CM5 CONNECTORS

Flashlight

File: flashlight.kicad_sch

Image credit to DigiKey

Vibration

File: vibration.kicad_sch

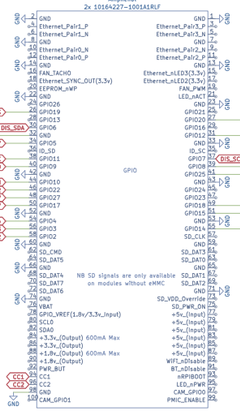
Image credit to DigiKey

Buttons

File: buttons.kicad_sch

Image credit to DigiKey

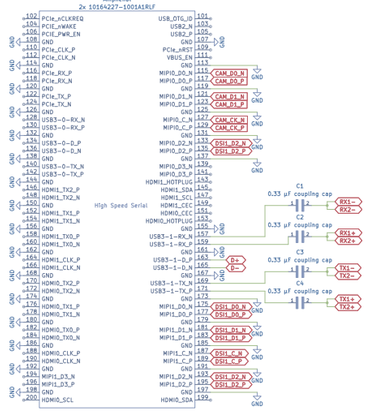
Module1A
ComputeModule5-CM5
Amphenol
2x 10164227-1001A1RLF



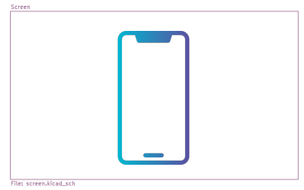
check I2c connections od codec and display perhaps use mipi

Don't forget to check against the official RPI IO board!!!

Module1B
ComputeModule5-CM5
Amphenol
2x 10164227-1001A1RLF



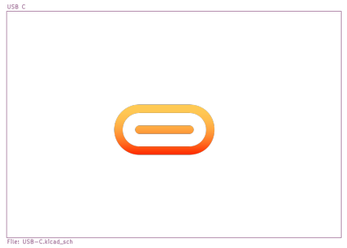
Screen



Files: screen.kicad_sch

Icon by lalawidi from Flaticon

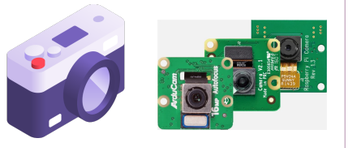
USB C



File: USB-C.kicad_sch

Icon by zkuJcon from Flaticon

Camera



File: camera.kicad_sch

Icon by Freepik from Flaticon

Image credit to Arducam

Fingerprint

File: fingerprint.kicad_sch

Icon by Mealcon from Flaticon

PWR_FLAG
VCC
VCC
VCC
#SV01
#3.3V01
#1.8V01
GND

Other

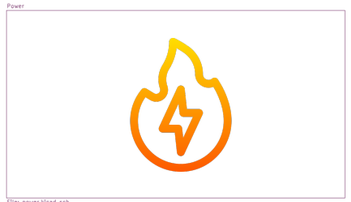
make sure the connector is in the
correct position relative to the screen (like in case of the camera).
Also make sure the cable doesn't have to bend to much

R1
thermistor (Not important, Remove if not enough gpio to use it.)

these pins need to be
connected to any remaining
GPIO. they are not super important

JACK-IN
CAM_IO0

Power



File: power.kicad_sch

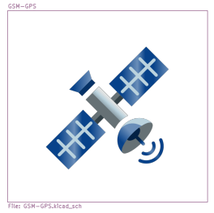
Icon by Freepik from Flaticon

Audio

File: audio.kicad_sc.kicad_sch

Icon by Freepik from Flaticon

GSM-GPS



File: GSM-GPS.kicad_sch

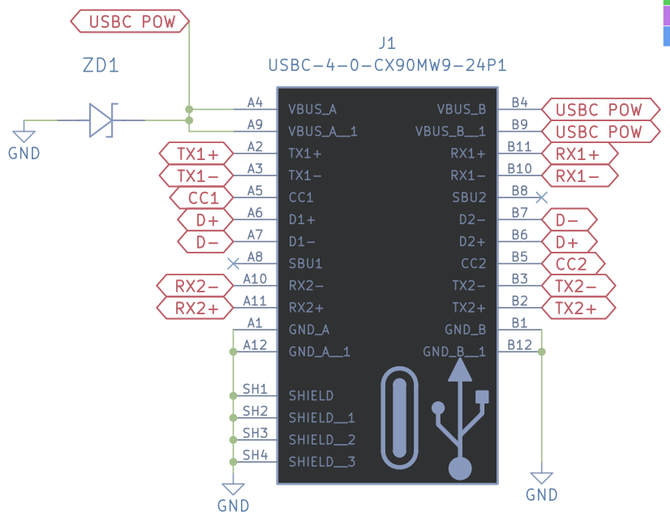
Icon by Wendy-G from Flaticon

V-Electronics	
Sheet: /	
File: cm5-carrier.kicad_sch	
Title: SPIRIT-carrier-board	
Size: A1	Date: 2024-08-16
KiCad E.D.A. 9.0.0	Rev: 1
	Id: 1/11

USB C 3.2→4.0

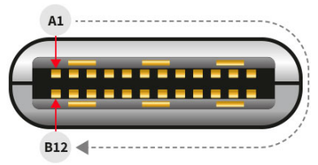
(Iphone 16 uses 2.0 XD)

resistors are not needed in case of the CC pins because the cm5 already takes care of the negotiation/role assignment

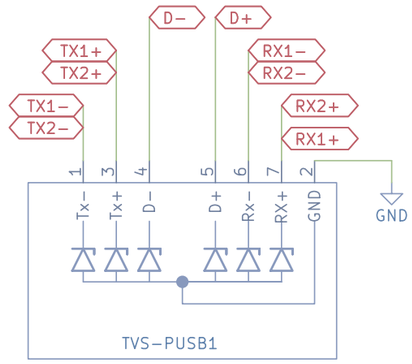


A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
GND	TX1+	TX1-	VBUS	CC1	D+	D-	SBU1	VBUS	RX2-	RX2+	GND
GND	RX1+	RX1-	VBUS	SBU2	D-	D+	CC2	VBUS	TX2-	TX2+	GND
B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1

- Mass (ground)
- High speed data path (1)
- High speed data path (2)
- Power supply
- Pins to recognize the side of the male
- Overvoltage protection
- USB 2.0



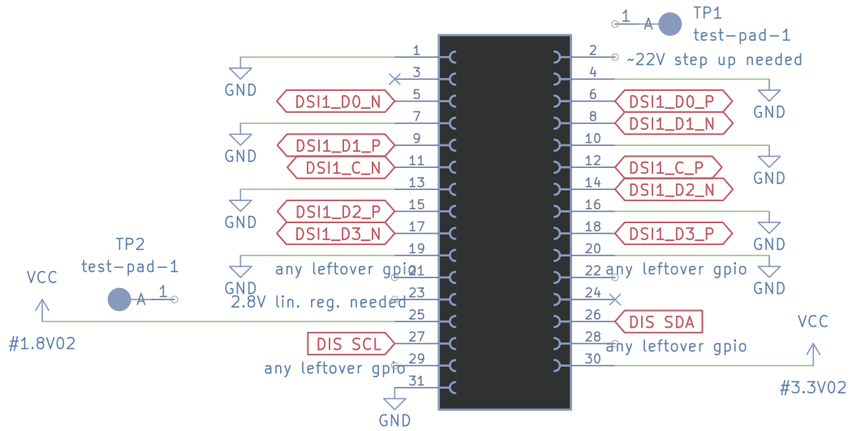
USB C protection:



Sheet: /USB C/ File: USB-C.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 2/11

Screen

DIS1

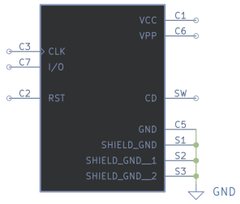


Sheet: /Screen/ File: screen.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 3/11

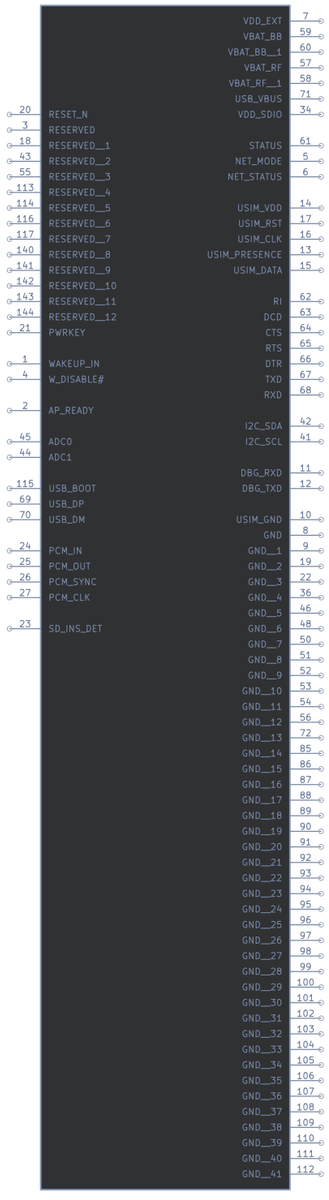
GSM & GPS

Take care when choosing variants for different continents

J2
SIM-G85D1160022HHR



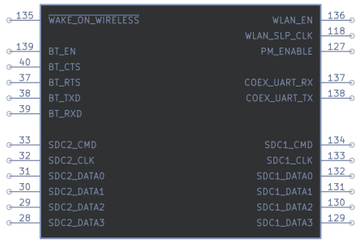
U2A
EG25GGC-128-SGNS



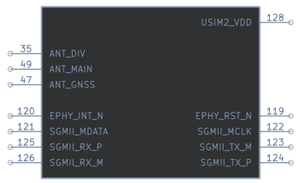
need to be careful if 128 and 256 symbols and footprints are identical

TODO rename them and double check

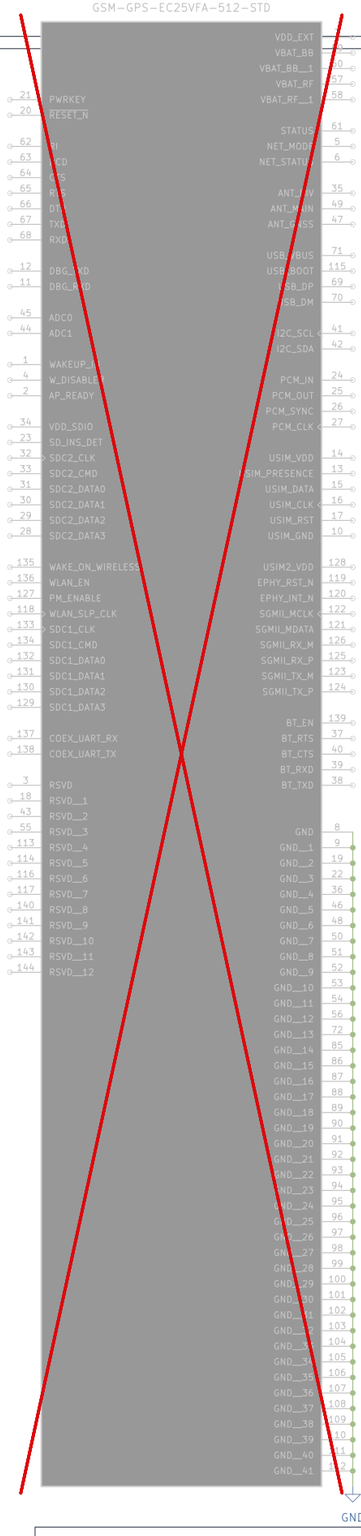
U2B
EG25GGC-128-SGNS



U2C
EG25GGC-128-SGNS



U1
GSM-GPS-EC25VFA-512-STD

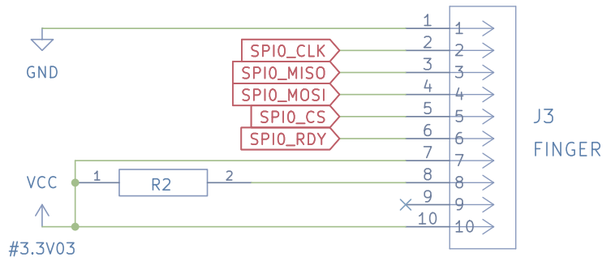


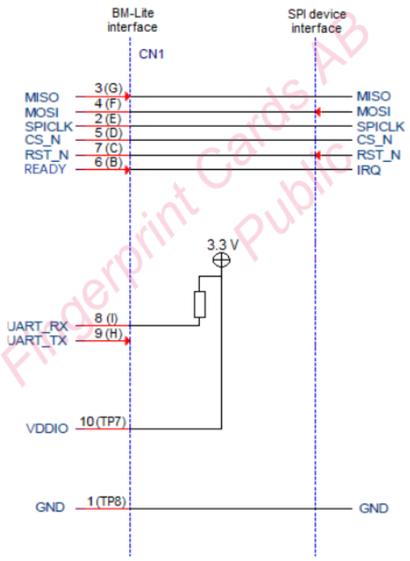
is it ok to connet all of these pins to the same GND?

GND

Sheet: /GSM-GPS/		
File: GSM-GPS.kicad_sch		
Title:		
Size: A3	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 4/11

Fingerprint





- **SPI0 (primary SPI bus):**
  - **MOSI (Master Out Slave In)** → GPIO 10 (physical pin 19)
  - **MISO (Master In Slave Out)** → GPIO 9 (physical pin 21)
  - **SCLK (Clock)** → GPIO 11 (physical pin 23)
  - **CE0 (Chip Select 0)** → GPIO 8 (physical pin 24)
  - **CE1 (Chip Select 1)** → GPIO 7 (physical pin 26) pinout.xyz
- **SPI1 (alternate SPI bus):**
  - **MOSI** → GPIO 20 (physical pin 38)
  - **MISO** → GPIO 19 (physical pin 35)
  - **SCLK** → GPIO 21 (physical pin 40)
  - **CE0** → GPIO 18 (physical pin 12)
  - **CE1** → GPIO 17 (physical pin 11) (and CE2 on GPIO 16/pin 36) pinout.xyz

Sheet: /Fingerprint/ File: fingerprint.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 5/11

Audio

35mm Jack should be ESD protected
come back to this task when USB 3.0 implemented

#3.3V04 VCC
#1.8V03 VCC
#3.3V05 VCC
#5V02 VCC

MIC NOTES

doesn't require codec,
communicates directly over I2S

uses 3.3V (5V max)

clock should be <1kHz to enter sleep mode

Figure 8 shows how two I2S Microphones can be connected on a single I2S bus. R41–R44 are included to dampen or terminate their respective traces. If the traces are electrically long then they should be controlled impedance traces with impedance in the 50–120 Ohm range. Traces are considered electrically long when the length of the trace (in inches) is greater than 2 times the rise/fall time (in nS). Even if the traces are not electrically long, R41–R44 can be used as dampening resistors (27–51 Ohms) to improve signal integrity by reducing overshoots and ringing caused by stray inductance and capacitance. In either case, R41–R44 are to be placed as close as possible to the device that drives the trace (signal source). The decoupling capacitors (C32–33, and C34–35) are most effective if the trace inductance between the capacitor and microphone is minimized. This can be accomplished by using short, wide traces. If a ground plane is used under the microphone, then connect the capacitor ground pads directly to the plane with vias without any trace used.

UNFINISHED, ADD CAPS AND RES

GND

#3.3V06
VCC

U3
CODEC–TLV320AIC3204IRHBR

24	AVDD		
29	DVDD		
26	LDOIN/HPVDD		
6	IOVDD		
30	LDO_SELECT	MICBIAS	19
31	RESET	REF	18
12	SPI_SELECT		
9	SCL/SS	DOUT/MFP2	5
10	SDA/MOSI	DIN/MFP1	4
11	MISO/MFP4		
8	SCLK/MFP3	MCLK	1
		BCLK	2
32	GPIO/MFP5	WCLK	3
13	IN1_L	HPL	25
15	IN2_L	LOL	22
20	IN3_L		
14	IN1_R	LOR	23
16	IN2_R	HPR	27
21	IN3_R		
		EP	33
		AVSS	17
		DVSS	28
		IOVSS	7

AUDIO_SCL
AUDIO_SDA
AUDIO_MCLK
AUDIO_BCLK_I2S
AUDIO_WCLK_I2S

GND

MK1
microphone

3	GND		
6	DATA_OUT	BCLK	4
		SELECT	2
		WS	1
5	VDD		

AUDIO_MIC_DATA
MIC–SWITCH
AUDIO_BCLK_I2S
AUDIO_WCLK_I2S
left channel selected

R3
100K–0805–resistor–ERA6AEB104V

C5
200–pf–CC0603KRX7R7BB104

C6
01–uf–CC0603KRX7R7BB104

GND

J4
SJ2–35894B–SMT–TR

1	
4	
3	
10	JACK–IN
2	

connect to any remaining gpio, non critical imo –ve

LS1
CMR–15062S–67
LEFT

LS2
CMR–15062S–67
RIGHT

careful with the I2S protocol and look at the datasheet if implementing stereo mics (2 units)

Sheet: /Audio/
File: audio.kicad_sc.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 6/11

Power

Rails:

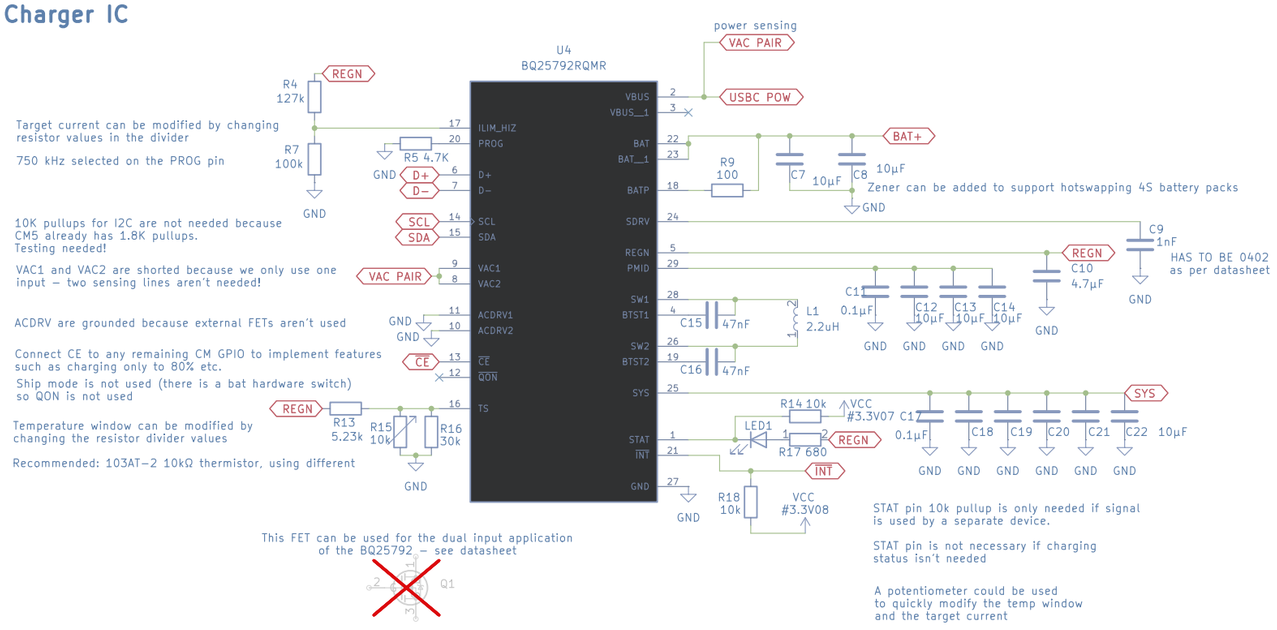
1x 22V
1x 5V
2x 3.3
1x 1.8

Total max current: 10.6A

CM5 SHOULD NOT BE CONNECTED DIRECLTY TO USBC POW!!!!
REMEMBER to implement UVLO !!!

DOUBLE CHECK ALL INDUCTOR VALUES CHOSEN
MAKE POWER BUDGET!!!
ADD TEST PADS!!!

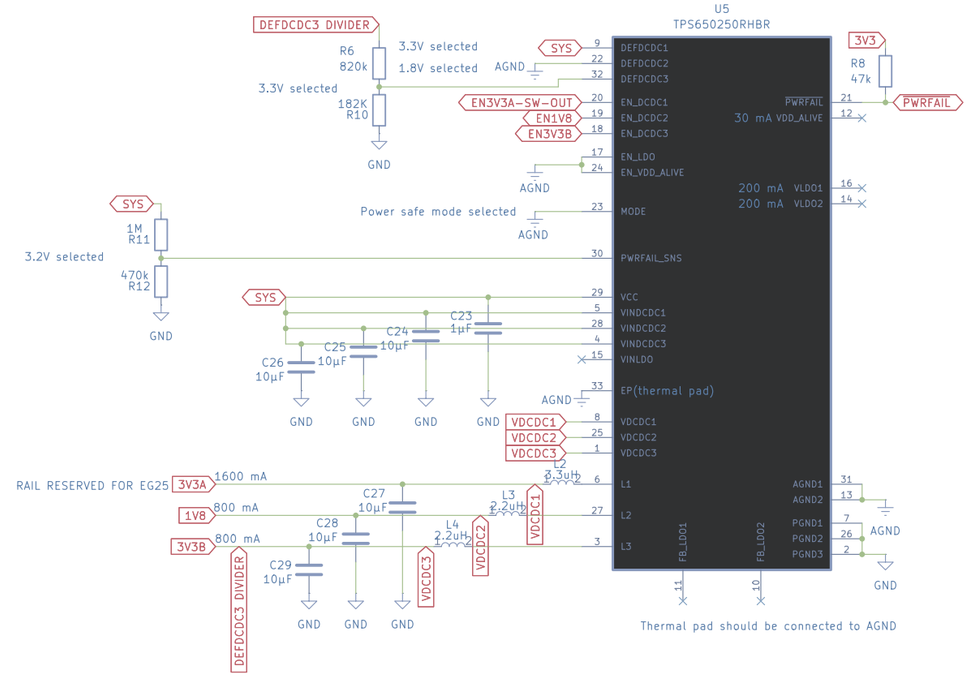
Charger IC



1V8 RAIL
2x 3V3 RAIL

LDOs are not in use currently

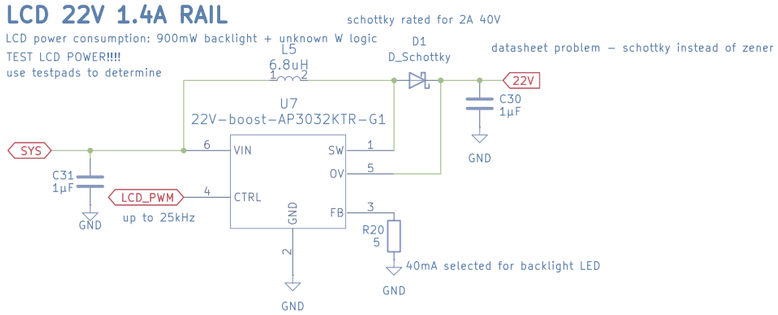
TODO PWRFAIL should be used to switch a master transistor to disconnect the battery



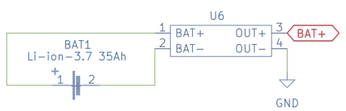
https://en.wikipedia.org/wiki/Ripple_(electrical)

LCD 22V 1.4A RAIL

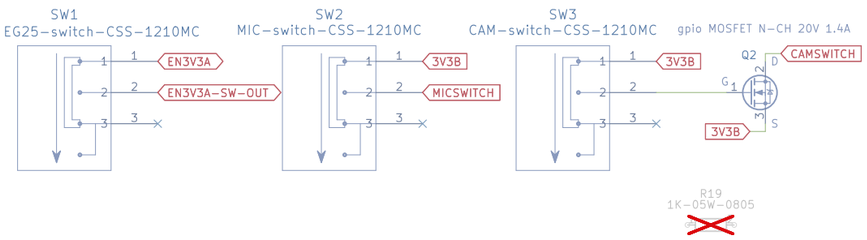
LCD power consumption: 900mW backlight + unknown W logic
TEST LCD POWER!!!!
use testpads to determine



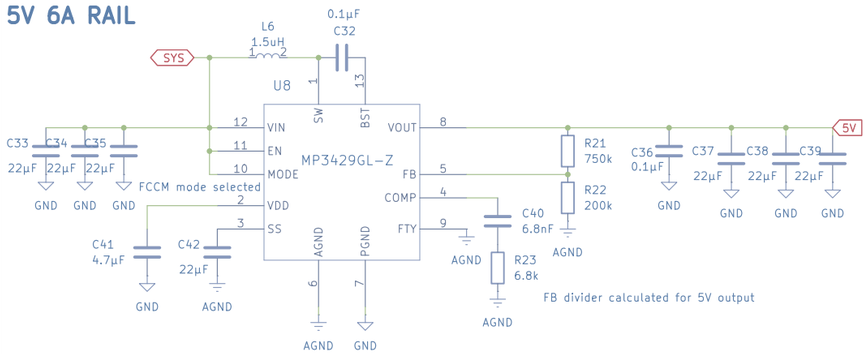
Battery connector



Privacy switches



5V 6A RAIL



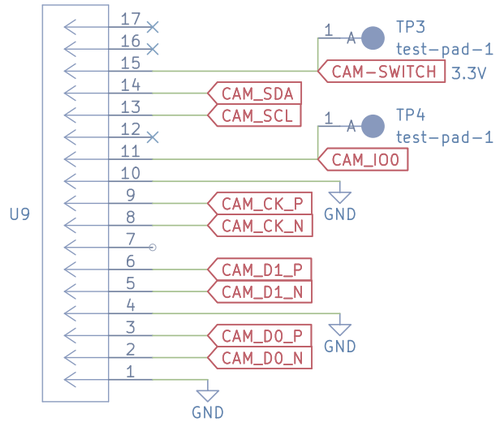
Place the transistors and other heat sensitive components on the back of the pcb so they can be heatsinked to the chasses aluminium

add DEMORKPISSY on PCB silkscreen

Sheet: /Power/		
File: power.kicad_sch		
Title:		
Size: A3	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 7/11

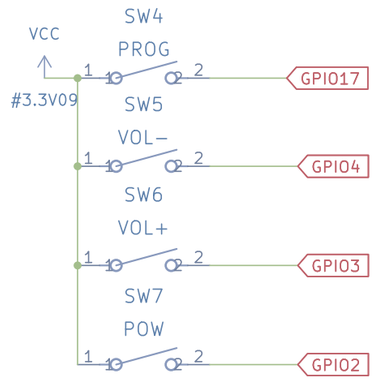
Camera

FPC15pin-1mm-pitch-F52Q-1A7H1-11015



Sheet: /Camera/ File: camera.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 8/11

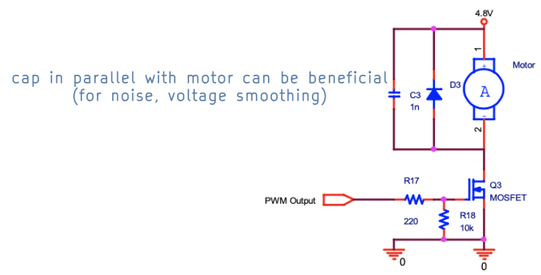
BUTTONS

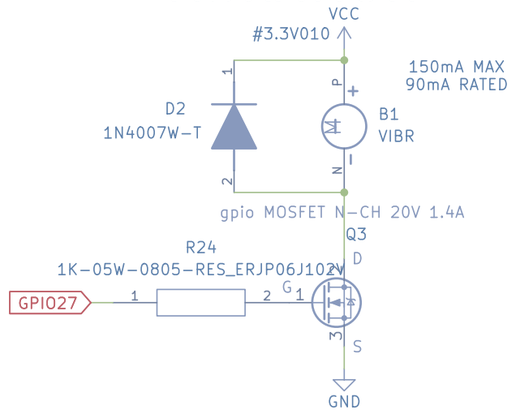


one GPIO can be used for all buttons, just use different value resistors for each button

Sheet: /Buttons/ File: buttons.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 9/11

VIBRATION





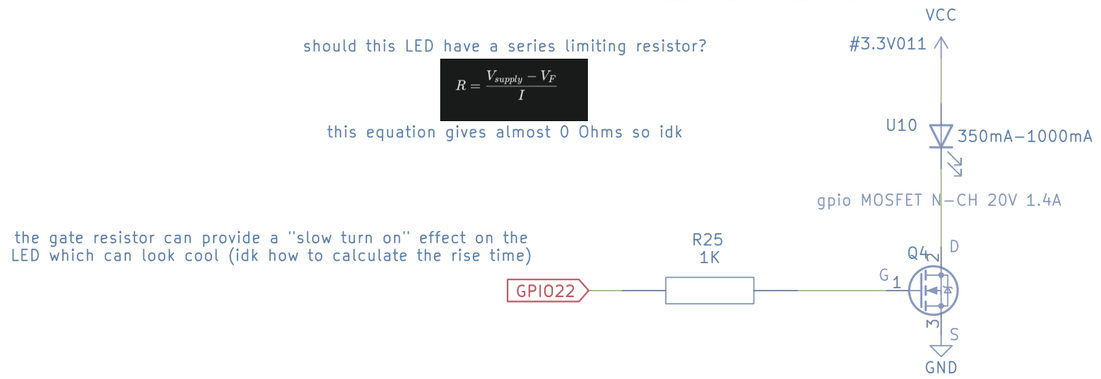
Sheet: /Vibration/ File: vibration.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 10/11

FLASHLIGHT

should this LED have a series limiting resistor?

$$R = \frac{V_{supply} - V_F}{I}$$

this equation gives almost 0 Ohms so idk



Sheet: /Flashlight/ File: flashlight.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.0		Id: 11/11