OLIMEX

ESP32-POE2

User Manual

olimex.com

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Introduction to ESP32-POE2

ESP32-POE2 is an upgraded version of the popular ESP32-PoE - an IoT based on ESP32-WROVER-E WIFI/BLE/Ethernet development board with Power-Over-Ethernet feature. The ESP32-POE2 allows 25W power negotiation and can supply 24V/12V/5V/3.3V to additional equipment connected to it.

The PoE in ESP32-POE2 is handled by TPS2378 chip that is IEEE 802.3af-compliant, including pre-standard (legacy) PoE support.

The PoE powering requires at least 37V DC to operate successfully. The board takes power from the Ethernet cable and can be expanded with sensors and actuators. Perfect solution for Internet-of-Things projects.

+ **Important notice:** ESP32-POE2 has **no galvanic isolation** on Ethernet's power supply, this might be a problem for ground loops. This also means that when you program the board via the micro USB connector the Ethernet cable should be disconnected (if you have power over the Ethernet enabled)! Any board with own external power supply attached to ESP32-POE2 can be dangerous. Consider using Olimex USB-ISO to protect your computer and board from accidental short circuit.

ESP32-POE2 features

- ESP32-WROVER-E-N4R8 - WiFi and bluetooth module with 4MB flash, 8MB PSRAM

- CE-RED and LVD certification

- Original design by OLIMEX Ltd

- Low power design - 200uA consumption in deep sleep

- Ethernet 100Mb interface with IEEE 802.3 PoE support

- USB-C connector for ESP32 programming

- MicroSD card working in 1 bit mode (3 more GPIOs)

- LiPo battery charger with LiPo battery connector

- Battery level monitor pin on ADC

- External power supply detection pin on ADC

- Total output for external circuits - 25W max, max power distributed as follows:
  - 0.75A at 24V or 1.5A at 12V (selectable by jumper);
  - 1.5A at 5V;
  - 1A at 3.3V.

- UEXT connector

- EXT connector

- User button

- Reset button

- PCB dimensions: 59x90 mm

PoE standard

[ESP32-POE2](#) follow the original IEEE 802.3af PoE standard and provides up to 25 W of DC power (minimum 44 V DC and 350 mA). Only 23 W is assured to be available at the powered device as some power dissipates in the cables.

The differences between ESP32-POE2 and ESP32-POE-ISO:

ESP32-POE-ISO is limited in the voltage it can provide on the headers. There are only 5V and 3.3V outputs – ESP32-POE2 has 12V DC or 24V DC/V.

ESP32-POE2 is not galvanic isolated which means that it's not safe to connect it to other devices which use non isolated power supply.

+ YOU SHOULD NOT CONNECT ESP32-POE2 to computer's USB port while it's powered by Ethernet POE!!! If you connect USB while ESP32-POE2 is powered by Ethernet you will damage the board or your computer or both. This also voids the warranty!
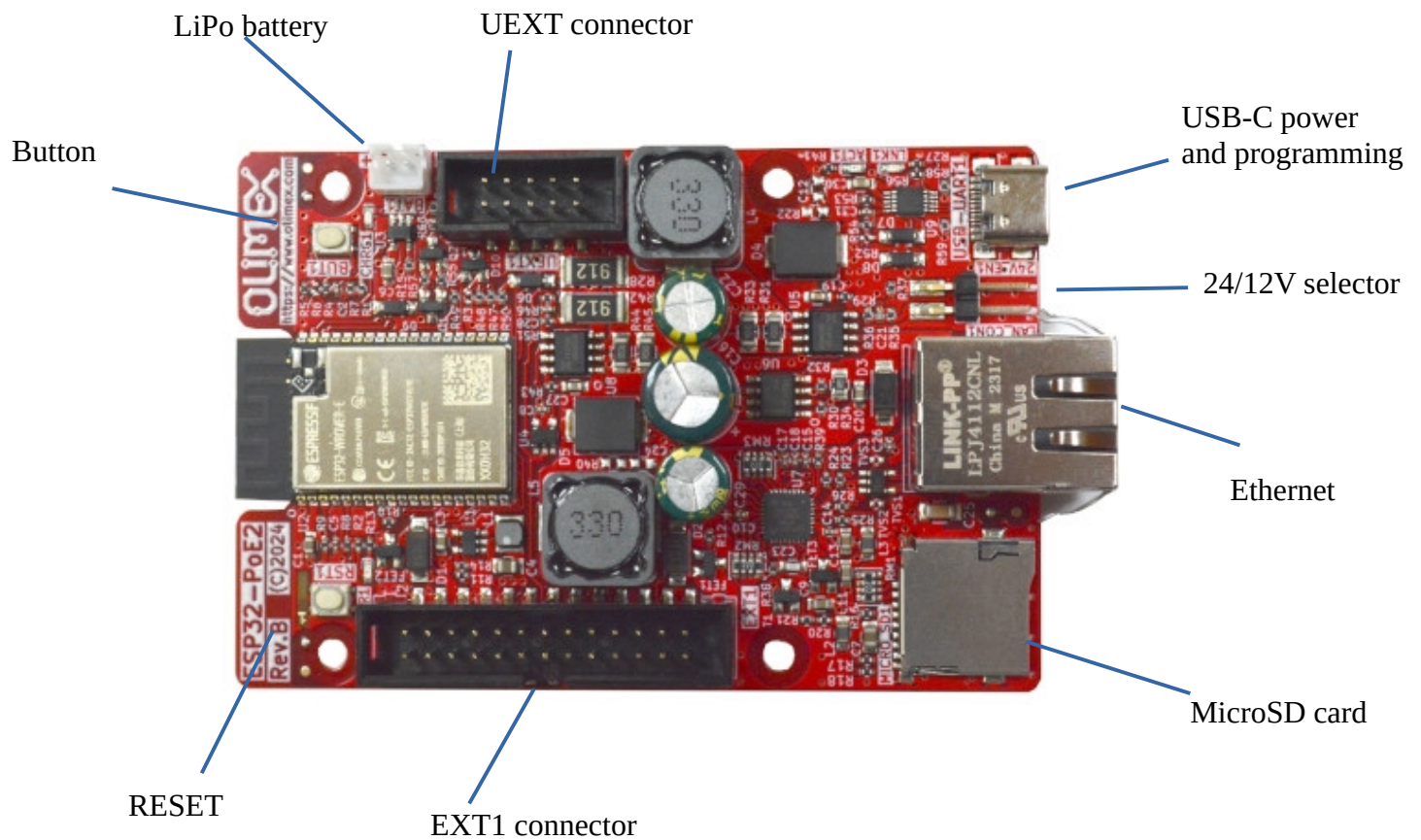
+ The board is susceptible to grounds loops.

+ The most optimal setup for the board is being connected just the PoE Ethernet cable. No sources of power with different ground should be attached at the same time.

Order codes for ESP32-POE2 and accessories:

ESP32-POE2	Commercial temperature grade 0-70C board with internal antenna
USB-CABLE-A-TO-C-1M	1 meter USB-A to USB-C cable for ESP32-POE2 power and programming
Ethernet-CABLE-1M	1 meter Cat 5e Gigabit Ethernet cable with not shielded RJ45 connectors
Box-ESP32-POE2-F	Plastic box for ESP32-POE2
BATTERY-LIPO1400mAh	- Lipo battery 3.7V 1400mAh – note these batteries can be shipped only by ground so we can deliver only to EU destinations.
UEXT modules	- different sensors, relays, LCDs, RTC, GSM, GPS etc accessories which can be connected to UEXT connector

HARDWARE

ESP32-POE2 layout:

LiPo battery

UEXT connector

USB-C power
and programming

Button

24/12V selector

Ethernet

RESET

EXT1 connector

MicroSD card
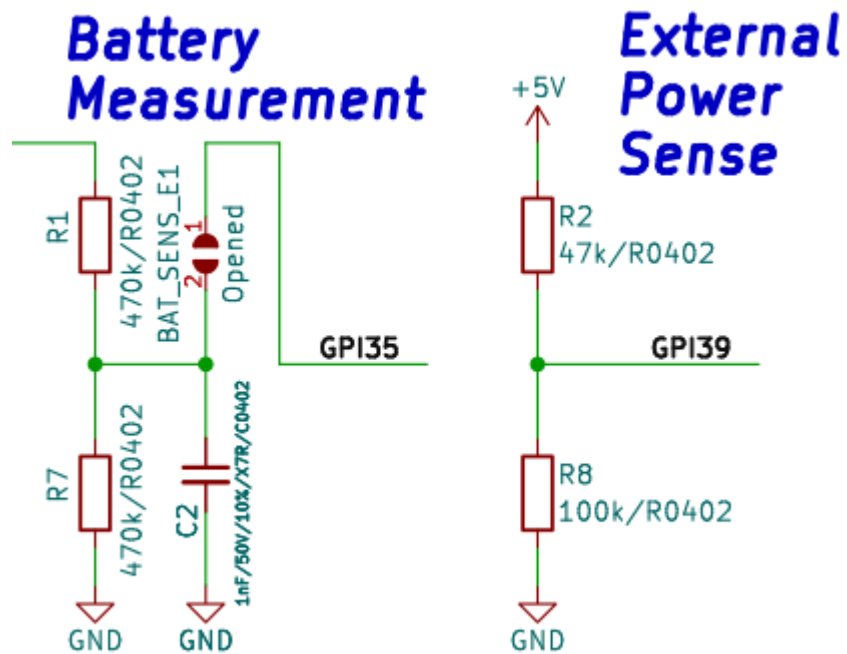
ESP32-POE2 GPIOs:

Power sense and battery level measurement:

- External power sense available on GPI39

- Battery measurement disabled by default (for more free GPIOs)

- Close SMT jumper BAT_SENS_E1 to enable battery measurement on GPI35.

GPIO Buttons:

By default button BUT1 is user button. However, BUT1 can be configured as BOOT button if you solder R6 pads together (or if you solder 0R resistor in 0402 package on same R6 pads). BOOT button might be needed if you need to manually force boot mode.
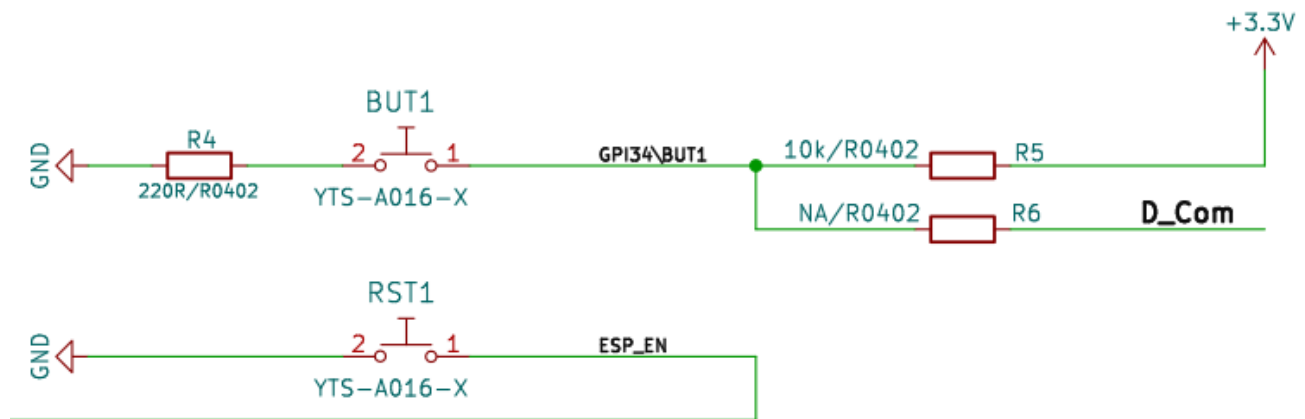
SD card connector (1-bit SD interface):

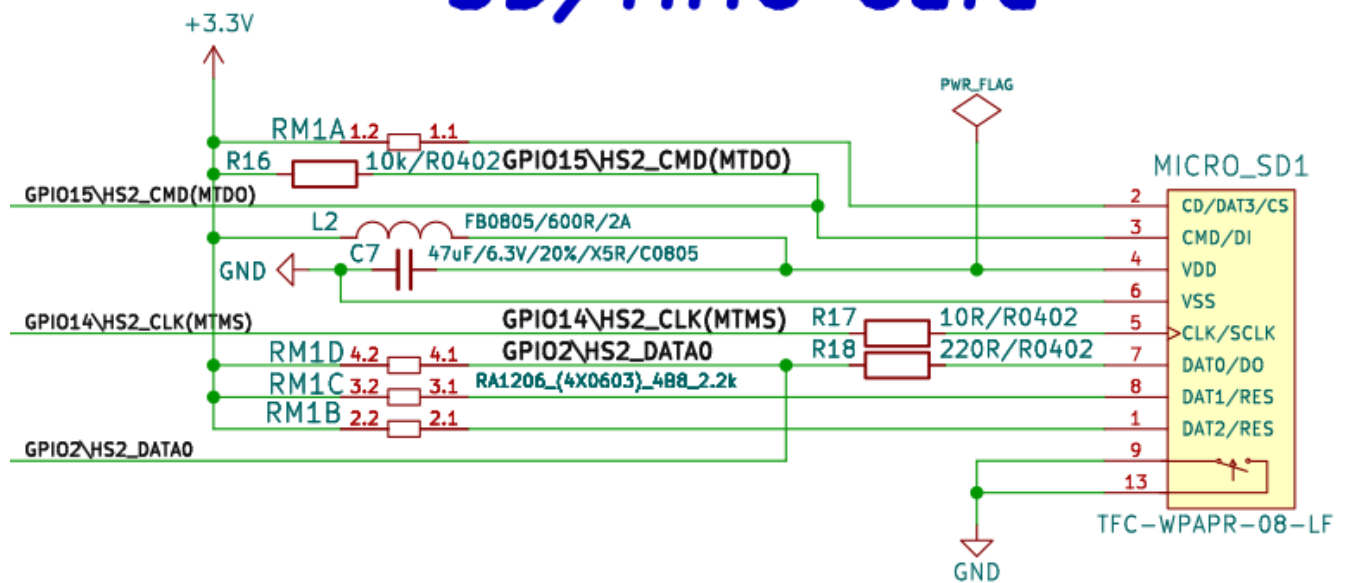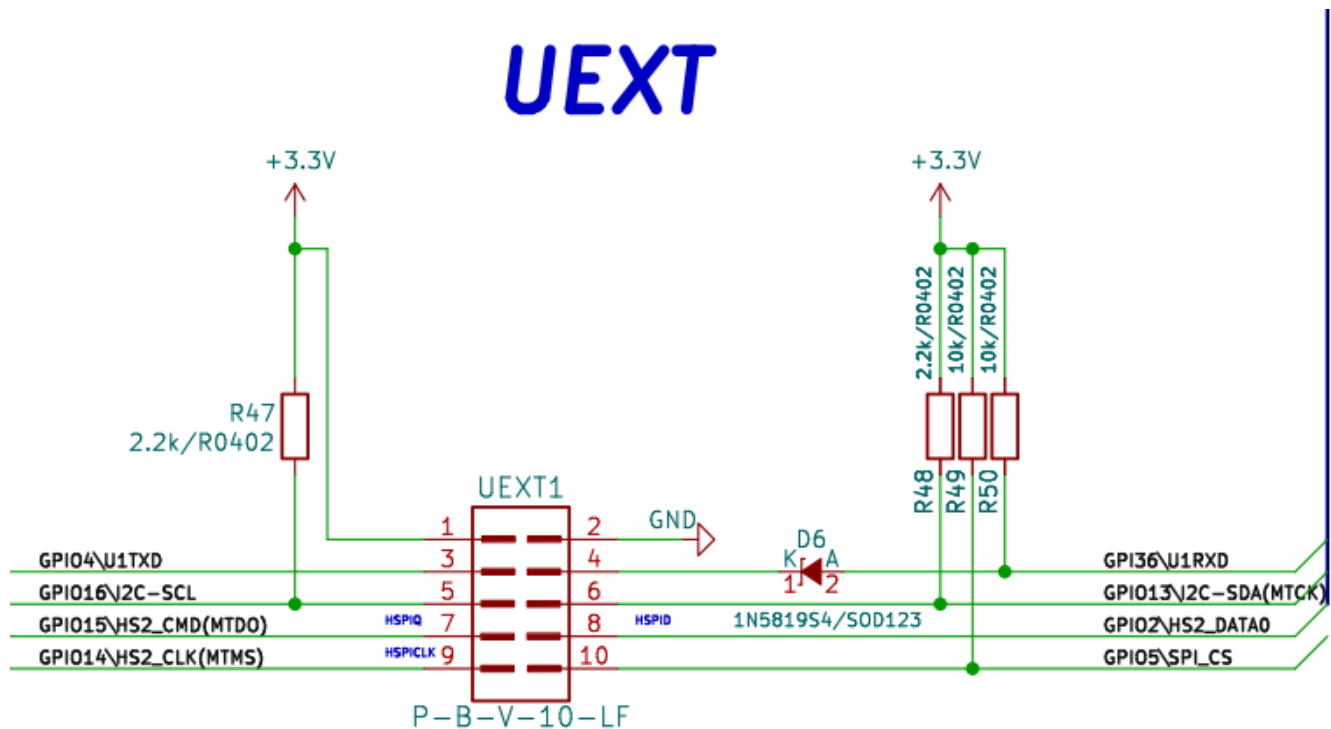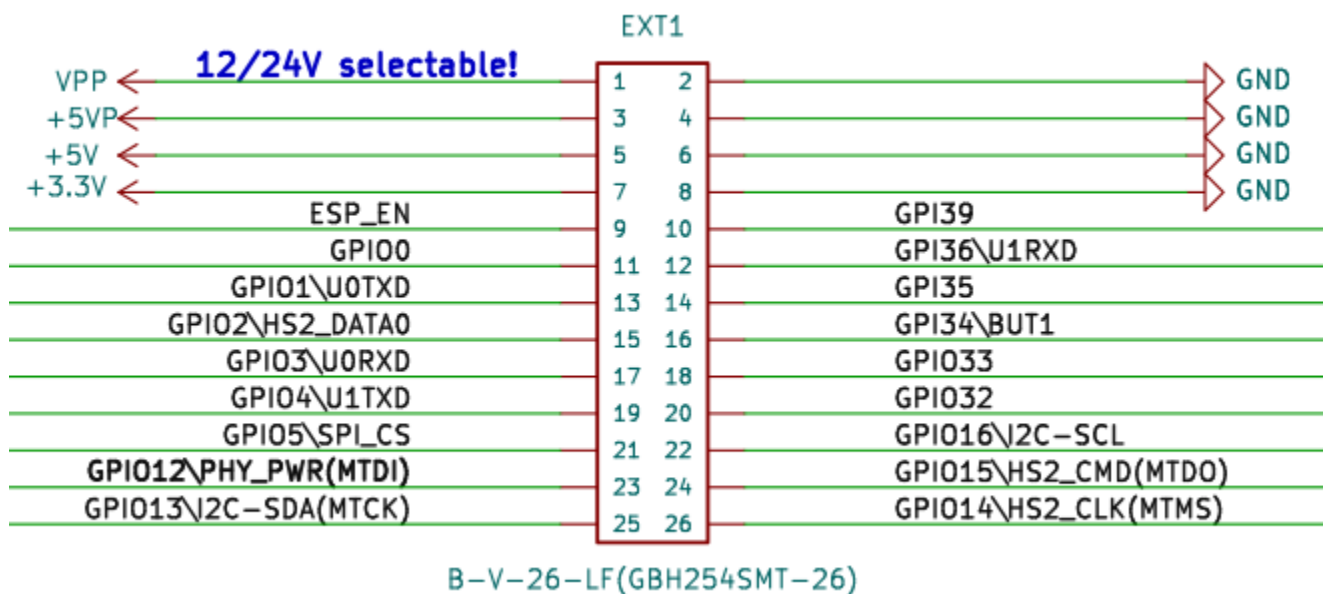**UEXT connector:**

UEXT

+3.3V   +3.3V

R47
2.2k/R0402   2.2k/R0402 10k/R0402 10k/R0402

                                          R48   R49   R50

UEXT1

1		2	GND

GPIO4\U1TXD   3   4   D6   GPI36\U1RXD
GPIO16\I2C-SCL   5   6   K◄A   GPIO13\I2C-SDA(MTCK)
GPIO15\HS2_CMD(MTDO) HSPIQ 7 8 HSPID 1 2 1N5819S4/SOD123 GPIO2\HS2_DATA0
GPIO14\HS2_CLK(MTMS) HSPICLK 9 10   GPIO5\SPI_CS

P-B-V-10-LF

EXT1 connector:

EXT1

12/24V selectable!

VPP	1	2	GND
+5VP	3	4	GND
+5V	5	6	GND
+3.3V	7	8	GND
ESP_EN	9	10	GPI39
GPIO0	11	12	GPI36\U1RXD
GPIO1\U0TXD	13	14	GPI35
GPIO2\HS2_DATA0	15	16	GPI34\BUT1
GPIO3\U0RXD	17	18	GPIO33
GPIO4\U1TXD	19	20	GPIO32
GPIO5\SPI_CS	21	22	GPIO16\I2C-SCL
GPIO12\PHY_PWR(MTDI)	23	24	GPIO15\HS2_CMD(MTDO)
GPIO13\I2C-SDA(MTCK)	25	26	GPIO14\HS2_CLK(MTMS)

B-V-26-LF(GBH254SMT-26)

POWER SUPPLY:

VPP   selectable 12V/1.5A or 24V/0.75A output from PoE, depends on PTH jumper state

+5VP   5V/1.5A output from PoE

+5V   1. can be input or output

2. when board is connected to USB or to Ethernet PoE this line can be used as output and power other circuits

3. if you want to use as input i.e. to power the board from external 5V on this pin sure board is not connected to the USB!

+3.3V   output which can source up to 0.5A @ 3.3V i.e. (1.65W)

GPIOs:

ESP_EN resets ESP32 module

GPIO0, **GPIO1** are used only during programming, after that are free to use

GPIO2, **GPIO14**, **GPIO15** are used for the SD-card, if no SD card is present these are free to use

GPIO2, **GPIO4**, **GPIO5**, **GPIO13**, **GPIO14**, **GPIO15**, **GPIO16**, **GPIO36** are shared on both UEXT and EXT1,2 headers so if you use them at one connector do not use at the other

GPI39 is used to measure external power supply voltage

GPI34 is connected to used button and have 10K pullup

GPI35 is free to use but can be connected to measure the LiPo battery voltage if SENS_BAT_E1 solder jumper

ESP32-POE2 schematics:

ESP32-POE2 latest schematic is on GitHub

ESP32-POE2 power supply:

ESP32-POE2 can be powered by 4 sources:

- Ethernet PoE

- USB-C connector

- LiPo battery

- EXT1 pin 5 (+5V) note that this signal is connected to USB 5V signal so when you power with this pin you should not connect the board to the USB!

Power consumption of ESP32-POE2 is between 50 and 200mAdepend on the operation mode.

If LiPo battery is connected it's charged automatically when power supply is attached with about 100mA.

When the LiPo battery is attached and external power supply is missing internal DCDC step-up converter and switching circuit automatically powers ESP32-POE from the battery. 1400mAh battery will provide about 8 hours of stand alone operation.

+The LiPo battery connector is JST 2.0 mm connector and with Olimex's battery polarity. If you use batteries from other manufacturers please make PLUS and MINUS are connected properly as you may damage the board!!!
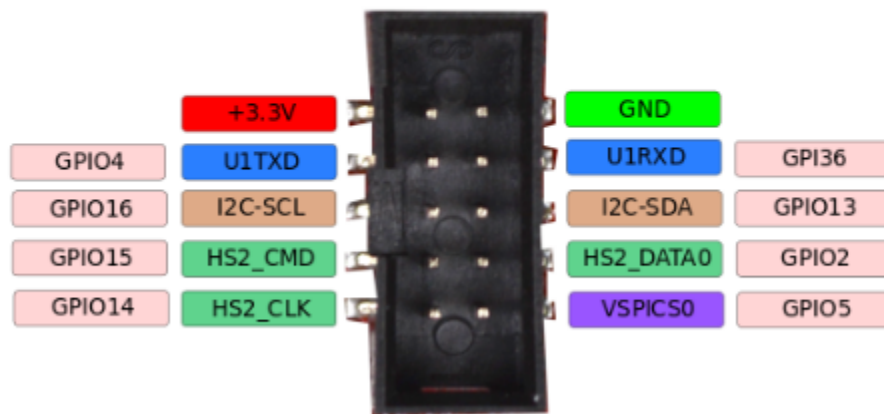
UEXT connector:

UEXT connector stands for Universal EXTension connector and contain +3.3V, GND, I2C, SPI, UART signals.

UEXT is 0.1" 2.54mm step boxed plastic connector. All signals are with 3.3V levels.

Olimex has developed number of MODULES with this connector. There are temperature, humidity, pressure, magnetic field, light sensors. Modules with LCDs, LED matrix, Relays, Bluetooth, Zigbee, WiFi, GSM, GPS, RFID, RTC, EKG, sensors and etc.

SOFTWARE:

ESP32-POE2 uses same software as ESP32-POE which is very popular board and supported by

- Espressif ESP-IDF
- MicroPython
- Arduino IDE
- Esphome
- PlatformIO

Document Revision History

Revision 2.0 May 2024

- Fixed wrong info about ESP32 module - the board is manufactured with WROVER module, not WROOM;

- Clarified warnings about isolation;

- Added some extra info about different GPIOs;

- Spelling improvements.

Revision 1.0 April 2024