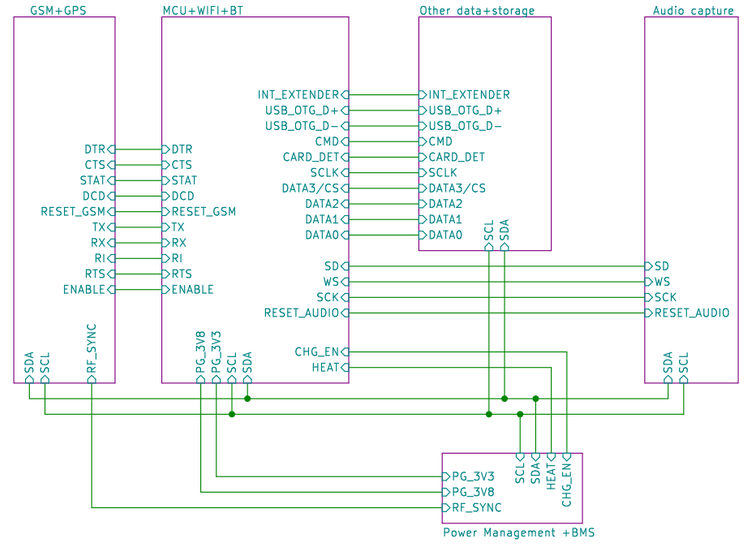
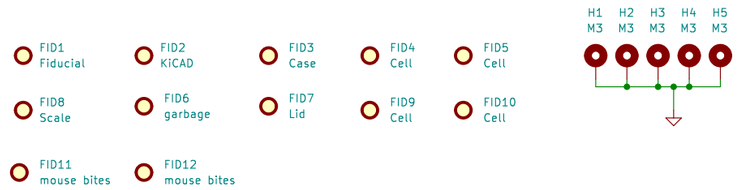
All SMD caps ceramic are 0603 16V X7R or better unless other notes are made
All SMD resistors are 0603
Stack up:
4 layer FR4 sig gnd gnd+sig sig
Delata(T) aimed for is 20C or less

| I2C ADRESSES |
|---|
| BME280 0x76 |
| TLV320ADC3100 0x30 |
| TCA9554A 0x21 |
| INA3221 0x40 |
| TCA9545APWR 0x20 |
| MAX11601 0x64 |
| MMA8452 = 0x1C |




## CASE+ GRAPHICS + MECHANICAL



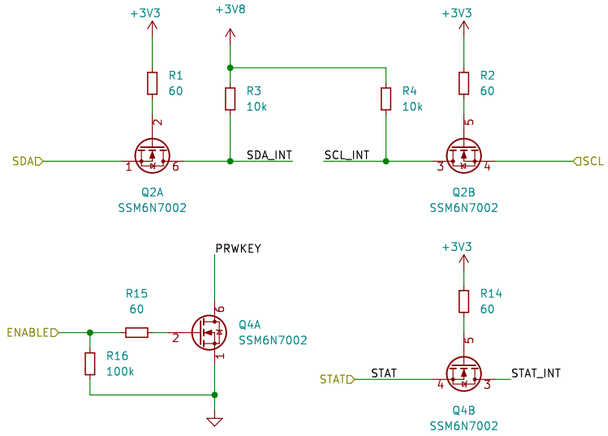

Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

Sheet: /
File: Bird_detector_V1.kicad_sch

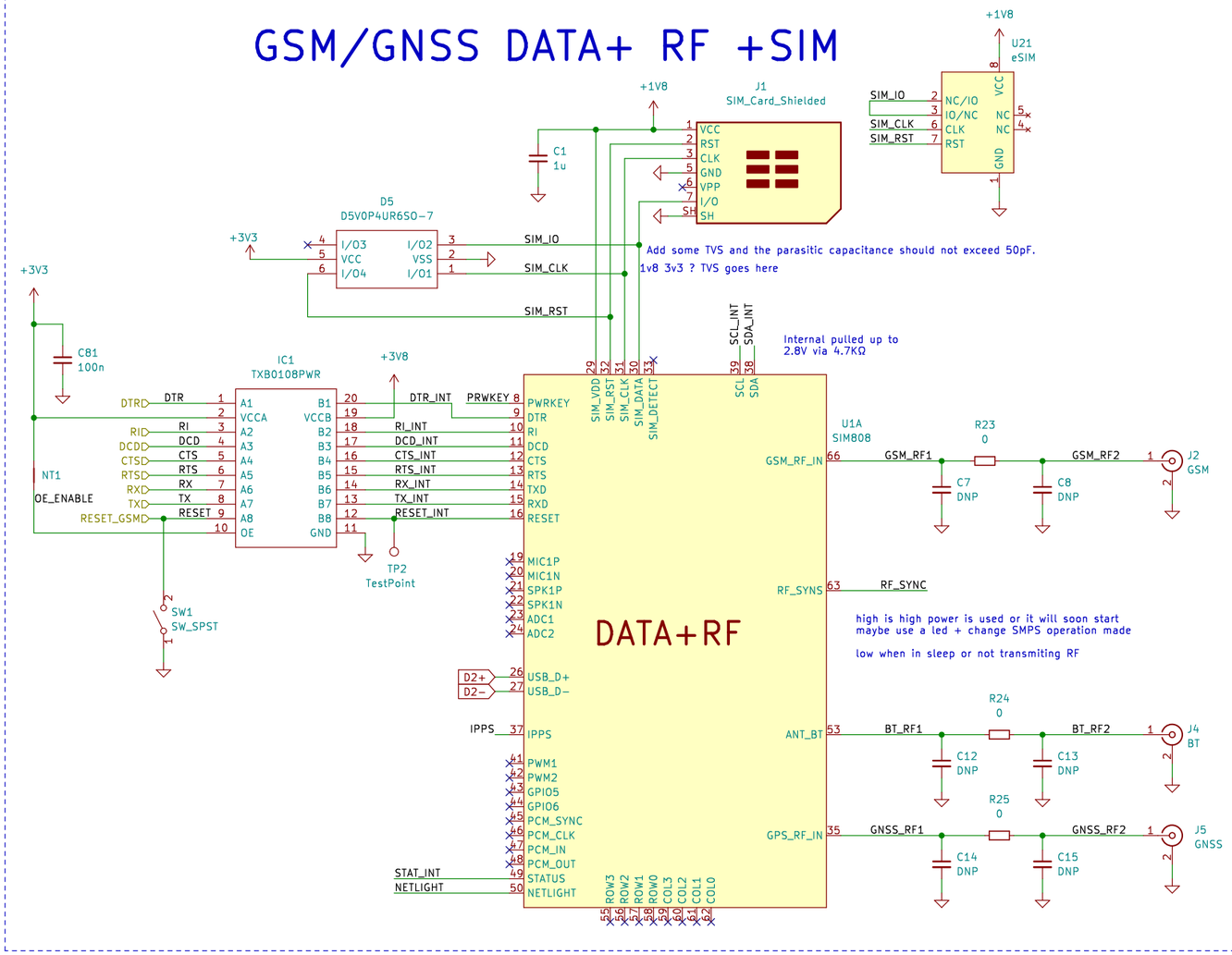
**Title: Bird Detection and Recognition System**

| Size: A3 | Date: 2022-11-23 | **Rev: V0.1** |
|---|---|---|
| KiCad E.D.A. kicad (6.0.9) | | Id: 1/8 |

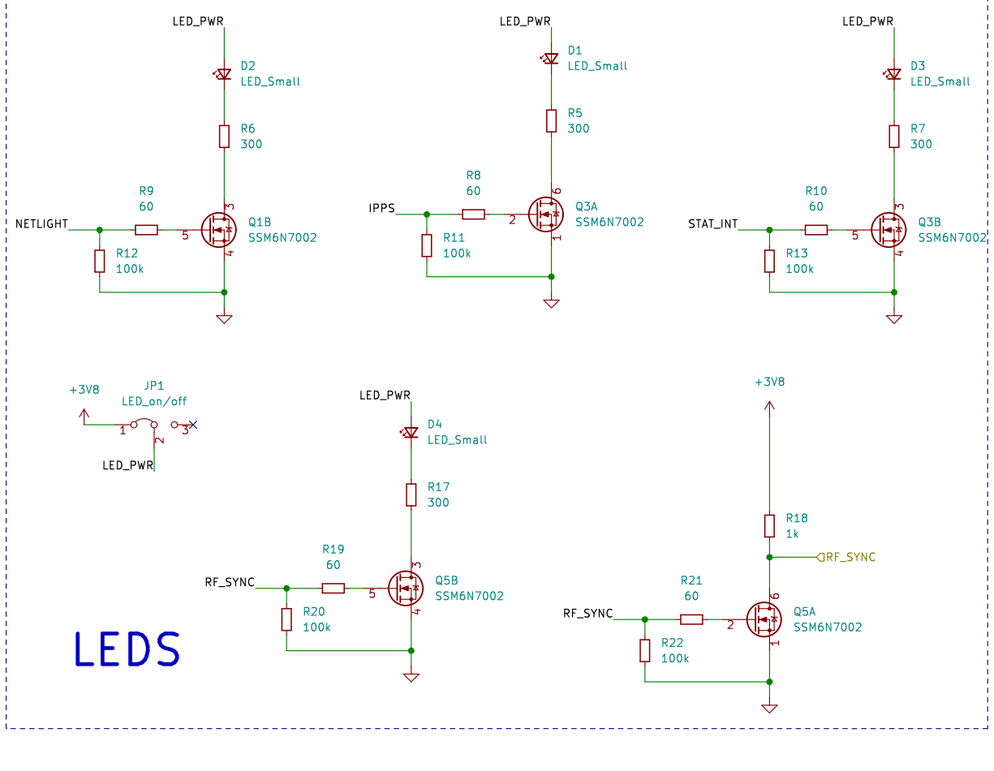
# LEVEL SHIFTERS



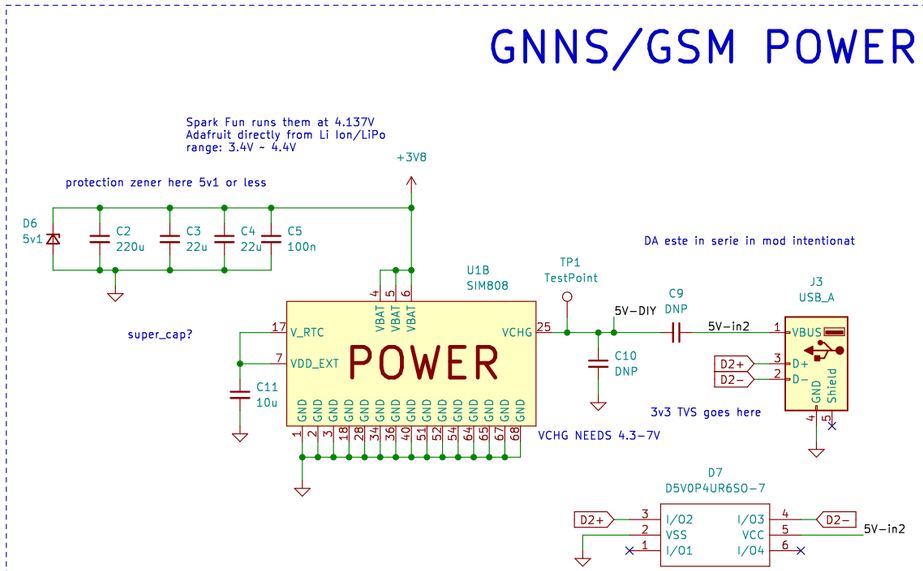

# GSM/GNSS DATA+ RF +SIM




# LEDS




# GNNS/GSM POWER




Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

Sheet: /GSM+GPS/
File: RF.kicad_sch

**Title: Bird Detection and Recognition System**

| Size: A3 | Date: 2022-11-23 | **Rev: V0.1** |
|---|---|---|
| KiCad E.D.A. kicad (6.0.9) | | Id: 2/8 |

Danger free pins:

GPIO_03
GPIO_45

BOOT

Free safe pins:

# MCU

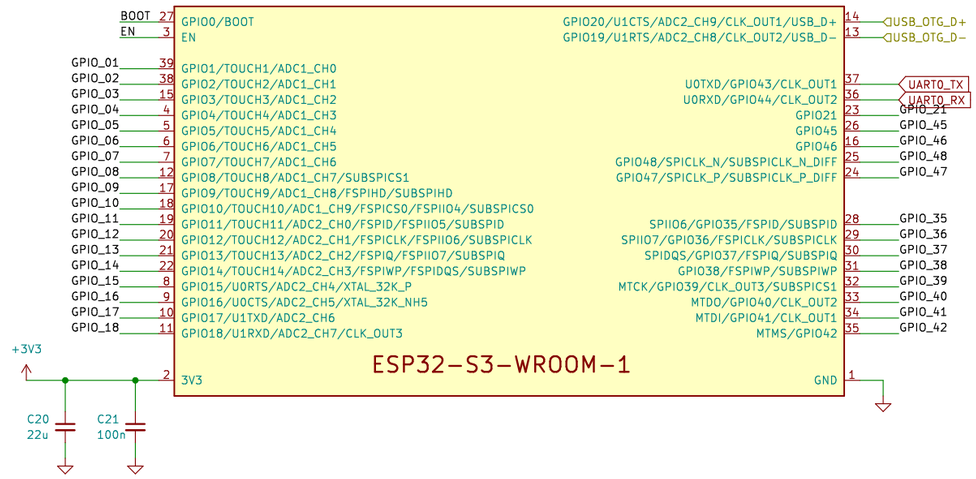
ESP32-S3 has four strapping pins:
- GPIO0
- GPIO45
- GPIO46
- GPIO3

GPIO0, GPIO45 and GPIO46 are connected to the chip's internal weak pull-up/pull-down during the chip reset.
GPIO3 is floating by default

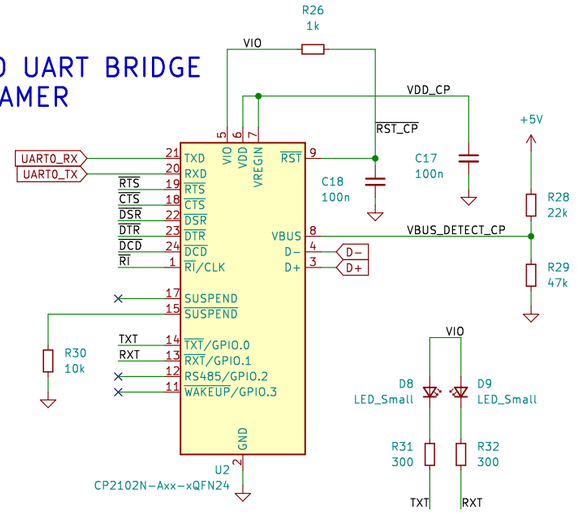
Internal Pull-up/down 45k
Max IC typical current:
source 40mA
sink 28mA

EN pin TTL:
0.75*Vcc+ HIGH
0.25*Vcc- LOW

U3
ESP32-S3-WROOM-1



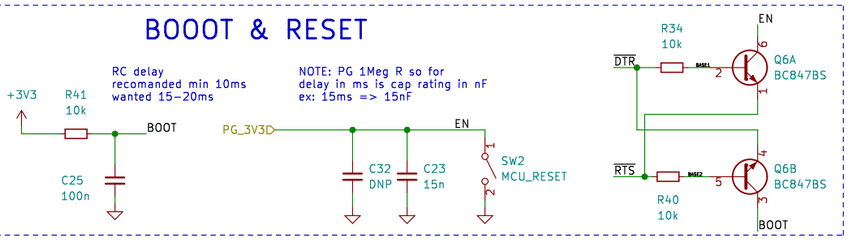

## USB TO UART BRIDGE PROGRAMER



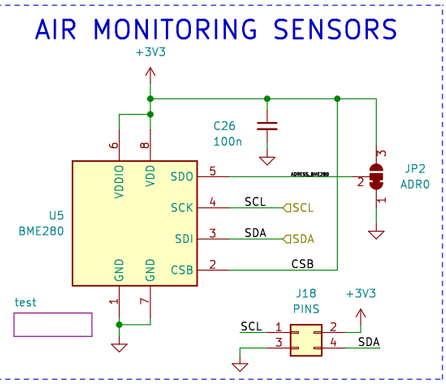

## BOOOT & RESET

RC delay
recomanded min 10ms
wanted 15-20ms

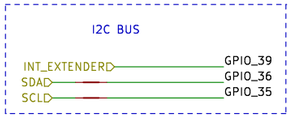
NOTE: PG 1Meg R so for
delay in ms is cap rating in nF
ex: 15ms => 15nF



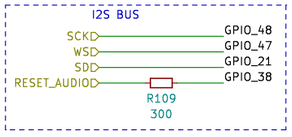

## AIR MONITORING SENSORS



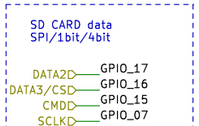

## I2C BUS



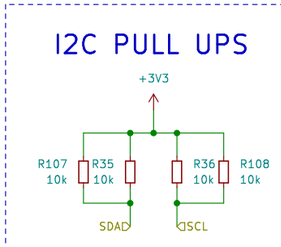

## I2S BUS



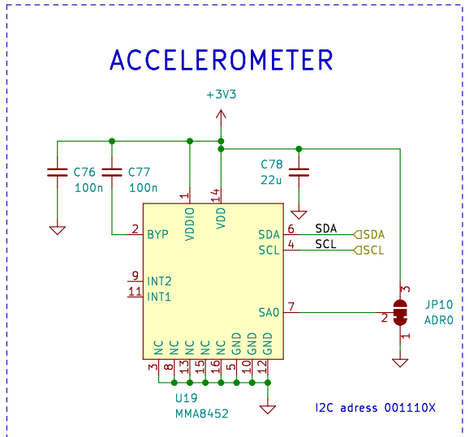

## SD CARD data
SPI/1bit/4bit



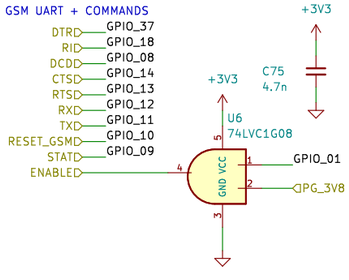

## I2C PULL UPS




## ACCELEROMETER

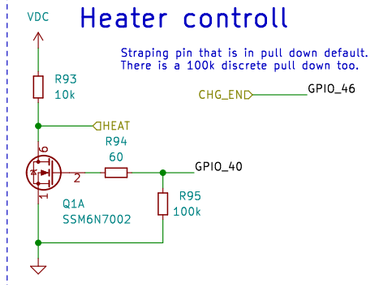



## GSM UART + COMMANDS

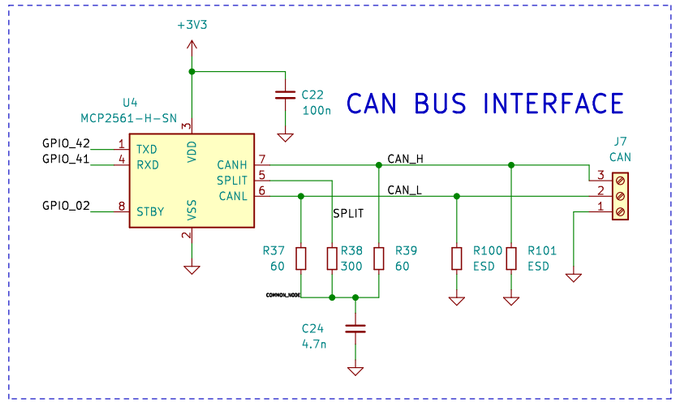



## Heater controll

Straping pin that is in pull down default.
There is a 100k discrete pull down too.




## CAN BUS INTERFACE



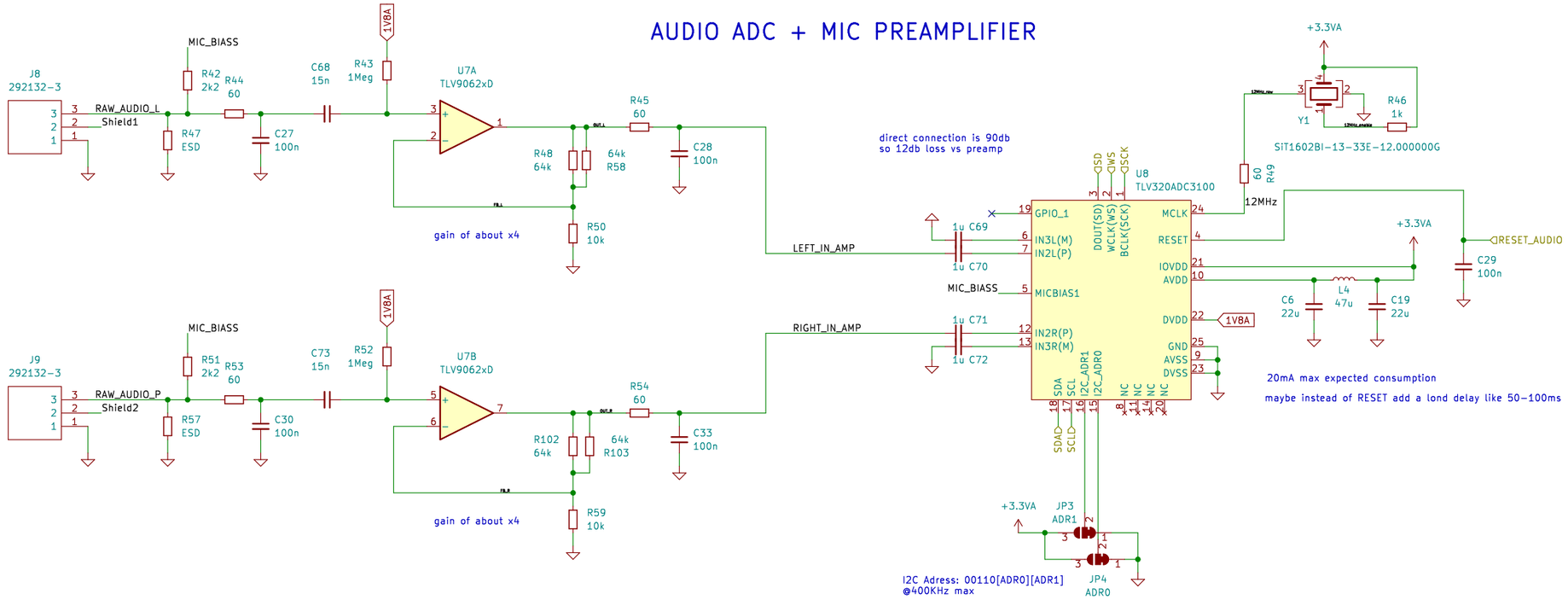

Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

Sheet: /MCU+WIFI+BT/
File: MCU.kicad_sch

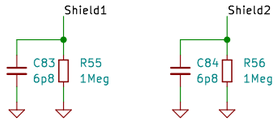
**Title: Bird Detection and Recognition System**

| | | |
|---|---|---|
| Size: A3 | Date: 2022-11-23 | **Rev: V0.1** |
| KiCad E.D.A. kicad (6.0.9) | | Id: 3/8 |

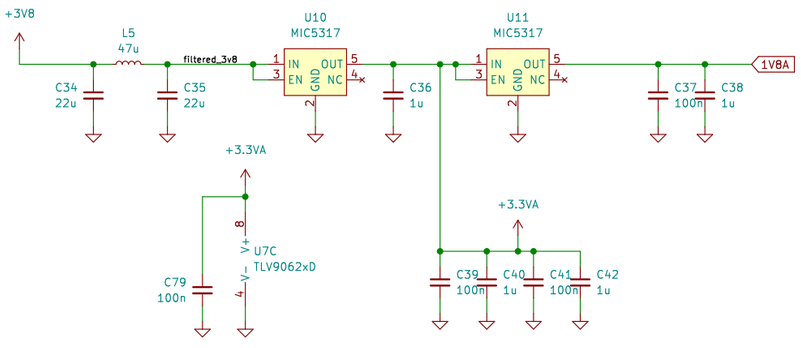
# AUDIO ADC + MIC PREAMPLIFIER




## Shield terminations

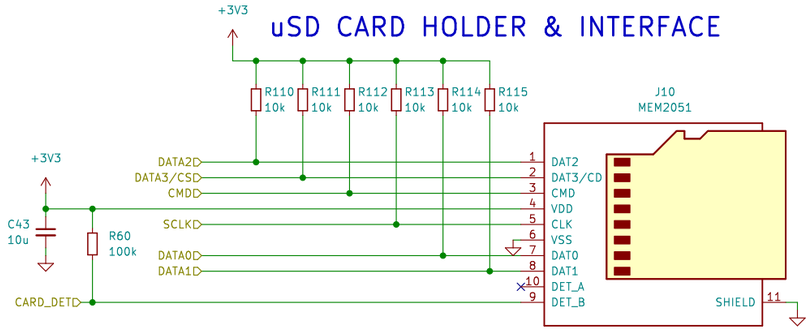



## Power

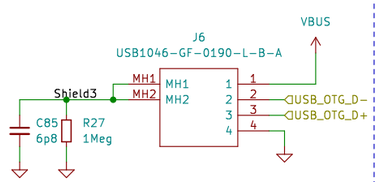



| | |
|---|---|
| Layout by: Kecs Robert Alfred | |
| Verified by: Kecs Robert Alfred | |
| Designed by: Kecs Robert Alfred | |
| Sheet: /Audio capture/ | |
| File: Audio.kicad_sch | |
| **Title: Bird Detection and Recognition System** | |
| Size: A3 | Date: 2022-11-23 |
| KiCad E.D.A. kicad (6.0.9) | **Rev: V0.1** |
| | Id: 4/8 |

## uSD CARD HOLDER & INTERFACE

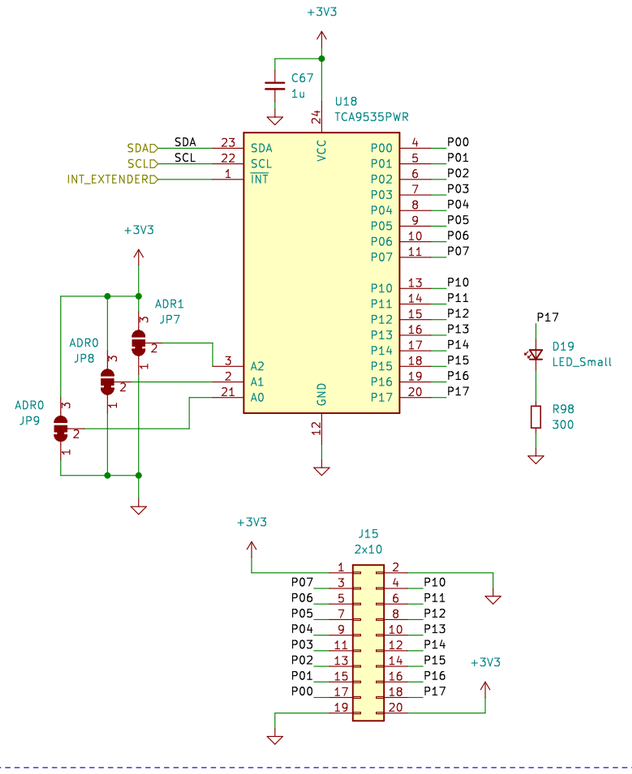



## USB OTG ESP32 DIRECT




**POWER IN ONLY !!!**

## GPIO EXTENDER & HINHEADER




| | | |
|---|---|---|
| Layout by: Kecs Robert Alfred | | |
| Verified by: Kecs Robert Alfred | | |
| Designed by: Kecs Robert Alfred | | |
| Sheet: /Other data+storage/ | | |
| File: SDcard.kicad_sch | | |
| **Title: Bird Detection and Recognition System** | | |
| Size: A3 | Date: 2022-11-23 | **Rev: V0.1** |
| KiCad E.D.A. kicad (6.0.9) | | Id: 5/8 |

# AOLAR POWER INPUT AND SMPP BMS

HEATER

Solar input
J11
Solar input

F1
PPTC 2.6A 16V

IN_SOLAR+
IN_SOLAR−

C44
100n

50m
R61

R64
1k

LED_Small
D14

Reverse Voltage Protection
+Indicator(0.17W R at 15V)
&Over Voltage Protection
&Overcurrent Protection
(Short Circuit too)

D12
MMSZ5245B
15V 1W total

D13
MMSZ5245B

Q7A
DMP3028LSD

Heater_Input

HEAT

Q8B
DMP3028LSD

Q8A
DMP3028LSD

R66
60

R104
10k

Q12A
SSM6N7002

R105
60

CHG_END

Q12B
SSM6N7002

R106
10k

D10
SX33L_R1_00001

Q9A
DMP3028LSD

R65
1k

R67
100k

+5V

VDC

4.5–28V
input

C46
22u

C47
22u

Q7B
DMP3028LSD

BMS_SW_OUT

C45
100n

D11
SX33L_R1_00001

L1
15u

R62
50m

+BATT

C48
22u

C49
22u

C50
1u

R63
60

C51
15n

C74
15n

snubber

U12
CN3791

VG
DRV
VCC
CHRG
DONE
MPPT
GND
CSP
BAT
COM

R68
300

D15
LED_Small

D16
LED_Small

CSP

R69
1Meg

MPPT

1.205V at MPPT

R72
280.5587k

R73
64k

5.5V MPPT
for seed studio solar

R71
10k

Q10B
SSM6N7002

Q10A
SSM6N7002

R74
100k

R75
100k

R33
60

R70
60

COM

COM_CAP

C52
220n

## BMS CELLS TEMPERATURE MOITORING CIRCUITRY

U9B
TLV9062xD

U9A
TLV9062xD

U9C
TLV9062xD

+3V3

+3.3VA

R96
10k

R76
64k

R77
64k

R97
10k

Temp1_out

Temp1

Temp2

Temp2_out

TH1
100k

TH2
100k

R79
64k

R80
64k

C16
100n

C31
100n

C80
100n

Temp1_buffer

Temp2_buffer

## ADC I2C

U13
MAX11601

+3V3

C53
100n

Temp1_out
Temp2_out
TestPoint
TP3
TestPoint
TP4

AIN0
AIN1
AIN2
AIN3/REF
Vdd
GND
SCL
SDA

SCL
SDA

I2C adress 001100100

## USB 2.0 POWER INPUT

J13
USB_A

VBUS
FB2
MH2029-401Y

R78
50m

+5V

F2
PPTC 2.6A 16V

C55
100n

IN_USB_+
IN_USB_−

D+
D−

Shield
GND

3v3 TVS goes here

D17
D5V0P4UR6SO-7

ESD PROTECTION

I/O1
I/O2
VSS
I/O4
I/O3
VCC

## BATTERY POWER INPUT + USB SWITCH

J14
batt input

+BATT

Heater_Input

F3
PPTC 2.6A 16V

C82
supercap

Q11B
DMP3028LSD

Q11A
DMP3028LSD

U15
APX810S05

Vcc
GND
RESET

R83
100k

R84
100k

D18
SX33L_R1_00001

Q9B
DMP3028LSD

R82
1k

+5V

IN_SYSTEM−
IN_SYSTEM+

C56
100n

+VDC

50m
R81

SMPSs

DC
RF_SYNC
RF_SYNC

PG_3V8
PG_3V3

PG_3V8D
PG_3V3D

## POWER MEASUREMENT

+3V3

MAX 150mV on shunt

U14
INA3221

C54
100n

IN_USB_+
IN_USB_−
IN_SOLAR+
IN_SOLAR−
IN_SYSTEM+
IN_SYSTEM−

IN+1
IN−1
IN+2
IN−2
IN+3
IN−3
VS
VPU
PV
CRITICAL
WARNING
TC
SDA
SCL
A0
GND
EP

SDA
SCL

Adress:
100000[A0]

JP5
ADR1

+3V3

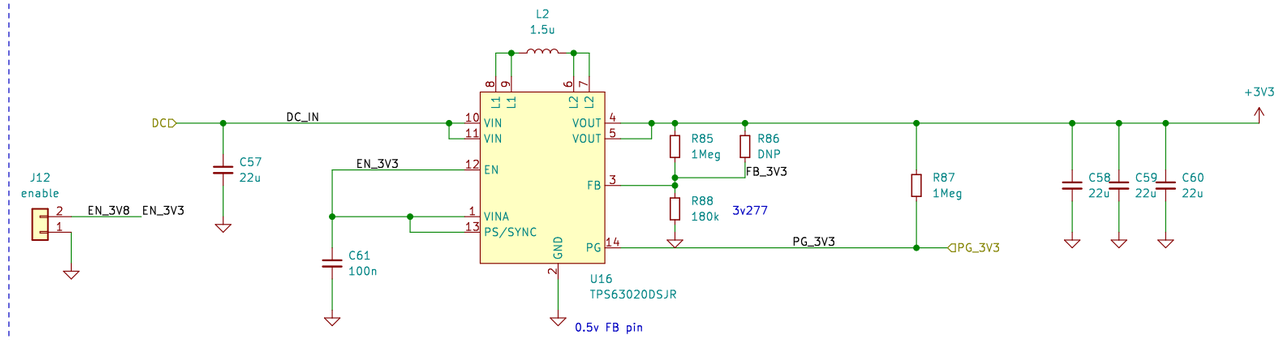
Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

Sheet: /Power Management +BMS/
File: Power.kicad_sch

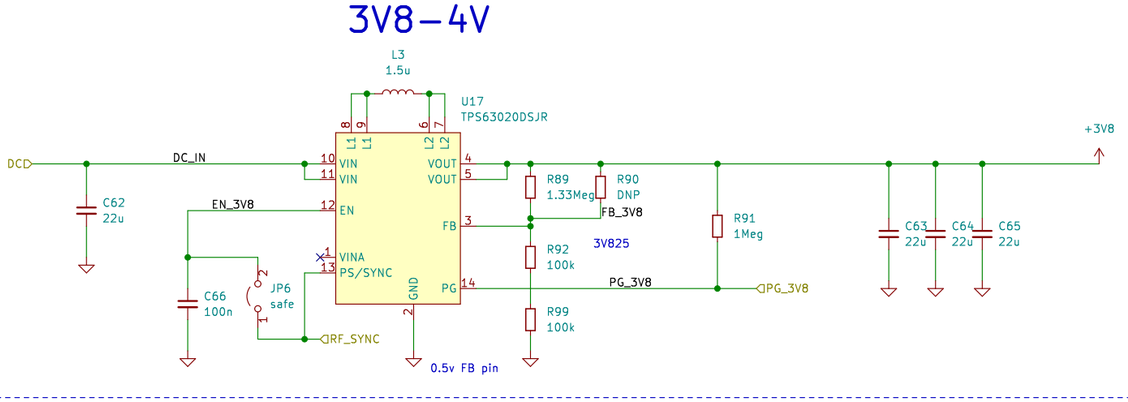
**Title: Bird Detection and Recognition System**

| Size: A3 | Date: 2022-11-23 | Rev: V0.1 |
|---|---|---|
| KiCad E.D.A. kicad (6.0.9) | | Id: 6/8 |

## 3V-3V3




## 3V8-4V

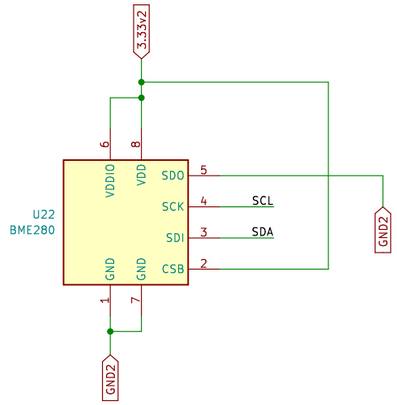


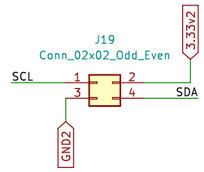

Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

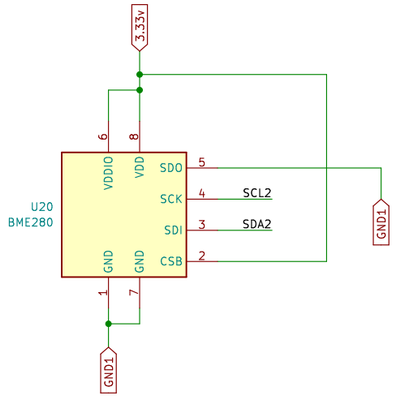
Sheet: /Power Management +BMS/SMPSs/
File: SMPSs.kicad_sch

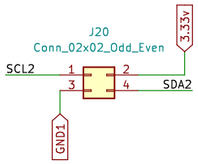
**Title: Bird Detection and Recognition System**

| Size: A3 | Date: 2022-11-23 | **Rev: V0.1** |
|---|---|---|
| KiCad E.D.A. kicad (6.0.9) | | Id: 7/8 |




Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

Sheet: /MCU+WIFI+BT/test/
File: untitled.kicad_sch

**Title: Bird Detection and Recognition System**

| | | |
|---|---|---|
| Size: A3 | Date: 2022-11-23 | **Rev: V0.1** |
| KiCad E.D.A. kicad (6.0.9) | | Id: 8/8 |