

ESP32-POE2

User Manual

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www.olimex.com

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Introduction to ESP32-POE2

[ESP32-POE2](#) is an upgraded version of the popular [ESP32-PoE](#) board with more power output capabilities. ESP32-POE2 is 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 provide 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 additional peripherals. 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 board requires networking equipment that complies with IEEE 802.3af. It is **STRONGLY** recommended to use **isolated PoE equipment**.

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

ESP32-POE-ISO has limited output voltage range. There are only 5V and 3.3V outputs available, while ESP32-POE2 has also 12V DC or 24V DC.

[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.

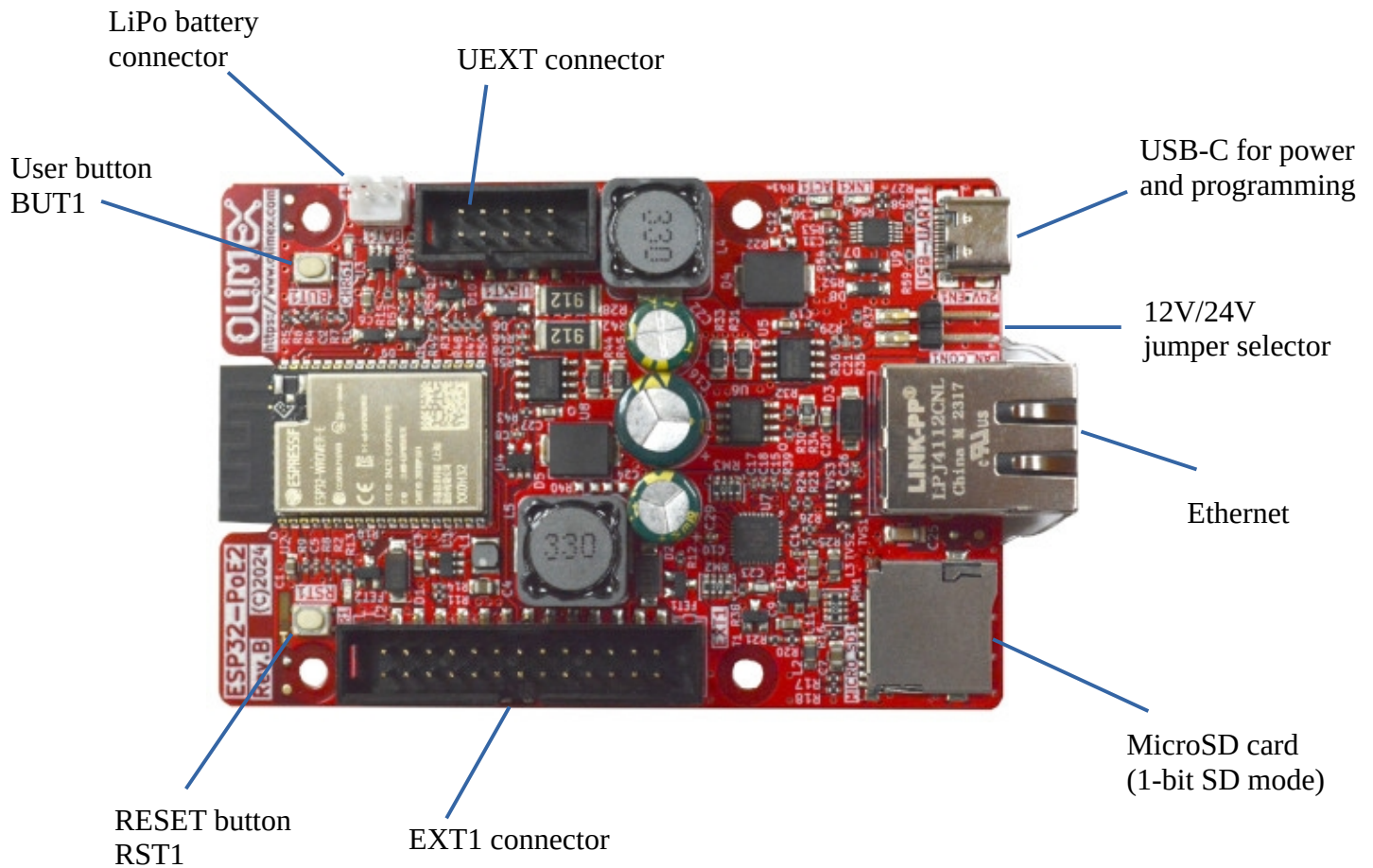
- + YOU SHOULD NOT CONNECT [ESP32-POE2](#) to computer's USB port while it's powered by Ethernet POE!!! If you connect USB while [ESP32-POE2](#) is powered by Ethernet you will damage the board or your computer or both. This also voids the warranty!
- + The board is susceptible to grounds loops. Make sure your PoE network equipment is isolated.
- + The most optimal setup for the board is being connected just to the PoE Ethernet cable and all attached peripherals are attached only to ESP32-POE2. No sources of power with different ground should be attached at the same time. Additional boards that are attached to ESP32-POE2 and are also attached to other sources of power supply (being powered from other sources) can also cause problems!

Order codes for ESP32-POE2 and accessories:

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

HARDWARE

ESP32-POE2 layout:

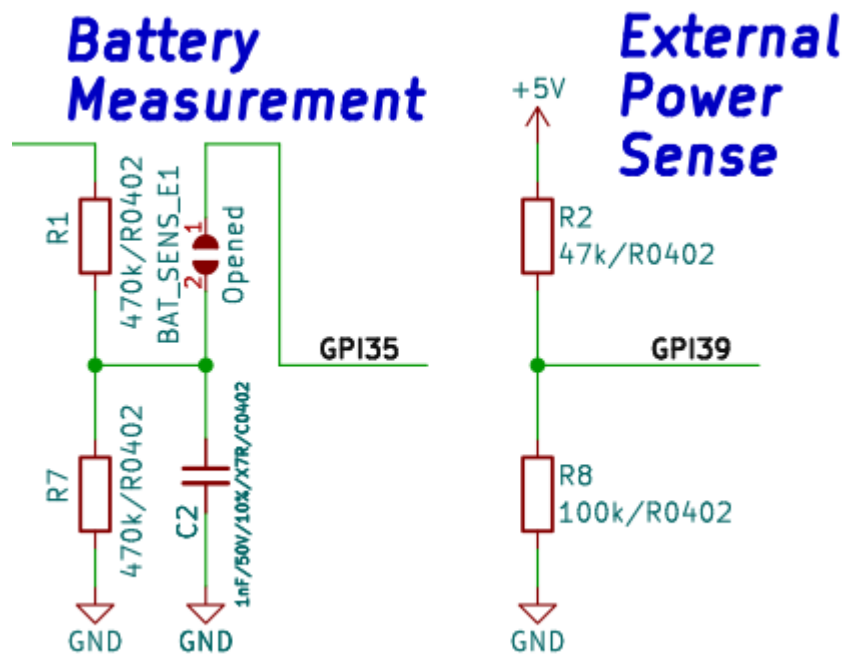


ESP32-POE2 GPIOs:

+ ESP32 chip and modules have very good pin multiplexing. You can define any free GPIO pin for almost any goal. This means if you need to use I2C, you are not forced to strictly use GPIO13 and GPIO16 but can re-define other pins, say GPIO32 and GPIO33 for I2C operation!

Power sense and battery level measurement:

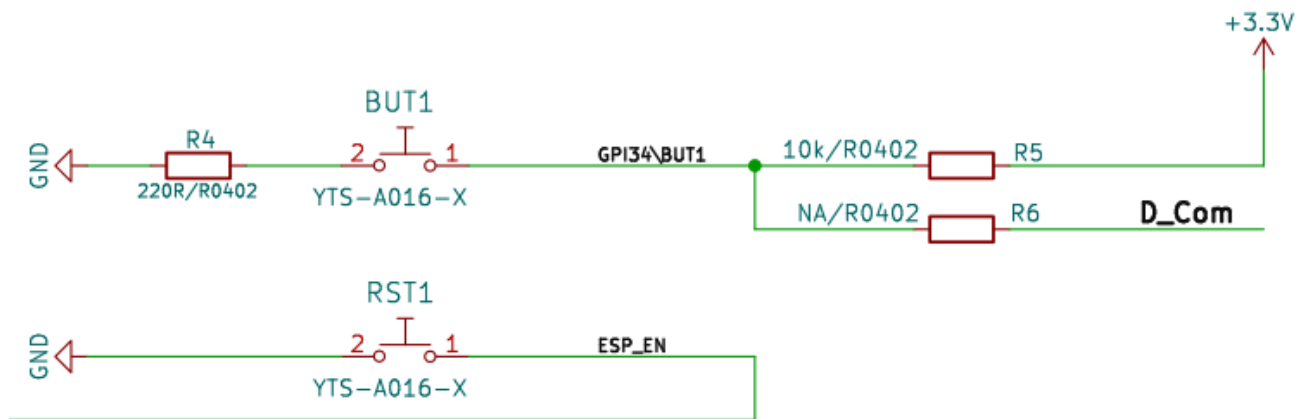
- External power sense available on GPI39
- Battery measurement disabled by default (for additional free GPIO), but can be enabled by SMT jumper change
- Close SMT jumper BAT_SENS_E1 to enable battery measurement on GPI35.



GPIO Buttons:

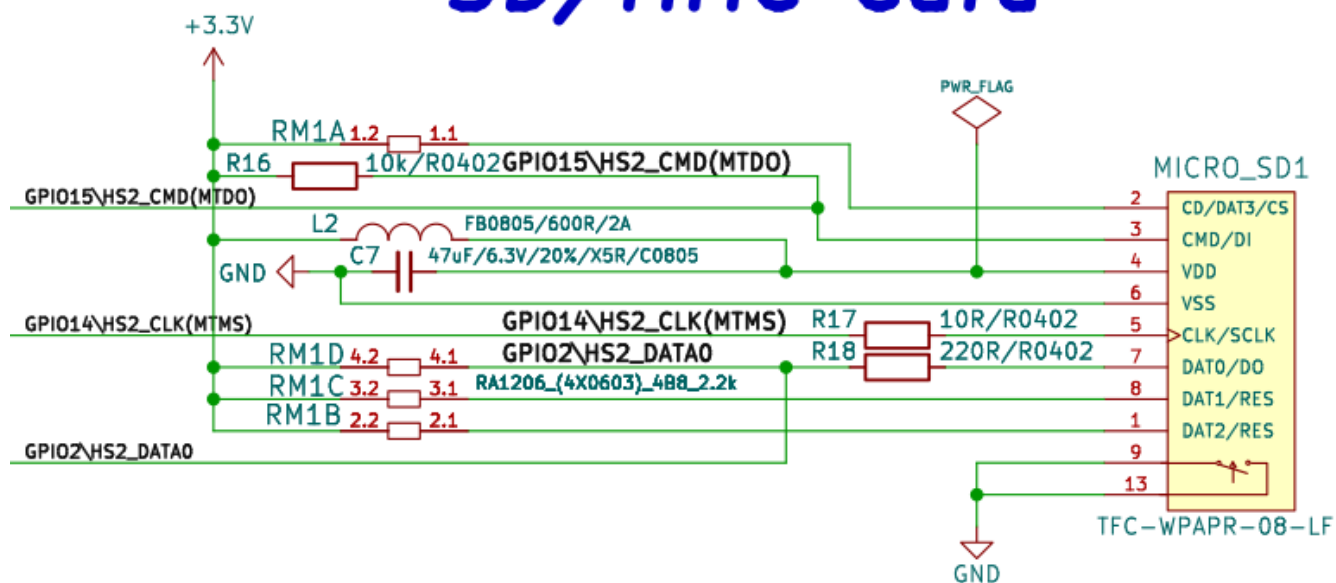
By default button BUT1 is user button since the board automatically enters bootloader mode. However, BUT1 can be configured as BOOT button if you solder R6 pads together (or if you solder 0R resistor in 0402 package on same R6 pads). BOOT button might be needed if you need to manually force boot mode.

Buttons

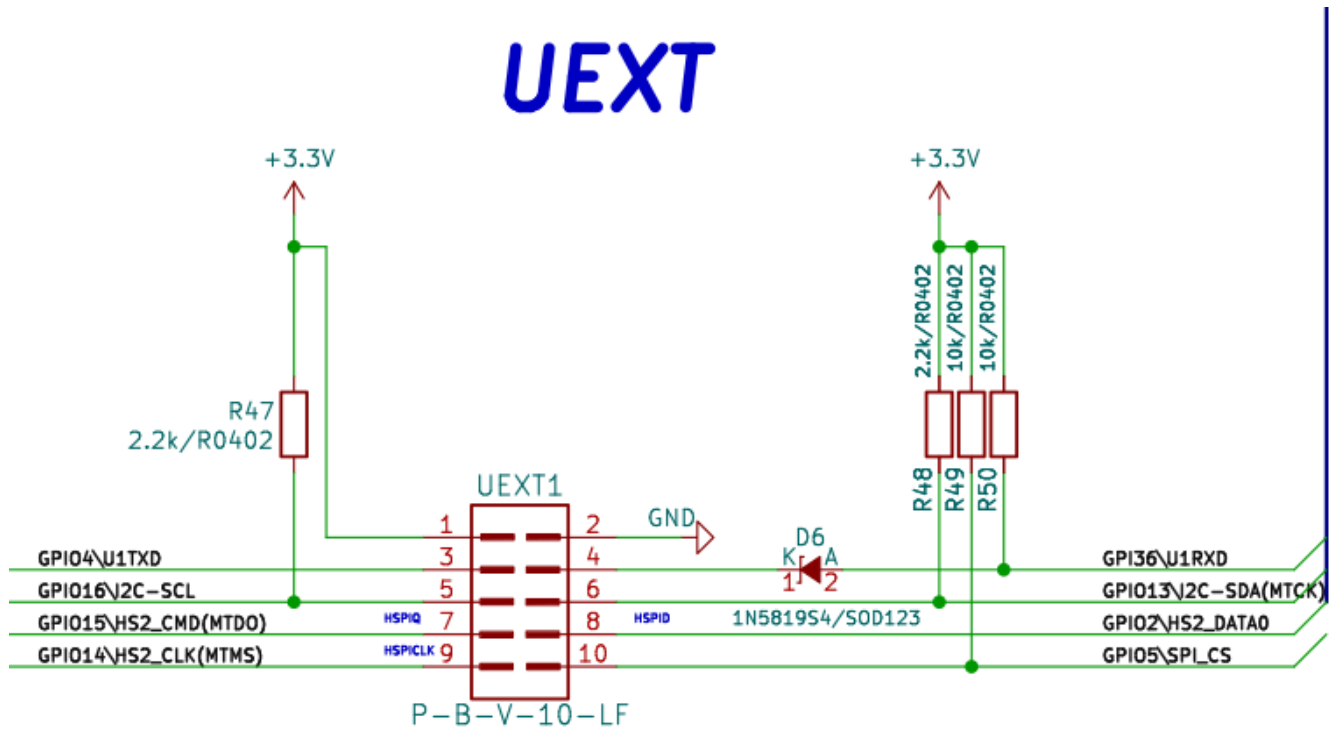


SD card connector (1-bit SD interface):

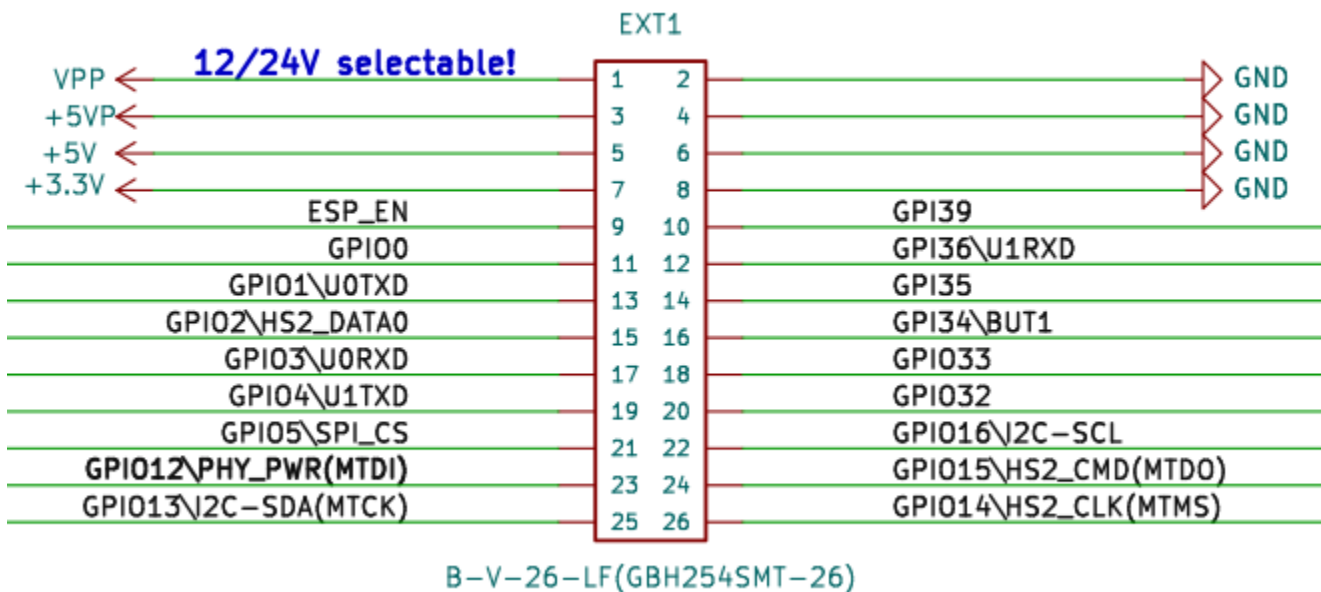
SD/MMC Card



UEXT connector:



EXT1 connector:



POWER SUPPLY:

VPP selectable 12V/1.5A or 24V/0.75A output from PoE, depending on 24V_E1 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

GPIO39 is used to measure external power supply voltage

GPIO34 is connected to used button and have 10K pullup

GPIO35 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 200mA depend 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!!!

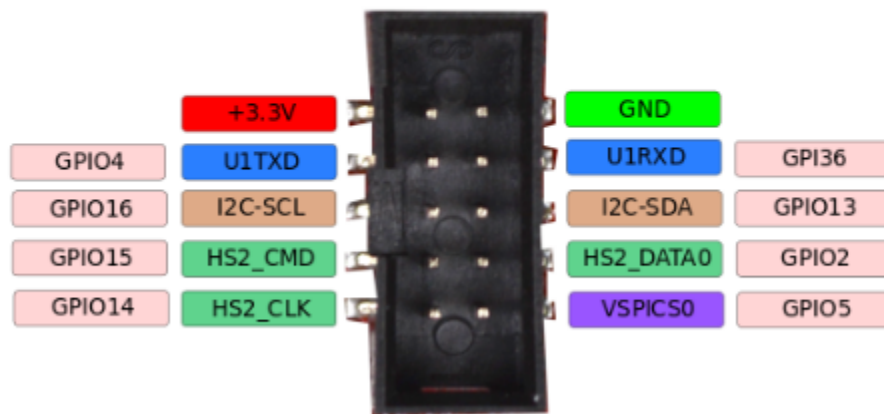
UEXT connector:

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.

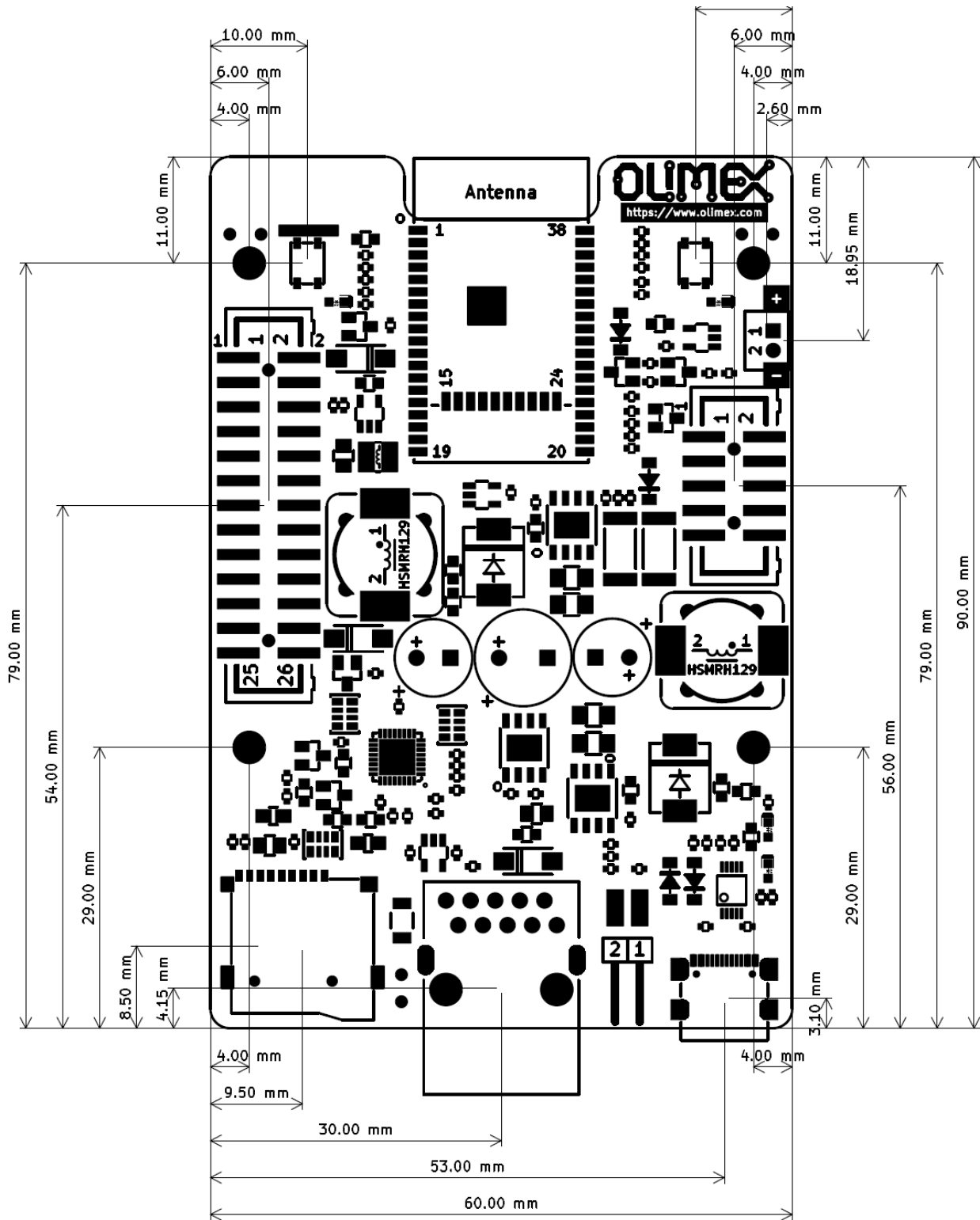
UEXT connector

note it share same pins with EXT1 and EXT2



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.

DIMENSIONS



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 2.1 May 2024

- Added dimensions
- Spelling improvements

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