dh)
Write	00111	1	0	0	00111100 (3Ch)

Sheet: /Sensors/
File: sensors.sch

Title: Sensors

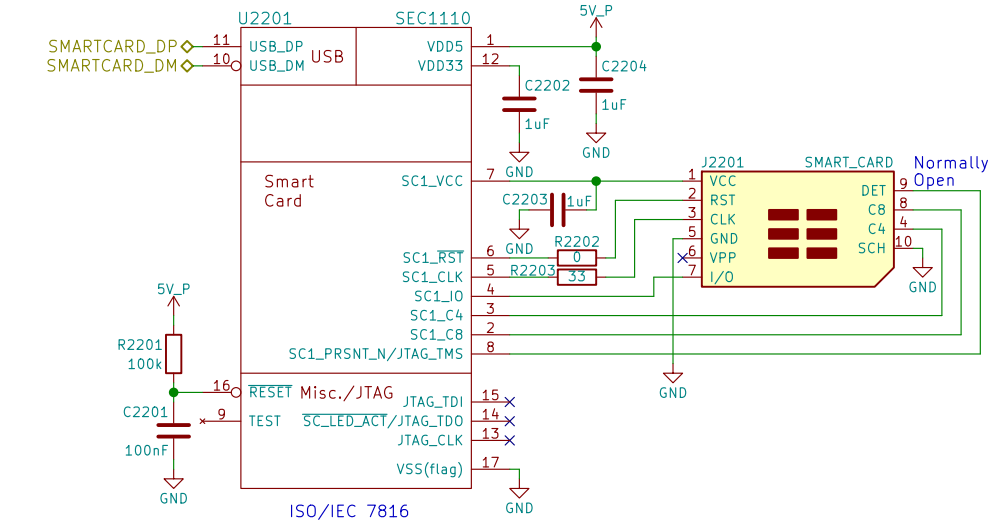
Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 20/24



Sheet: /SPI Flash/
File: flash.sch

Title: SPI NOR Flash

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 21/24

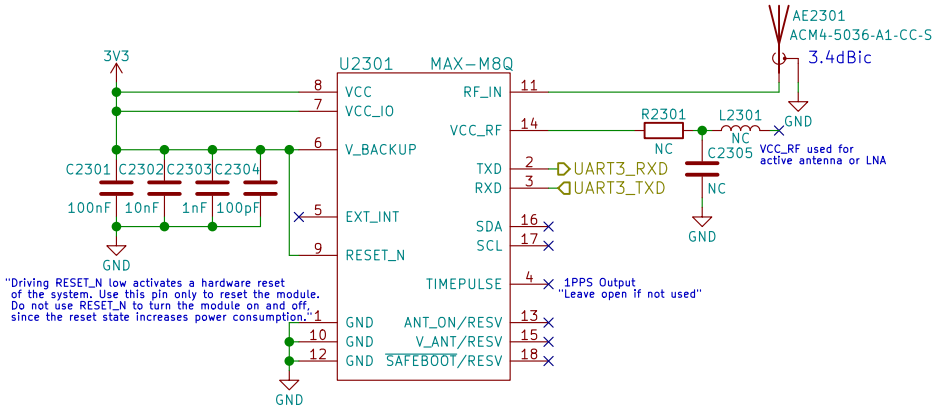


Reference:
http://www.microchip.com/DevelopmentTools/ProductDetails.aspx?PartNO=EVB-SEC1110

Sheet: /Smart Card/
File: smartcard.sch

Title: Smart Card

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 22/24



Reference:
https://www.u-blox.com/sites/default/files/MAX-8-M8-FW3_HardwareIntegrationManual_%28UBX-15030059%29.pdf

Sheet: /GNSS/
File: gnss.sch

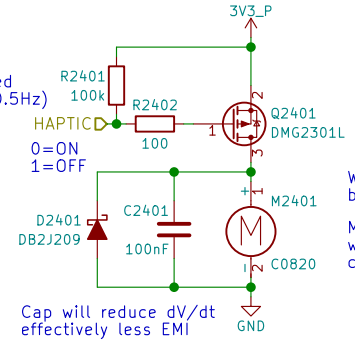
Title: GNSS

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 23/24

PWM pins occupied:
GPIO1_IO01 – LCD Backlight
GPIO1_IO13 – LED
GPIO1_IO14 – Ethernet (CLKO_25MHz)
GPIO1_IO15 – 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)!

Cap will reduce dV/dt
effectively less EMI

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

Sheet: /Haptic Motor/
File: haptic.sch

Title: Haptic/Vibration Motor

Size: A4	Date: 2018-06-01	**Rev: v0.1.0**
KiCad E.D.A. kicad 4.0.7		Id: 24/24