System Regulator

U1
AMS1117-3.3
V_USB — VI VO — 3.3V
GND

C3 10uf
C1 10uf
GND

Power LED
V_USB
R1
1KOHM-0402T-1/16W-1%
D2 Blue
GND

USB-to-Serial Converter

J8
USB4105-GF-A-120
VBUS
CC1 CC2
A6 B6
A7 B7
A8 B8
SBU1 SBU2
DP1 DP2
DM1 DM2
SHELL_GND
GND

V_USB
3.3V
U4
CH340C
VCC
V3
R232
RTS
DTR
USB+
USB-
CTS
CH340-Tx
CH340-Rx
CH340-RTS
CH340-DTR
TXD
RXD
GND

R9 R10 5.1K 5.1K
GND

C8
0.1UF-0402T-6.3V-10%-X7R
GND

C9 100nf
C10 100nf
C11 100nf
C12 100nf
V_USB V_USB V_USB V_USB
GND

Auto-Reset

Boot Mode Configuration

Pin	Run	Bootloader	Default
IO0	1	0	1
IO2	x	0	0
IO5	x	0	0
IO12	0	0	0
IO15	x	x	1

IO12 = MDTI, IO15 = MDTO

RESET
10KOHM-0402T-1/16W-1%
MMBT3904 R3 CH340-DTR
10KOHM-0402T-1/16W-1%
MMBT3904 R4 CH340-RTS
ESP_0/QPWR

If DTR is LOW, toggling RTS from HIGH to LOW resets to run mode.
If RTS is HIGH, toggling DTR from LOW to HIGH resets to bootloader.

Espressif ESP32-WROOM

3.3V
R6
RESET
3.3V
U2
ESP32-WROOM-32
EN
VDD
SENSOR_VP
SENSOR_VN
TXD0/IO1
RXD0/IO3
IO0/QPWR
CH340-RX
RGB_DI
CH340-TX
TP_FB
S3/S3_CS
IO12/GPIO1
IO13/GPIO0/LED
IO14/GPIO6
IO15/GPIO4
TP_RX
TP_TX
TP_SCK
TP_POCI
TP_SDA
TP_SCL
TP_PICO
TP_A1
TP_A0
GPIO2
GPIO2
GPIO3
GPIO3
TP_A2
TP_A6
SDO/SD0
SDI/SD1
SHD/SD2
SWP/SD3
SCK/CLK
SCS/CMD
GND

ESP_30/TP_A4
ESP_39/TP_A3

Use boot control pins with caution: 0, 2, 5, 12, 15

IO0: Avoid device connections. Can be used a stat LED.
IO2: Avoid external pullups — will cause bootloader fail.
IO5: Has builtin pullup at POR.
IO12: Avoid external pullups — will cause bootloader fail.
IO15: Has builtin pullup at POR.

ADC2 is unavailable when WiFi is enabled.

ESP_22/TP_SCL APDS_SCL
ESP_21/TP_SDA APDS_SDA
MPU_SDA
MPU_SCL

RGB Status LED

3.3V JP2 V_USB
Jumper_3_Bridged12
1 2 3
WS2812B
LED1
WS2812B
ESP_2/RGB_DI DIN
DOUT
3.3V
C7
0.1UF-0402T-6.3V-10%-X7R
GND

Status LED

ESP_13/GPIO0/LED
R11
1KOHM-0402T-1/16W-1%
D1 Blue
GND

microSD Connector

3.3V
J11
105162-0001
ESP_5/SD_CS
ESP_23/TP_PICO
ESP_18/TP_SCK
ESP_19/TP_POCI
DAT2
CD/DAT3
CMD
VDD
CLK
VSS
DAT0
DAT1
DET
GND_1
GND_2
GND_3
GND_4
GND

3.3V
C2
10UF-0402T-6.3V±20%
GND

Servo

ESP_32/GPIO5
J3
Conn_01x03
V_USB
GND

ESP_33/GPIO3
J4
Conn_01x03
V_USB
GND

ESP_15/GPIO4
J5
Conn_01x03
V_USB
GND

Analog

3.3V ESP_26/TP_A0
J6
A0
GND

3.3V ESP_25/TP_A1
J9
A1
GND

3.3V ESP_34/TP_A2
J12
A2
GND

3.3V ESP_39/TP_A3
J7
A3
GND

3.3V ESP_36/TP_A4
J10
A4
GND

3.3V ESP_35/TP_A6
J13
A6
GND

GPIO0/Boot Button

ESP_0/QPWR
SW1
SW_MEC_5E

Reset Button

RESET
SW2
SW_MEC_5E

3.3V ESP_16/TP_RX
ESP_17/TP_TX
J14
Serial
GND

3.3V ESP_32/GPIO5
ESP_15/GPIO4
J16
Sonar
GND

3.3V ESP_21/TP_SDA
ESP_22/TP_SCL
J15
I2C
GND

Sensors

Sensors
File: Sensors.kicad_sch

MPU6050 IMU

3.3V — C13 0.1uf — GND
3.3V — C14 0.1uf — GND
3.3V — VLOGIC (8) / VDD (13)

U5 MPU-6050

- 24 SDA — MPU_SDA
- 23 SCL — MPU_SCL
- 9 ADO
- 12 INT — MPU_INT
- 6 AUX_DA — XDA
- 7 AUX_C — XCL
- 11 FSYNC
- 1 CLKIN
- 20 CPOUT
- 10 REGOUT
- 18 GND — GND

3.3V — R14 4k7 — MPU_SDA
R15 4k7 — MPU_SCL

R12 4k7 — 3.3V
R13 4k7

C15 0.1uf — GND
C16 220pf — GND

GND

APDS9960 Gesture

U3 APDS-9960

- 8 VDD
- 6 GND
- 5 LEDA
- 4 LEDK
- 3 LDR
- 2 INT — APDS_INT
- 7 SCL — APDS_SCL
- 1 SDA — APDS_SDA

3.3V — C6 1.0uf — GND
3.3V — R7 1k0

VL — C17 100uf — GND
C5 1.0uf — GND

3.3V — JP1
- 3 — R8 4k7 — APDS_SDA
- 1 — R16 4k7 — APDS_SCL