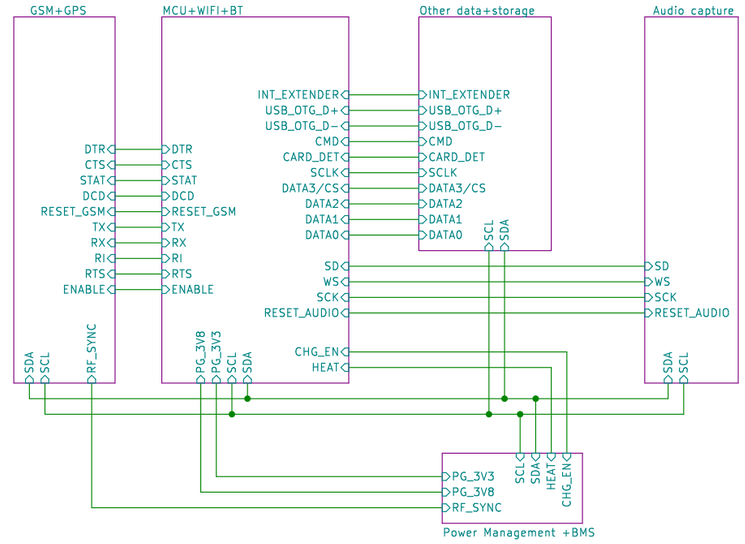
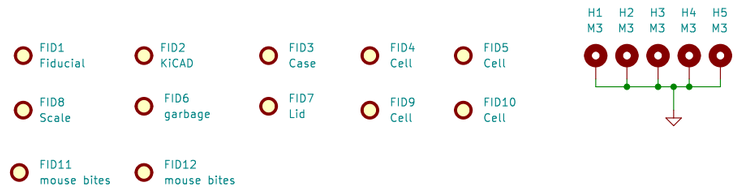
All SMD caps ceramic are 0603 16V X7R or better unless other notes are made
All SMD resistors are 0603
Stack up:
4 layer FR4 sig gnd gnd+sig sig
Delata(T) aimed for is 20C or less

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



CASE+ GRAPHICS + MECHANICAL



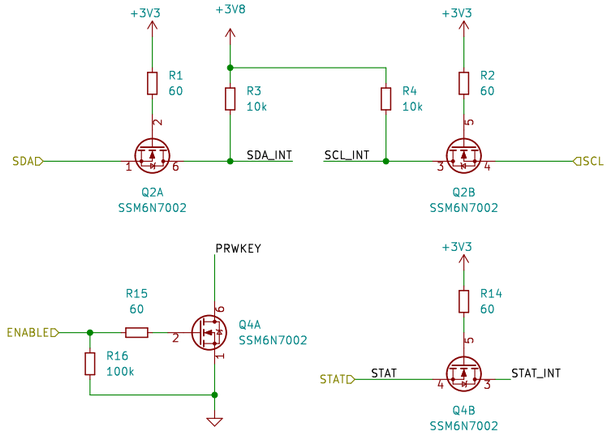
Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

Sheet: /
File: Bird_detector_V1.kicad_sch

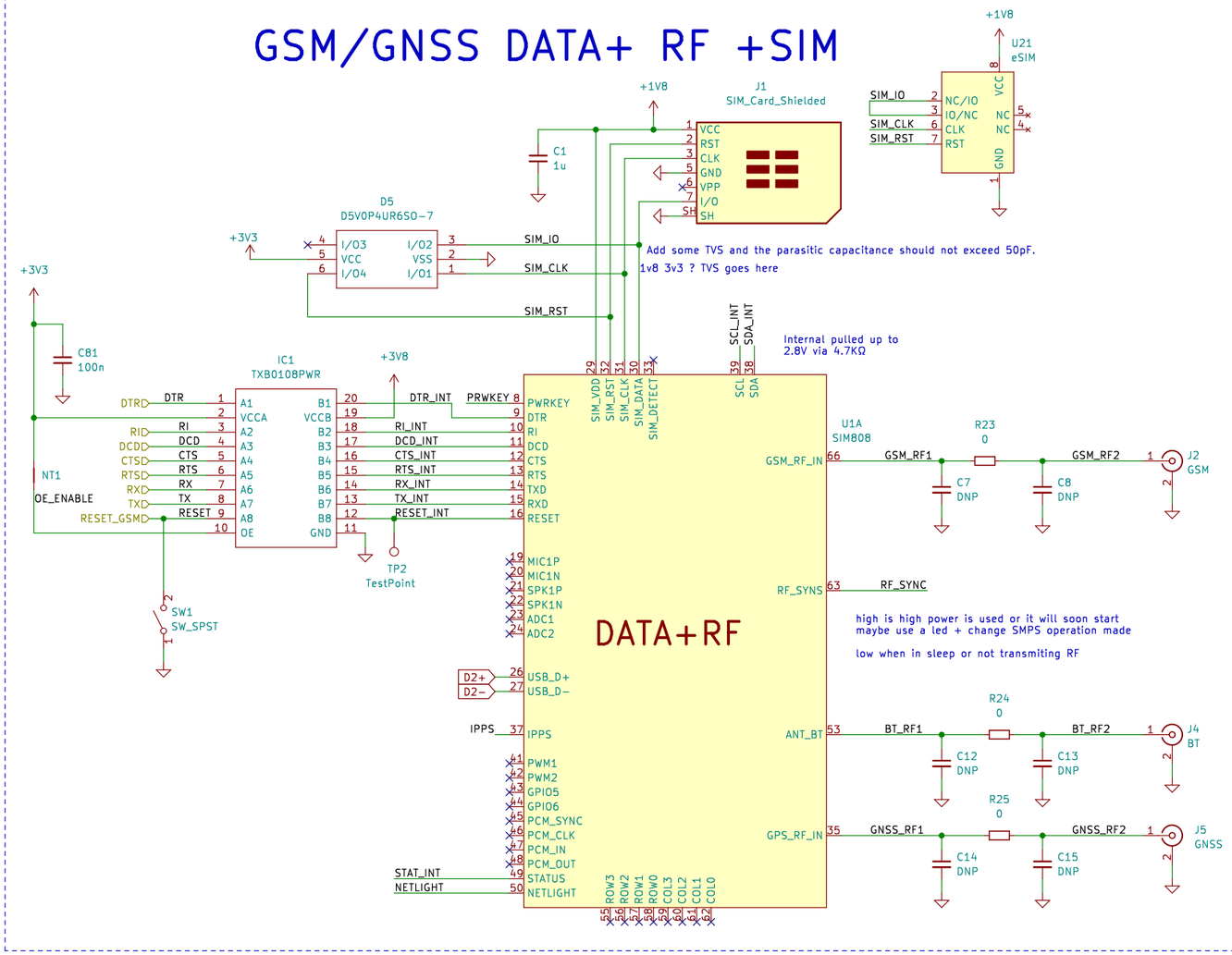
Title: Bird Detection and Recognition System

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

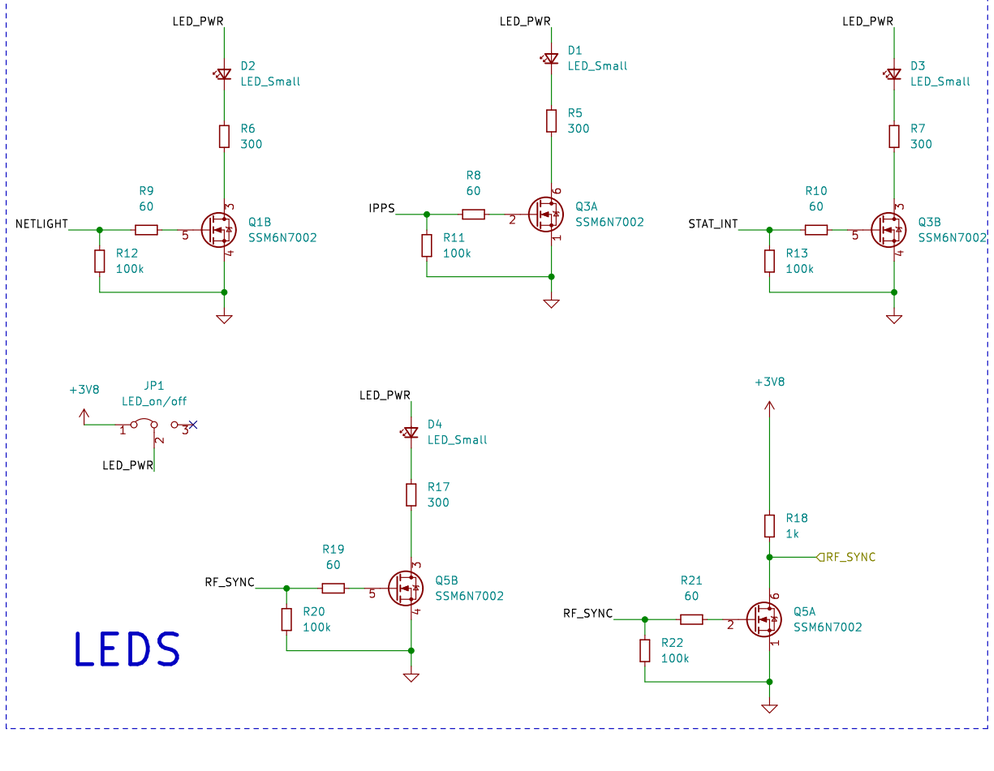
LEVEL SHIFTERS



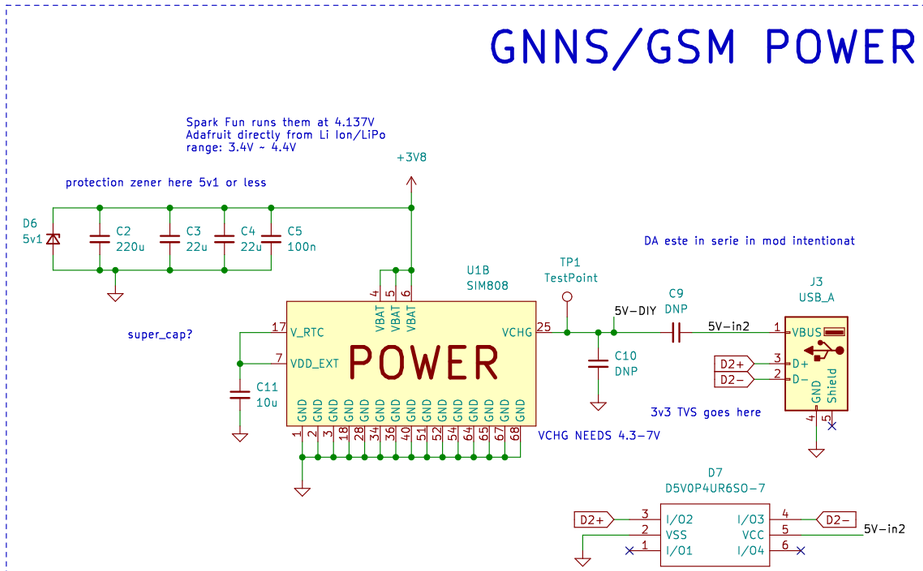
GSM/GNSS DATA+ RF +SIM



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

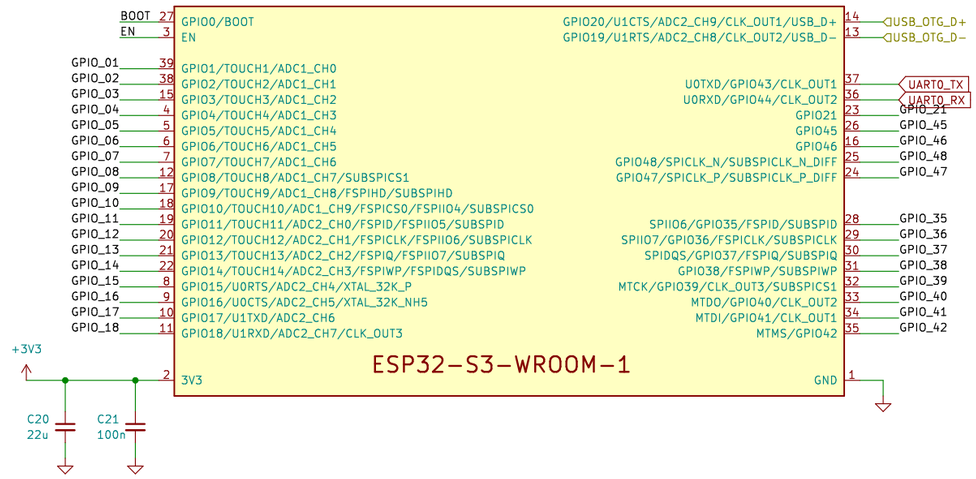
ESP32-S3 has four strapping pins:
- GPIO0
- GPIO45
- GPIO46
- GPIO3

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

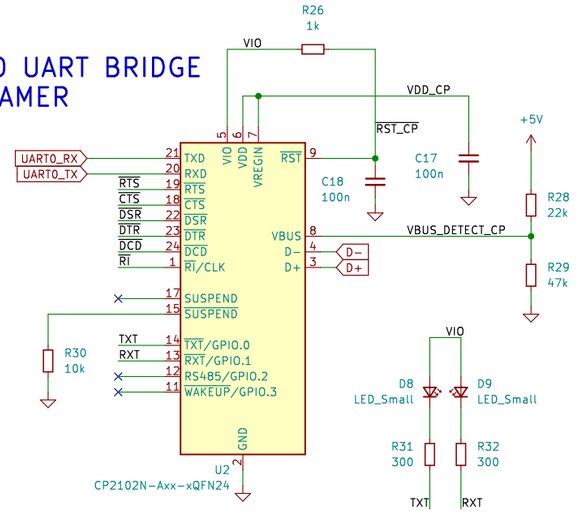
Internal Pull-up/down 45k
Max IC typical current:
source 40mA
sink 28mA

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

U3
ESP32-S3-WROOM-1



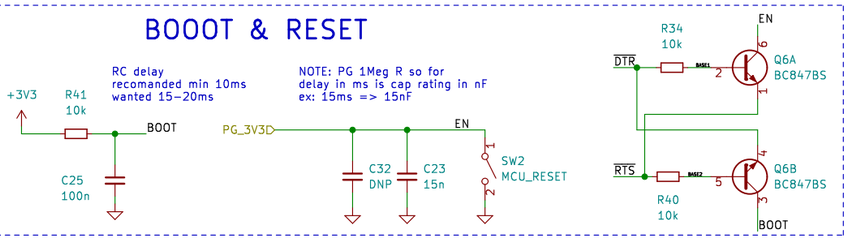
USB TO UART BRIDGE PROGRAMER



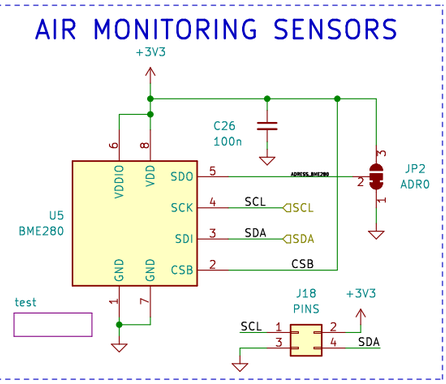
BOOOT & RESET

RC delay
recomanded min 10ms
wanted 15-20ms

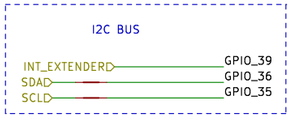
NOTE: PG 1Meg R so for
delay in ms is cap rating in nF
ex: 15ms => 15nF



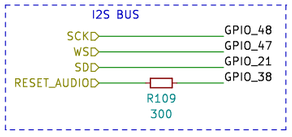
AIR MONITORING SENSORS



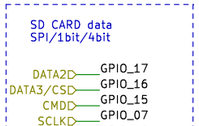
I2C BUS



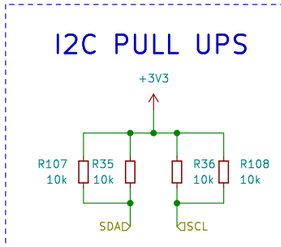
I2S BUS



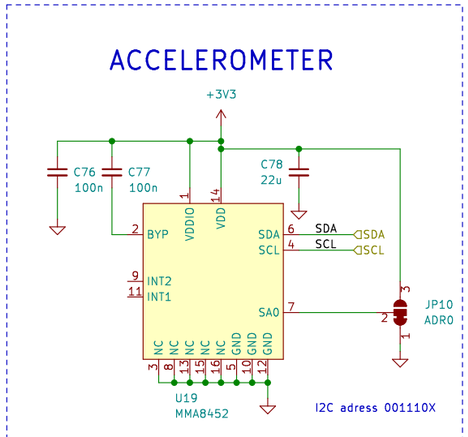
SD CARD data
SPI/1bit/4bit



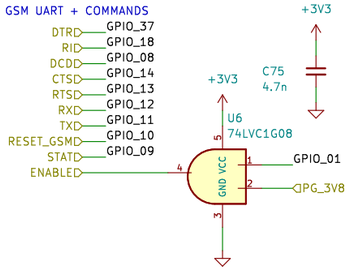
I2C PULL UPS



ACCELEROMETER

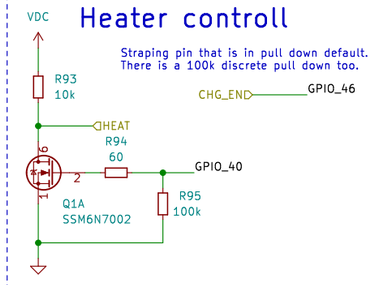


GSM UART + COMMANDS

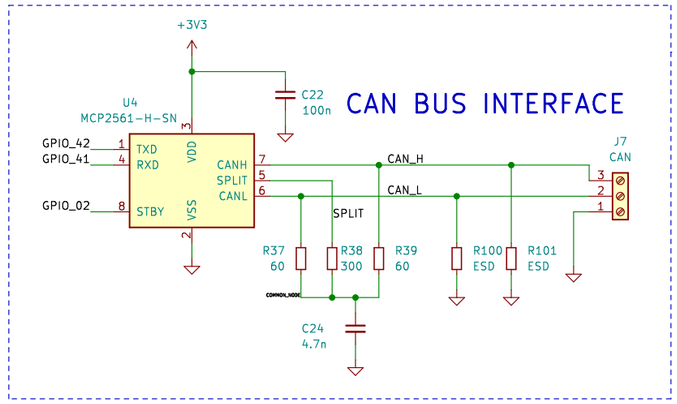


Heater controll

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



CAN BUS INTERFACE



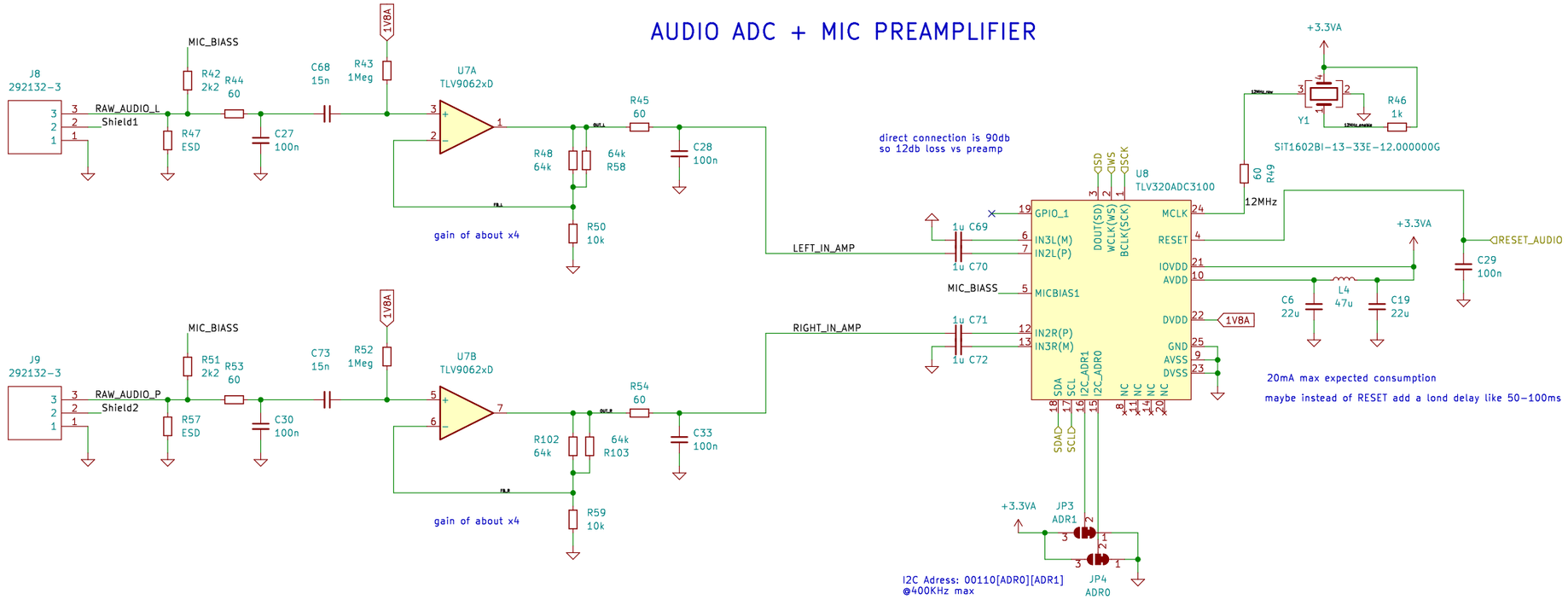
Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

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

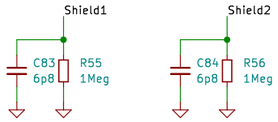
Title: Bird Detection and Recognition System

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

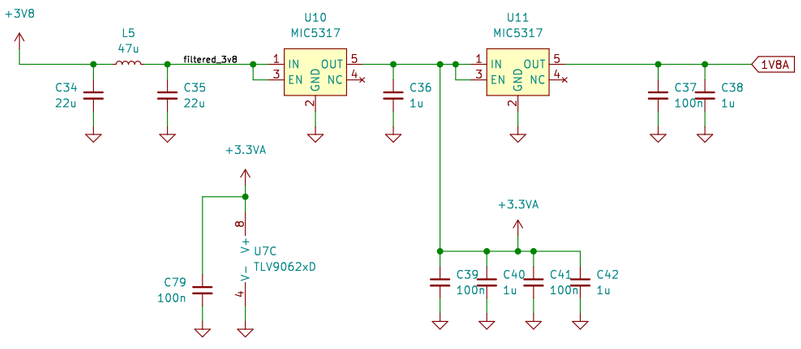
AUDIO ADC + MIC PREAMPLIFIER



Shield terminations



Power



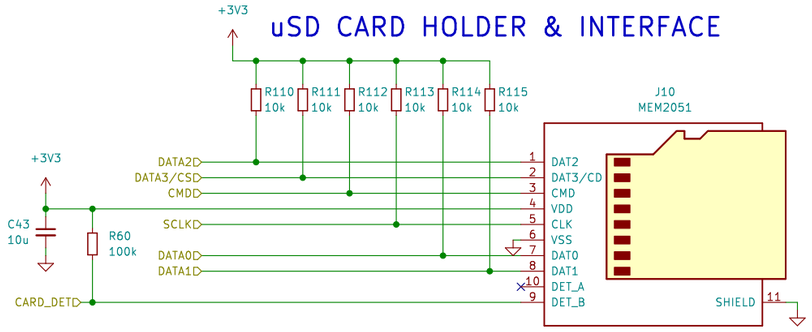
Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

Sheet: /Audio capture/
File: Audio.kicad_sch

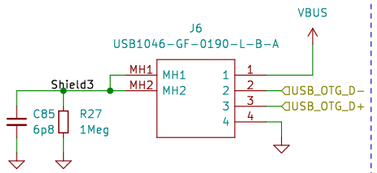
Title: Bird Detection and Recognition System

Size: A3	Date: 2022-11-23	**Rev: V0.1**
KiCad E.D.A. kicad (6.0.9)		Id: 4/8

uSD CARD HOLDER & INTERFACE

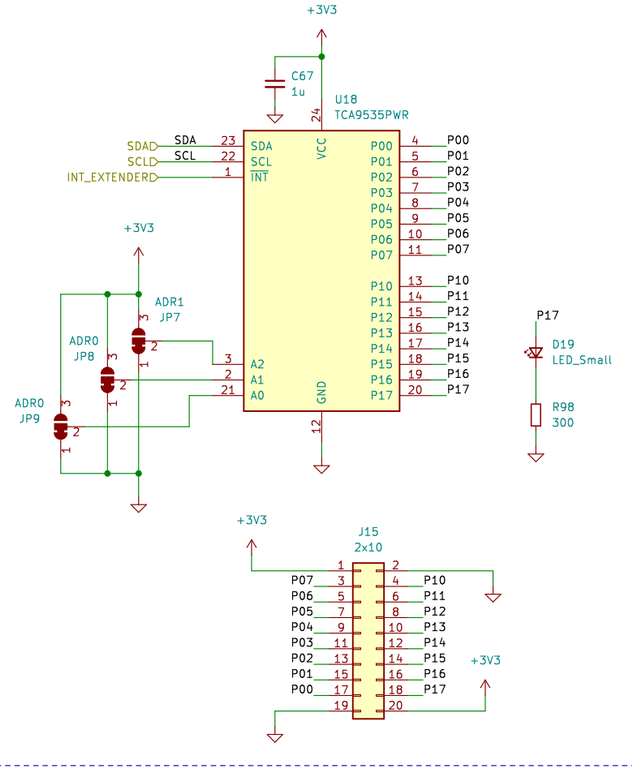


USB OTG ESP32 DIRECT



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

R69
1Meg

R71
10k

Q10B
SSM6N7002

Q10A
SSM6N7002

+5V

R74
100k

R75
100k

1.205V at MPPT

MPPT

R72
280.5587k

R73
64k

5.5V MPPT
for seed studio solar

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

CSP

R68
300

D15
LED_Small

D16
LED_Small

U12
CN3791

VG
DRV
VCC
CHRG
DONE
MPPT
GND
CSP
BAT
COM

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

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

Shield
GND
D+
D−

3v3 TVS goes here

IN_USB_+
IN_USB_−

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

50m
R81

+VDC

SMPSs

DC
RF_SYNC

RF_SYNCD

PG_3V8D
PG_3V3D

PG_3V8
PG_3V3

POWER MEASUREMENT

MAX 150mV on shunt

U14
INA3221

+3V3

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

Adress:
100000[A0]

JP5
ADR1

+3V3

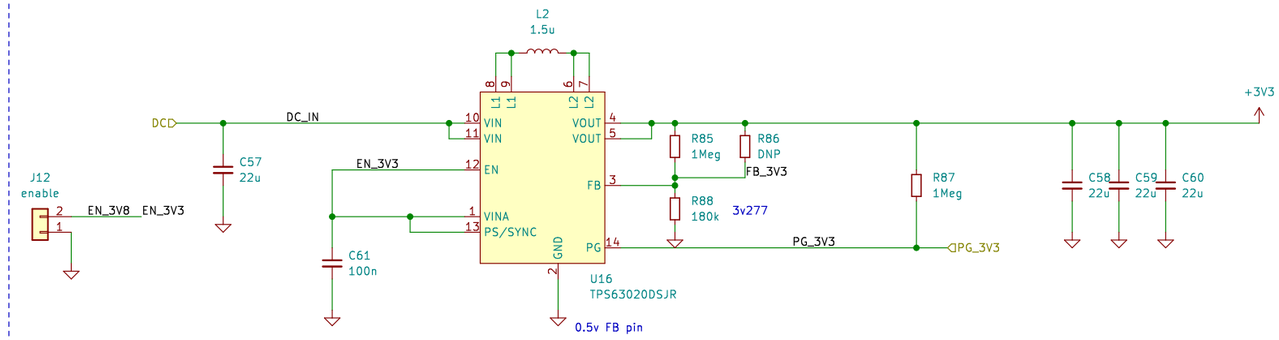
Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

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

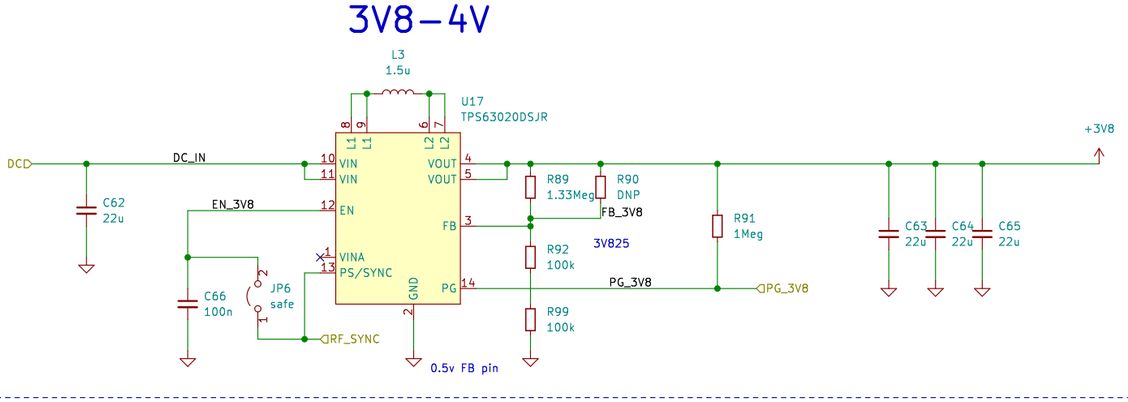
Title: Bird Detection and Recognition System

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

3V-3V3



3V8-4V

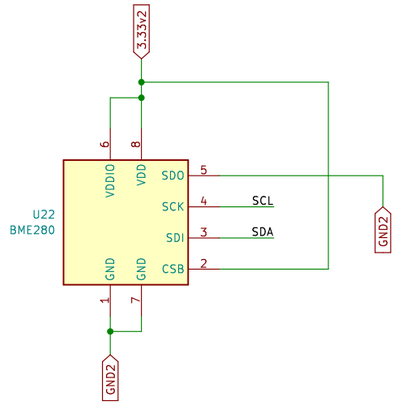


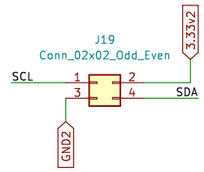
Layout by: Kecs Robert Alfred
Verified by: Kecs Robert Alfred
Designed by: Kecs Robert Alfred

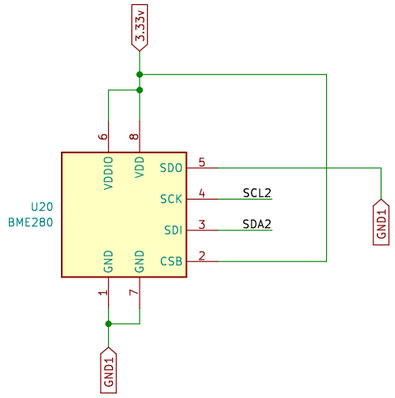
Sheet: /Power Management +BMS/SMPSs/
File: SMPSs.kicad_sch

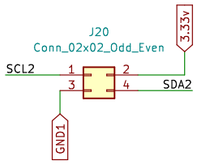
Title: Bird Detection and Recognition System

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