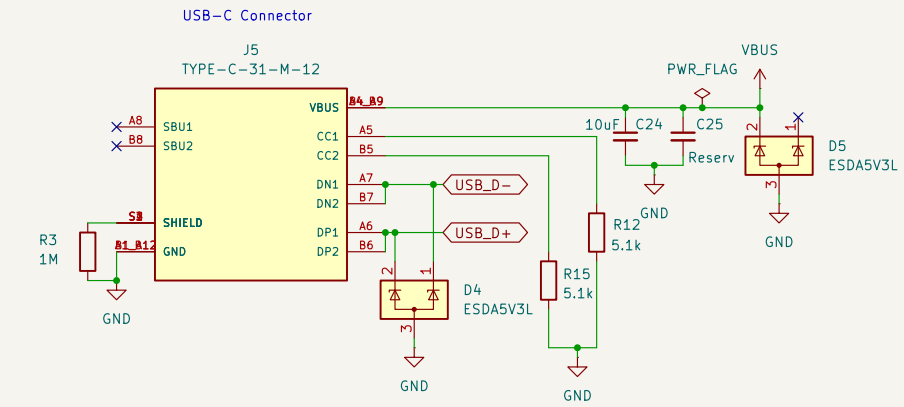
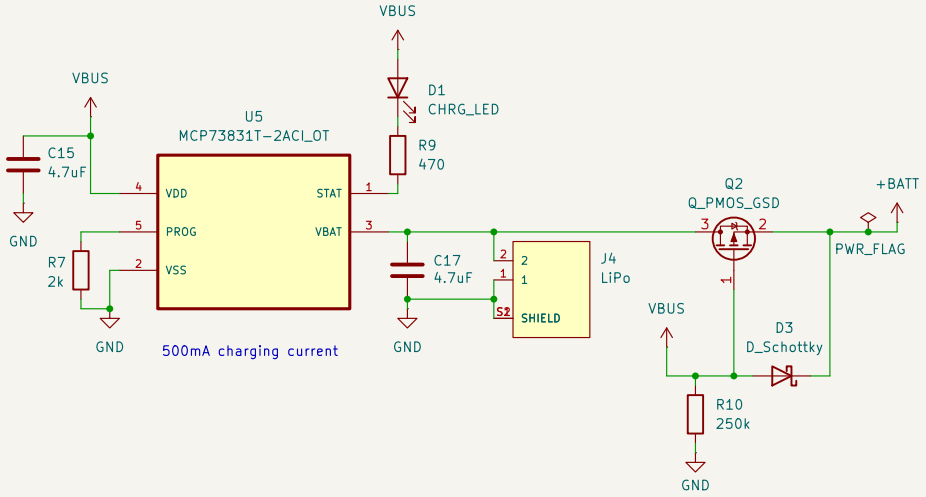
Mad Bot Schematics Tree

Power

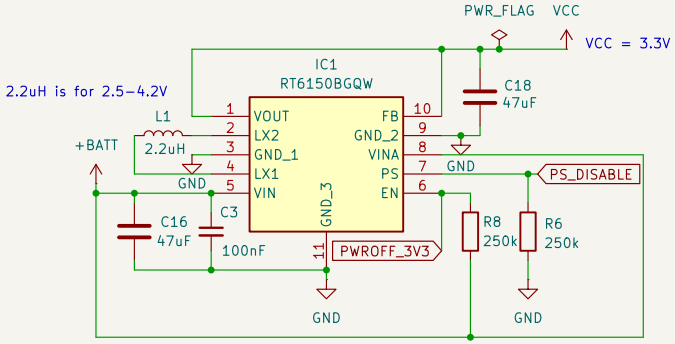


https://electronics.stackexchange.com/questions/644680/is-this-usb-circuit-with-esd-done-correctly

+BATT could be coming from battery or USB 5V



Buck-Boost 3.3V Regulator



Imax = 800mA
Input Voltage Range: 1.8V to 5.5V

Referenced: https://datasheets.raspberrypi.com/pico/pico-datasheet.pdf
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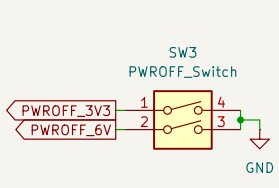
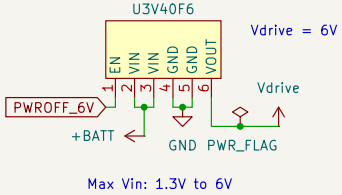
To ensure stability and excellent transient response, it is recommended to use a minimum of 10µF/X7R/1206 capacitors at the output. For surface mount applications, Taiyo Yuden or TDK ceramic capacitors, X7R series Multilayer Ceramic Capacitor is recommended. At least a 10µF input capacitor is recommended to improve transient behavior of the regulator and EMI behavior of the total power supply circuit. A ceramic capacitor placed as close as possible to the VIN and GND pins of the IC is recommended.

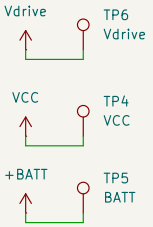


Boost 6V Regulator

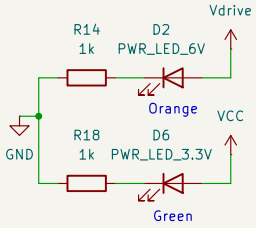


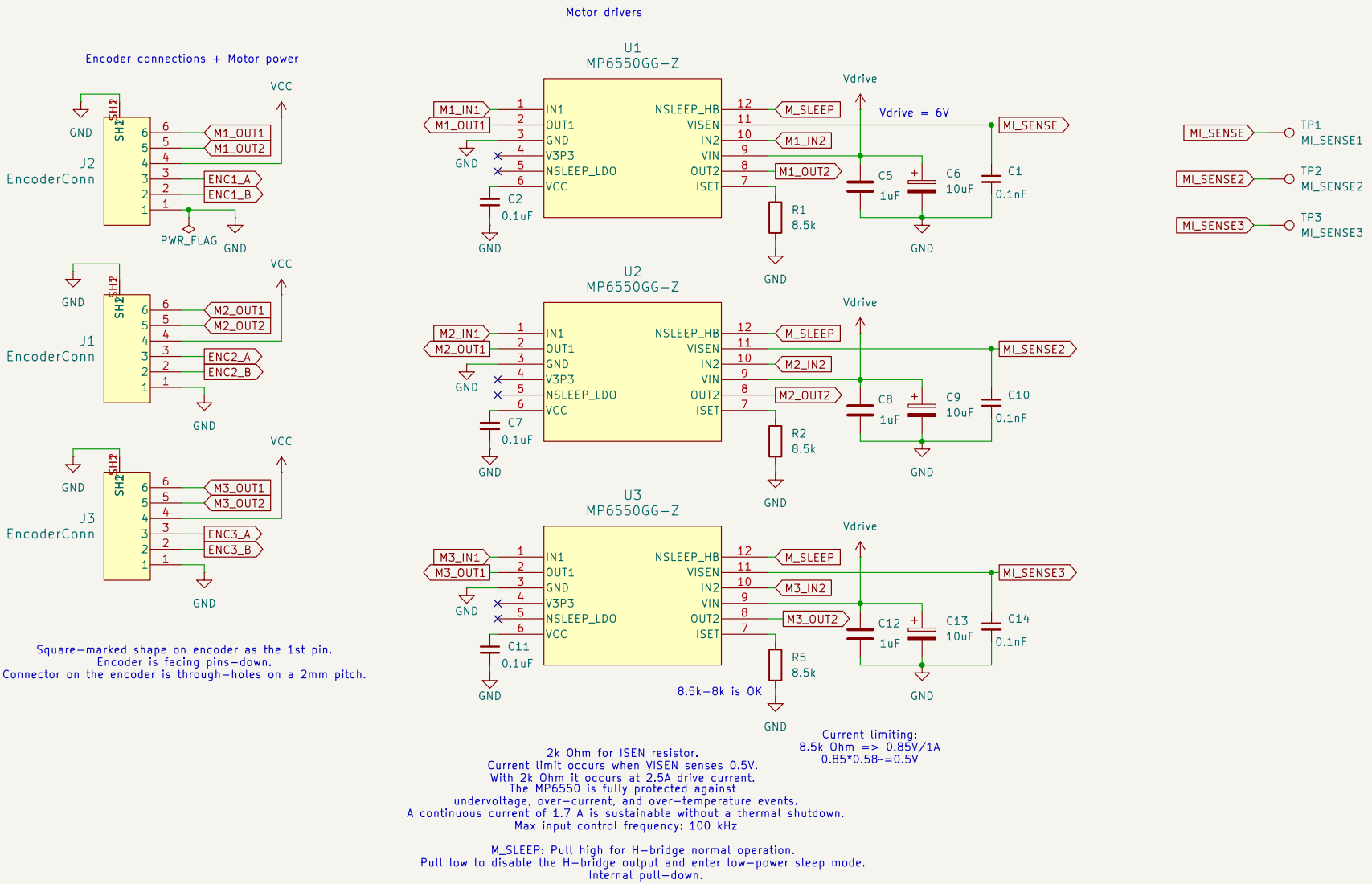
Max Vin: 1.3V to 6V

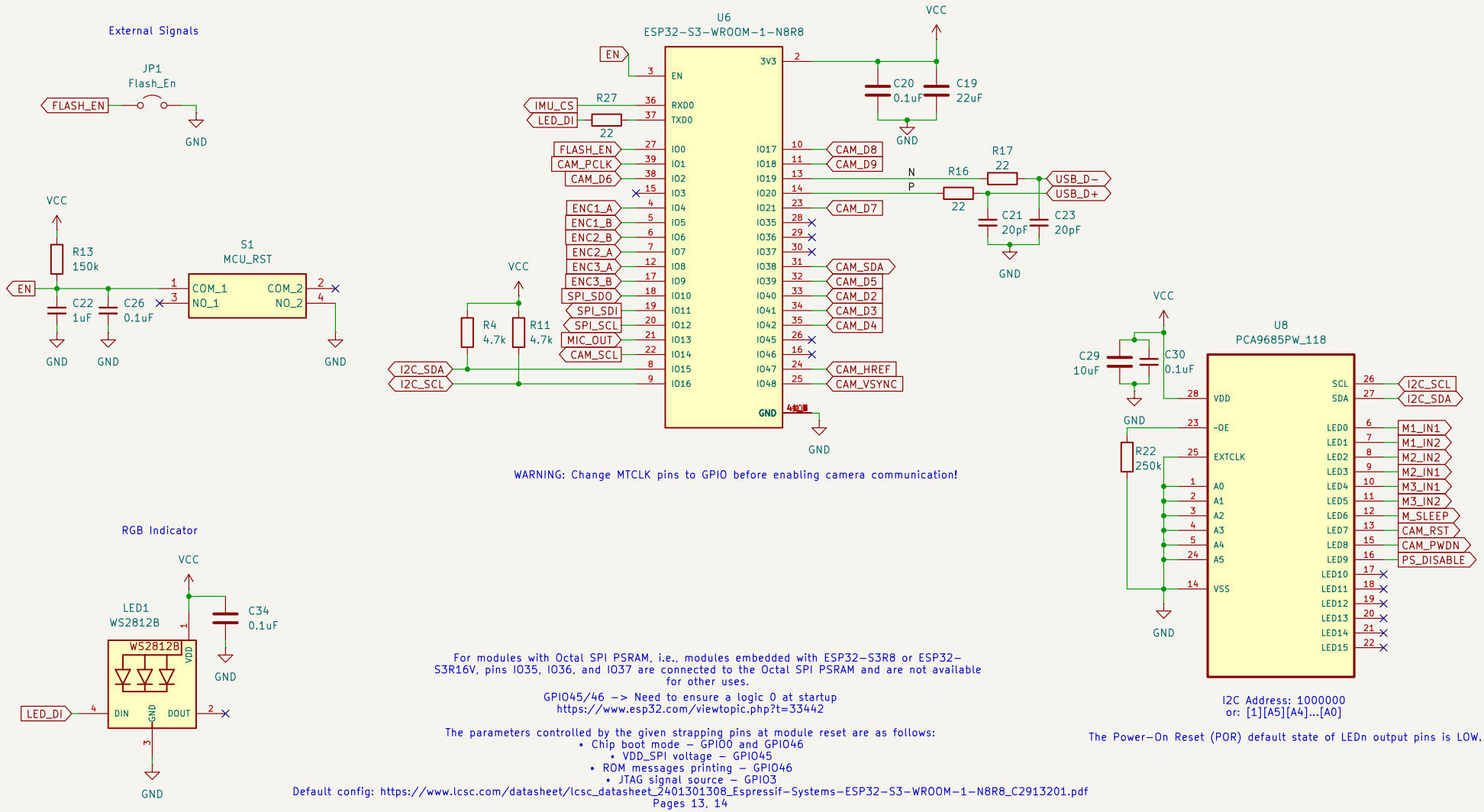
Testpoints

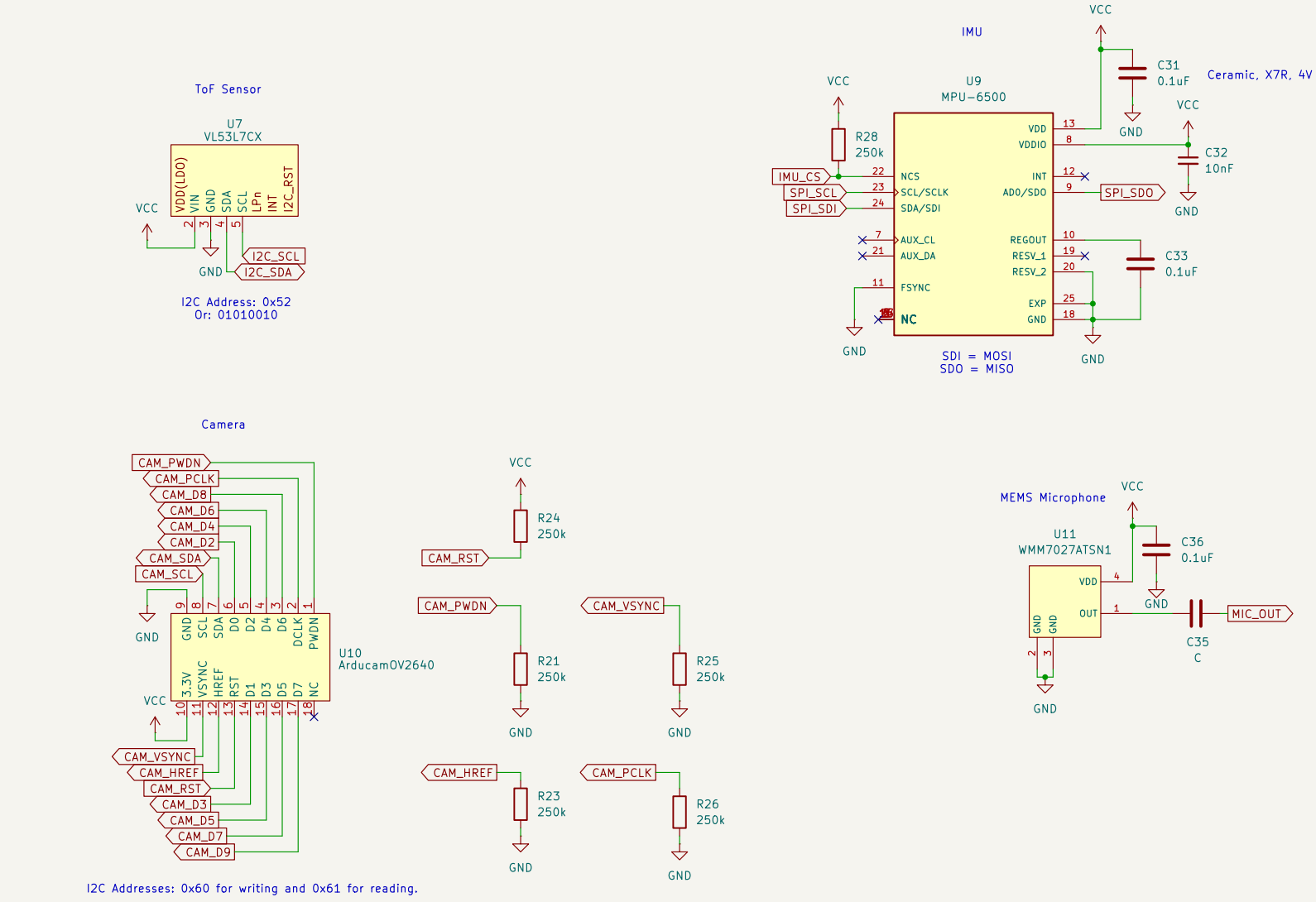


Power indicators




Encoder connections + Motor power
J2
EncoderConn
J1
EncoderConn
J3
EncoderConn
SH2
GND
VCC
M1_OUT1
M1_OUT2
ENC1_A
ENC1_B
PWR_FLAG
M2_OUT1
M2_OUT2
ENC2_A
ENC2_B
M3_OUT1
M3_OUT2
ENC3_A
ENC3_B
Square-marked shape on encoder as the 1st pin.
Encoder is facing pins-down.
Connector on the encoder is through-holes on a 2mm pitch.
Motor drivers
U1
MP6550GG-Z
U2
MP6550GG-Z
U3
MP6550GG-Z
IN1
OUT1
GND
V3P3
NSLEEP_LDO
VCC
NSLEEP_HB
VISEN
IN2
VIN
OUT2
ISET
M_SLEEP
Vdrive
Vdrive = 6V
MI_SENSE
MI_SENSE2
MI_SENSE3
C1
C2
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
0.1uF
1uF
10uF
R1
R2
R5
8.5k
8.5k-8k is OK
TP1
MI_SENSE1
TP2
MI_SENSE2
TP3
MI_SENSE3
Current limiting:
8.5k Ohm => 0.85V/1A
0.85*0.58-=0.5V
2k Ohm for ISEN resistor.
Current limit occurs when VISEN senses 0.5V.
With 2k Ohm it occurs at 2.5A drive current.
The MP6550 is fully protected against
undervoltage, over-current, and over-temperature events.
A continuous current of 1.7 A is sustainable without a thermal shutdown.
Max input control frequency: 100 kHz
M_SLEEP: Pull high for H-bridge normal operation.
Pull low to disable the H-bridge output and enter low-power sleep mode.
Internal pull-down.


External Signals
JP1
Flash_En
FLASH_EN
GND
VCC
R13
150k
EN
C22
1uF
C26
0.1uF
S1
MCU_RST
COM_1
NO_1
COM_2
NO_2
GND
GND
GND
U6
ESP32-S3-WROOM-1-N8R8
EN
3V3
C20
0.1uF
C19
22uF
GND
IMU_CS
LED_DI
R27
22
RXD0
TXD0
FLASH_EN
CAM_PCLK
CAM_D6
ENC1_A
ENC1_B
ENC2_B
ENC2_A
ENC3_A
ENC3_B
SPI_SDO
SPI_SDI
SPI_SCL
MIC_OUT
CAM_SCL
IO0
IO1
IO2
IO3
IO4
IO5
IO6
IO7
IO8
IO9
IO10
IO11
IO12
IO13
IO14
IO15
IO16
IO17
IO18
IO19
IO20
IO21
IO35
IO36
IO37
IO38
IO39
IO40
IO41
IO42
IO45
IO46
IO47
IO48
CAM_D8
CAM_D9
CAM_D7
CAM_SDA
CAM_D5
CAM_D2
CAM_D3
CAM_D4
CAM_HREF
CAM_VSYNC
GND
N
P
R16
22
R17
22
USB_D-
USB_D+
C21
20pF
C23
20pF
GND
VCC
R4
4.7k
R11
4.7k
I2C_SDA
I2C_SCL
WARNING: Change MTCLK pins to GPIO before enabling camera communication!
VCC
C29
10uF
C30
0.1uF
U8
PCA9685PW_118
GND
R22
250k
VDD
~OE
EXTCLK
A0
A1
A2
A3
A4
A5
VSS
SCL
SDA
LED0
LED1
LED2
LED3
LED4
LED5
LED6
LED7
LED8
LED9
LED10
LED11
LED12
LED13
LED14
LED15
I2C_SCL
I2C_SDA
M1_IN1
M1_IN2
M2_IN2
M2_IN1
M3_IN1
M3_IN2
M_SLEEP
CAM_RST
CAM_PWDN
PS_DISABLE
GND
I2C Address: 1000000
or: [1][A5][A4]...[A0]
The Power-On Reset (POR) default state of LEDn output pins is LOW.
RGB Indicator
VCC
LED1
WS2812B
C34
0.1uF
WS2812B
VDD
GND
LED_DI
DIN
GND
DOUT
GND
For modules with Octal SPI PSRAM, i.e., modules embedded with ESP32-S3R8 or ESP32-S3R16V, pins IO35, IO36, and IO37 are connected to the Octal SPI PSRAM and are not available for other uses.
GPIO45/46 -> Need to ensure a logic 0 at startup
https://www.esp32.com/viewtopic.php?t=33442
The parameters controlled by the given strapping pins at module reset are as follows:
• Chip boot mode – GPIO0 and GPIO46
• VDD_SPI voltage – GPIO45
• ROM messages printing – GPIO46
• JTAG signal source – GPIO3
Default config: https://www.lcsc.com/datasheet/lcsc_datasheet_2401301308_Espressif-Systems-ESP32-S3-WROOM-1-N8R8_C2913201.pdf
Pages 13, 14
on using UART0 as a normal peripheral
it can be reconfigured to act as other peripherals
https://www.esp32.com/viewtopic.php?t=38137
TODO:
check schematics
go through schematic checklist: https://docs.espressif.com/projects/esp-hardware-design-guidelines/en/latest/esp32s3/esp-hardware-design-guidelines-en-master-esp32s3.pdf


ToF Sensor
U7
VL53L7CX
VDD(LDO)
VIN
GND
SDA
SCL
LPn
INT
I2C_RST
VCC
GND
I2C_SCL
I2C_SDA
I2C Address: 0x52
Or: 01010010
IMU
U9
MPU-6500
VCC
R28
250k
IMU_CS
SPI_SCL
SPI_SDI
NCS
SCL/SCLK
SDA/SDI
AUX_CL
AUX_DA
FSYNC
NC
VDD
VDDIO
INT
AD0/SDO
REGOUT
RESV_1
RESV_2
EXP
GND
C31
0.1uF
Ceramic, X7R, 4V
C32
10nF
SPI_SDO
C33
0.1uF
SDI = MOSI
SDO = MISO
Camera
CAM_PWDN
CAM_PCLK
CAM_D8
CAM_D6
CAM_D4
CAM_D2
CAM_SDA
CAM_SCL
U10
ArducamOV2640
GND
SCL
SDA
D0
D2
D4
D6
DCLK
PWDN
3.3V
VSYNC
HREF
RST
D1
D3
D5
D7
NC
CAM_VSYNC
CAM_HREF
CAM_RST
CAM_D3
CAM_D5
CAM_D7
CAM_D9
R24
250k
R21
250k
R25
250k
R23
250k
R26
250k
I2C Addresses: 0x60 for writing and 0x61 for reading.
MEMS Microphone
U11
WMM7027ATSN1
VDD
OUT
C36
0.1uF
C35
C
MIC_OUT
TODO: see if any extra pins like interrupts can be connected to gpio expander
check SPI circuit
check I2C circuit