

# Espoir



## 1 Overview

Espoir is a Power over Ethernet+ (PoE+ 802.3af/at) mikroBUS™ mainboard based on the ESP32-MINI-1 microcontroller. It reduces risk, cost, and time to market by taking care of the often more challenging aspects of designing power supply and high-speed circuits of a microcontroller board. Developers can focus on their application and get to testing and deployment quickly.

Espoir's mikroBUS™ socket provides incredible ease of use, with over 1,300 mikroBUS™ add-on boards available right away, including Connaxio's mikroShield and makroShield (coming soon™) families.

### Example applications

Smart farming  
Smart lighting  
Access control  
Assembly line tracking  
Home automation

### Compatible IDEs

Eclipse IDE  
PlatformIO IDE  
Arduino IDE  
PyCharm  
... and many others.

### Compatible frameworks

Espressif's ESP-IDF  
Arduino  
MicroPython  
ESPHome (soon™)  
Tasmota (soon™)

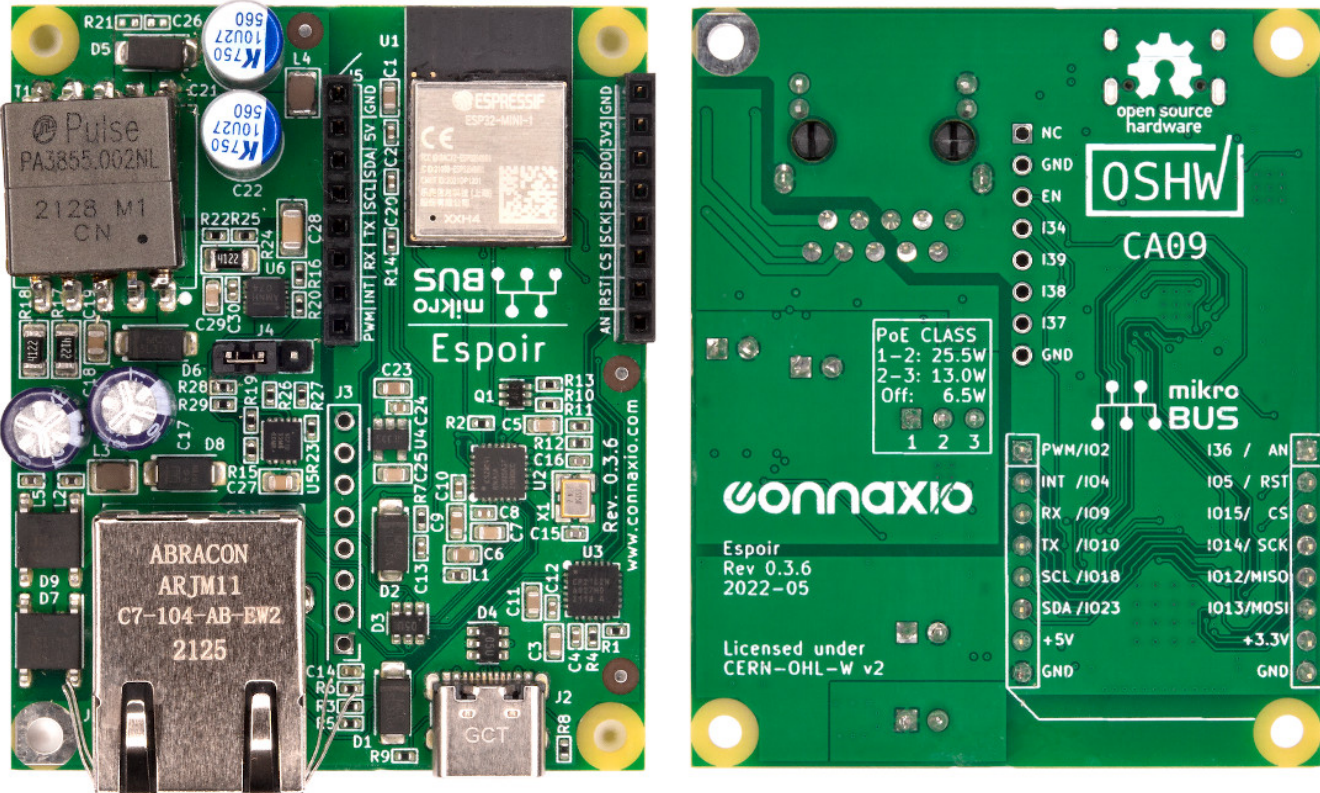
## 2 Features

- Processing
  - ESP32-MINI-1: Single core 240 MHz
  - 520 KB SRAM
  - 4 MB flash
- Power
  - Input: PoE+ 37 V - 57 V (Pi-filtered) through the Ethernet connector, with 2,250 V isolation, and jumper-selectable PoE Class 2, 3, and 4
  - Input: 5 V through the USB-C connector<sup>1</sup>
  - Output: 5 V at 3 A (15 W) (Pi-filtered) with overload and thermal protections
  - Output: 3.3 V at 0.7 A (2.3 W)<sup>2</sup>
- Connectivity
  - Wifi 2.4 GHz 802.11b/g/n & integrated antenna
  - Bluetooth 4.2 BLE
  - Ethernet 10/100-BaseT (80+ mbps throughput)
  - USB 2.0 via USB-C connector (tested at 2 MBaud)
  - 11 analog-digital input-output pins and 5 analog-digital input-only pins
  - Available peripherals: ADC, Touch sensor, JTAG, SD/SDIO/MMC, PWM, SDIO/SPI, UART, I<sup>2</sup>C, I<sup>2</sup>S, RMT, SPI, QSI, Pulse counter, TWAI (CAN 2.0)
- Mechanical
  - Weight: 31 g
  - Size: 50.8 x 61.0 mm<sup>2</sup>
  - PCB thickness: 1.6 mm
  - Four copper layers provide augmented thermal dissipation and electromagnetic compatibility
  - Mounting holes: Four M2.5 / 4-40 holes. The bottom-left hole is plated and connected to local ground.
  - One mikroBUS<sup>TM</sup> socket with two grounds, 5 V, 3.3 V, and 12 IOs
  - One optional extension header with two grounds, four input-only pins and the MCU's reset signal.
  - An L format (57.15 mm / 2.25 in) mikroBUS<sup>TM</sup> add-on board arrives flush with the opposite side of the PCB.
- Operating temperature range: -40°C to +85°C

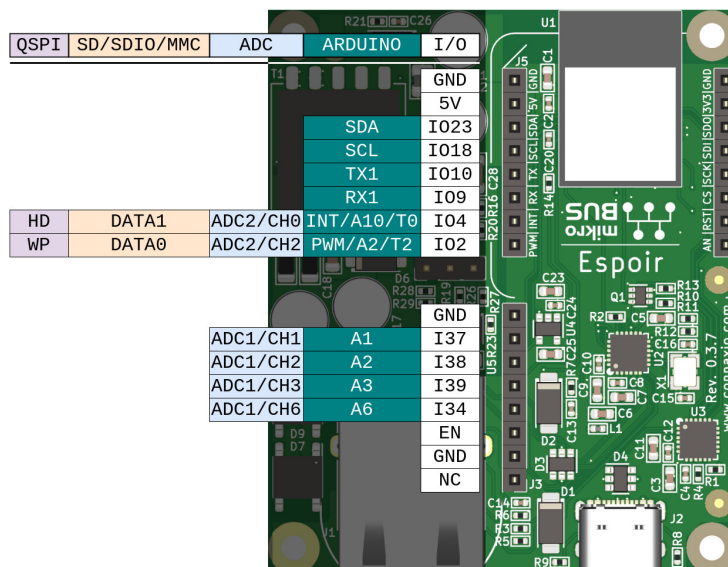
<sup>1</sup> USB VBUS (5 V) is connected to the 5 V rail through a schottky diode. When only USB power is connected, the voltage on the 5 V rail is 4.6 V.

<sup>2</sup> The 3.3 V rail is derived from the 5 V supply. Current consumed by the 3.3 V rail counts towards the 5 V rail's maximum current supply.

### 3 Top and bottom views



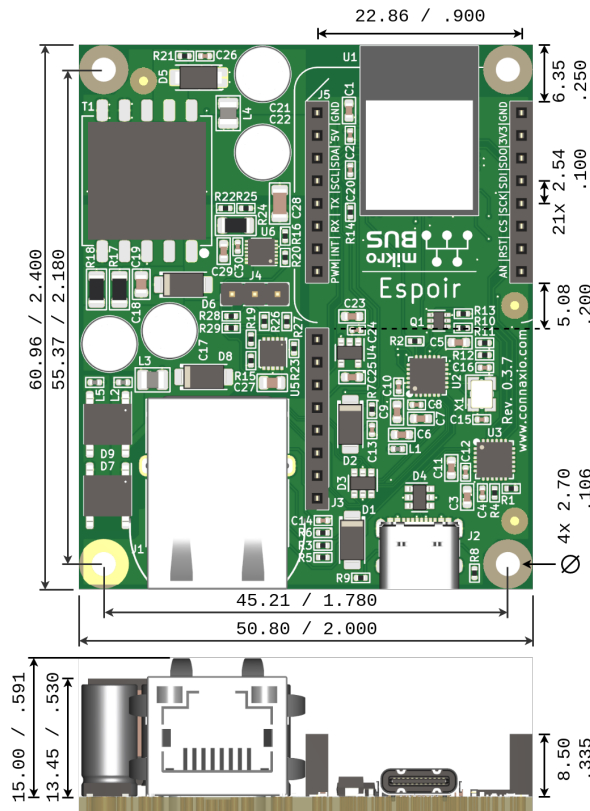
### 4 Pinout



I/O	ARDUINO	ADC	SD/SDIO/MMC	QSPI	JTAG
GND					
3.3V					
I013	MOSI/SD0/A14/T4	ADC2/CH4	DATA3	D	MTCK
I012	MISO/SDI/A15/T5	ADC2/CH5	DATA2	Q	MTDI
I014	SCK/A16/T6	ADC2/CH6	CLK	CLK	MTMS
I015	CS/SS/A13/T3	ADC2/CH3	CMD	CS0	MTDO
I05	RST				
I36	AN/A0	ADC1/CH0			

- UART, I<sup>2</sup>C, SPI, PWM, I<sup>2</sup>S, RMT, TWAI (CAN2.0): Any I/O
- I34-I39 are input-only pins

## 5 Dimensions



The main dimensions of Espoir are presented here. Complete 3D models can be found in Espoir's repository on Github.

The connector shields and the bottom-left mounting hole are connected to the local ground. It is therefore safe (and recommended) to connect them to a metal case.

Care must be taken to leave enough spacing under the PCB to avoid accidental contact of the through-hole pins with the case. A 1 mm gap should be observed between the pins and any conductive material to maintain proper isolation. 3 mm between the bottom of the PCB and the mounting surface is typically a good starting point.

## 6 Safety considerations

### Electrocution hazard

The area around the main transformer and Ethernet jack contains parts that operate at a typical voltage of 57 V, with peak voltages of up to 150 V. In some situations, these voltages may cause injury or death. Avoid contact with the SMD components (top) or solder joints (bottom) during operation.

### Burn hazard

Under constant heavy load, the area and parts around the main transformer may reach over 100°C and cause severe burns. Avoid contact with both the top and bottom of the PCB in that region when high load conditions are expected.

An IP20 enclosure with proper ventilation is recommended to avoid accidental contacts and overheating.

## 7 Certifications

Directive	Applicable standards

## 8 Quick links

Resource	URL
Espoir @ Connaxio	<a href="https://www.connaxio.com/electronics/espoir/">https://www.connaxio.com/electronics/espoir/</a>
Source @ Github	<a href="https://github.com/Connaxio/espoir">https://github.com/Connaxio/espoir</a>
Purchase @ Crowd Supply	<a href="https://www.crowdsupply.com/connaxio/espoir">https://www.crowdsupply.com/connaxio/espoir</a>
OSHA certification	<a href="https://certification.osha.org/ca000009.html">https://certification.osha.org/ca000009.html</a>
ESP32-MINI-1's Datasheet	<a href="https://www.espressif.com/sites/default/files/documentation/esp32-mini-1_datasheet_en.pdf">https://www.espressif.com/sites/default/files/documentation/esp32-mini-1_datasheet_en.pdf</a>
ESP32-U4WDH's Datasheet	<a href="https://www.espressif.com/sites/default/files/documentation/esp32_datasheet_en.pdf">https://www.espressif.com/sites/default/files/documentation/esp32_datasheet_en.pdf</a>
Connaxio @ Twitter	<a href="https://twitter.com/connaxio">https://twitter.com/connaxio</a>
Connaxio @ LinkedIn	<a href="https://www.linkedin.com/company/connaxio/">https://www.linkedin.com/company/connaxio/</a>