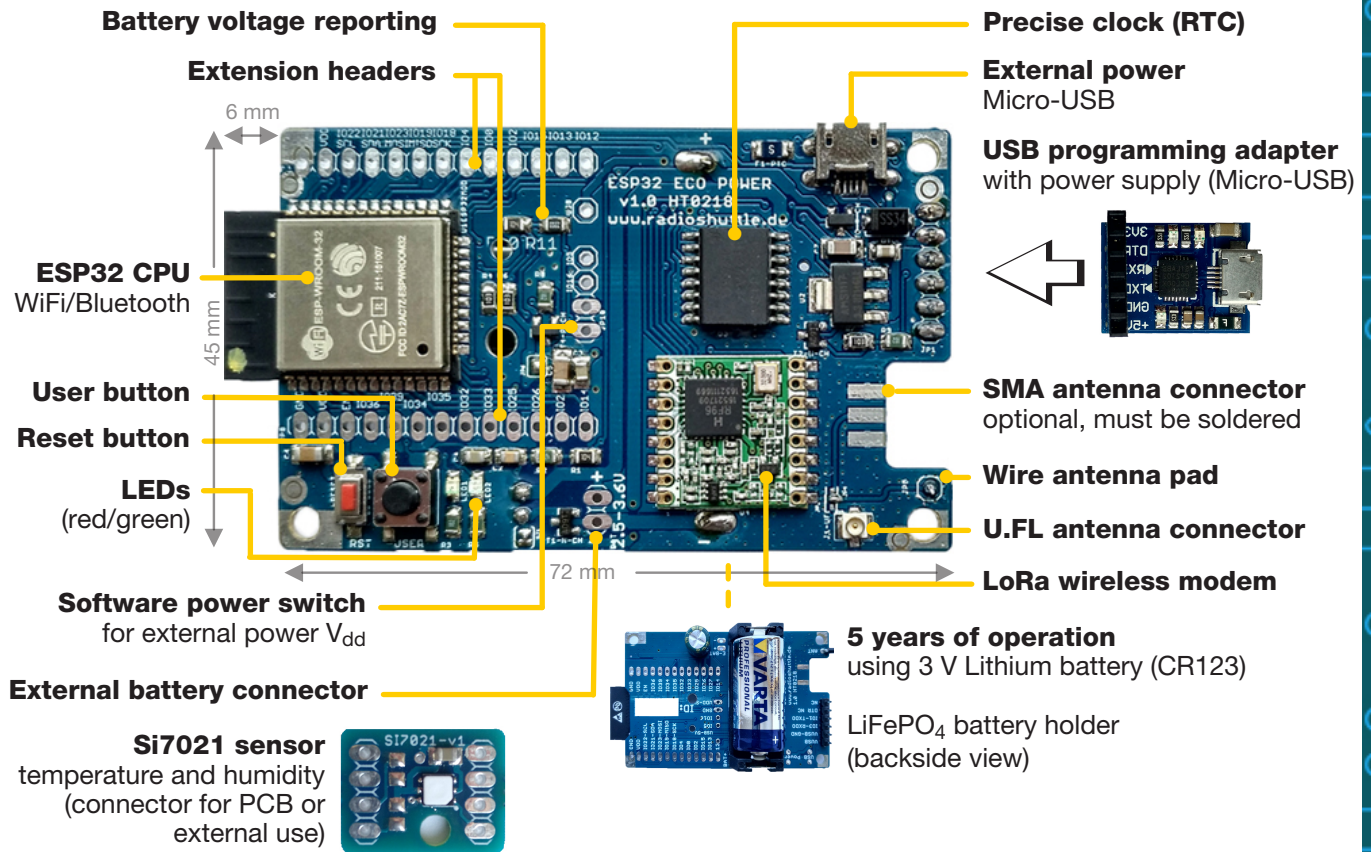


ESP32 ECO Power with LoRa

Arduino compatible, for Industrial use, ready for Makers



Arduino ESP32 with LoRa

This turnkey Arduino ESP32 board can immediately be used in an Arduino environment. The included RadioShuttle wireless protocol software allows node-to-node communication without the need of additional routers or servers. The solution is designed for battery operation (CR123) but can also be operated with an external power supply. A standard extension header allows custom hardware extensions. Simply brilliant!

LoRa wireless technology

The LoRa wireless technology allows sensors to communicate in the free 868 MHz ISM band across great distances from 200 m to 20 km, and is suited for small data rates. Our new Arduino ESP32 LoRa board can run for years on one battery, due to our proprietary

“RadioShuttle” LoRa wireless protocol software which has a very low energy requirement.

As existing LoRa modules do not meet our expectations, we developed this hardware and software completely from scratch. We are confident that our groundbreaking LoRa wireless solution will prove to be ideal for a range of uses, including many sensor applications.

LoRa basics

LoRa utilizes spread-spectrum modulation, which is used by LoRa in the free 433 MHz and 868 MHz ISM frequencies in Europe. We use 868 MHz because this band is less busy and better controlled. LoRa offers a superior wireless experience.

Peer-to-peer LoRa wireless protocol software

We do not use the standardized LoRaWAN protocol because it is not efficient enough, does not support direct node-to-node communication, and is too costly and complex for many users.

We have developed a completely new LoRa wireless protocol software, called “RadioShuttle”, which can efficiently send messages in a fast and secure way between simple LoRa modules.

The RadioShuttle software can be operated as a server or node.

ESP32 ECO Power with LoRa

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Hardware

- Arduino ESP32 compatible board
- ESP32 MCU (2x 240 MHz)
- 4 MB Flash, 512 kB RAM
- Dedicated RTC (very accurate)
- 2 buttons (1 User, 1 Reset)
- 2 LEDs (red, green)
- ESP32 extension headers
 - 2x 13 pin headers + 5 pins
 - SPI, I²C bus available
 - RX/TX programming pins
 - 13 GPIOs freely available
 - Software controlled power pin (battery voltage)
 - USB power pin (5 V)
- Micro-USB for external power supply
- Micro-USB programming adapter
 - Power supply via USB
 - Arduino Serial Monitor
- Optimized for battery use
 - Battery voltage reporting
 - 2.5-3.6 V operating voltage
 - Battery holder (CR123) for:
 - Lithium 3 V battery
 - Rechargeable 3 V LiFePO₄
 - 5 years operation on one 1700 mAh battery, reduced energy consumption using deep sleep
 - External battery connector (2 pins)
- Automatic power selection (battery/USB)

ESP32 capabilities

- WiFi as client or server
- Bluetooth support

Development environment

- Standard Arduino IDE for Mac, Windows, and Linux

LoRa radio

- LoRa chip 168 dB link budget (Semtech SX1276 based)
EU: 868 MHz
- Optimized antenna:
 - 8.2 cm external wire (antenna ground plane on board)
 - U.FL connector
 - SMA connector (optional)
- License-free operation

Wireless protocol software “RadioShuttle”

- Reliable message transmission, receipt is confirmed, lost data is automatically repeated
- Simple message transmission (requires less time/energy), e.g. temperature data
- Parallel queueing and processing of different messages to one or more stations (energy efficient protocol processing in the background)
- Unique 32-bit device ID (device number) per LoRa participant, unique 16-bit app ID (program number for communication)

RadioShuttle data security

- AES 128-bit encryption
- SHA-256 encrypted passwords with random number per login
- Secure against replay attack

RadioShuttle operating mode

- As a node (node-offline)
- As a node (node-online)
- As a server (station-basic)

Temperature sensor

- Silicon Labs Si7021
- Temperature (-40 °C ... +85 °C)
- Humidity (0 ... 80%)
- Sensor module (included):
 - 15 mm x 15 mm, connector for PCB or external use

Dimensions

- 72 mm x 45 mm x 20 mm
Battery holder, pin headers can be omitted to reduce height

More information:

www.arduino-hannover.de

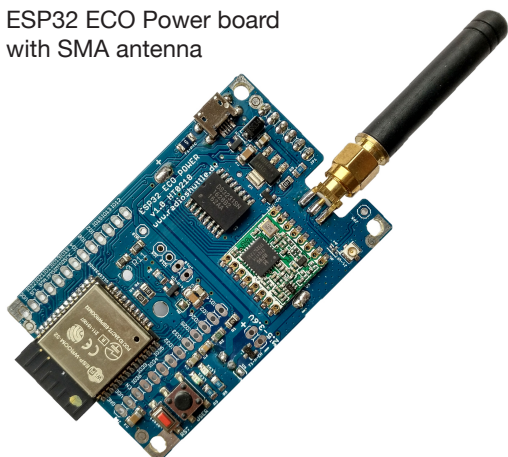
Technical guide:

www.radioshuttle.de/en/esp32-eco-power-en/esp32-eco-power-board-en/

RadioShuttle protocol:

www.radioshuttle.de/en/radioshuttle-2/protocol/

ESP32 ECO Power board with SMA antenna



Backside view of ESP32 ECO Power board with battery holder and soldered-on wire antenna

