ESP32-GATEWAY

User Manual

Document revision 2.1, October 2024

www.olimex.com

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1. What is ESP32-GATEWAY

ESP32-GATEWAY is a mature Open Source Hardware development board that incorporates n ESP32 module. The ESP32-GATEWAY board is designed and manufactured by Olimex, while the ESP32 module is designed and manufactured by Espressif systems. The ESP32 modules are extremely popular WIFI/BT modules due to their size, price, and very good documentation.

The ESP32-GATEWAY board has the following features:

- ESP32-WROOM-32E or ESP32-WROOM-32UE module with WiFi, BLE connectivity
- USB type C connector for powering and programming with CH340 USB serial converter
- Ethernet 100Mb interface with LAN8710A driver
- MicroSD card
- Reset button
- User button
- Power status LED
- User LED
- GPIO 20 pin connector with all ESP32 ports
- Dimensions: (50 x 62)mm ~ (1.95 x 2.45)"
- Optional external antenna (-EA)
- Industrial grade -40+85C version available (-IND)

1.1 ESP32-GATEWAY variants

The board has 4 variants – ESP32-GATEWAY, ESP32-GATEWAY-EA, ESP32-GATEWAY-EA-IND, ESP32-GATEWAY-IND. The base variant ESP32-GATEWAY works in commercial temperature range (0-70 degrees C) and has on-module antenna.

ESP32-GATEWAY and ESP32-GATEWAY-IND come with ESP32-WROOM-32E module;

ESP32-GATEWAY-EA and ESP32-GATEWAY-EA-IND come with ESP32-WROOM-32UE and external antenna;

ESP32-GATEWAY and ESP32-GATEWAY-EA work in the commercial temperature range 0-70C;

ESP32-GATEWAY-IND and ESP32-GATEWAY-EA-IND have all components rated for operating in the industrial temperature range -40+85C.

1.2 Board use requirements

You only need a fitting USB cable and a personal computer. The latest hardware revision of the board requires USB type C connector. Usually only such cable is required:

https://www.olimex.com/Products/Components/Cables/USB-CABLE-A-TO-C-1M/

Notice that older hardware revisions came with USB micro connector and require USB micro cable.

The computer needs software compatible with ESP32 modules. Most commonly used tools are ESP-IDF and Arduino IDE with ESP32 package. You can use ESP32-GATEWAY with any software tool that supports the main ESP32 module.

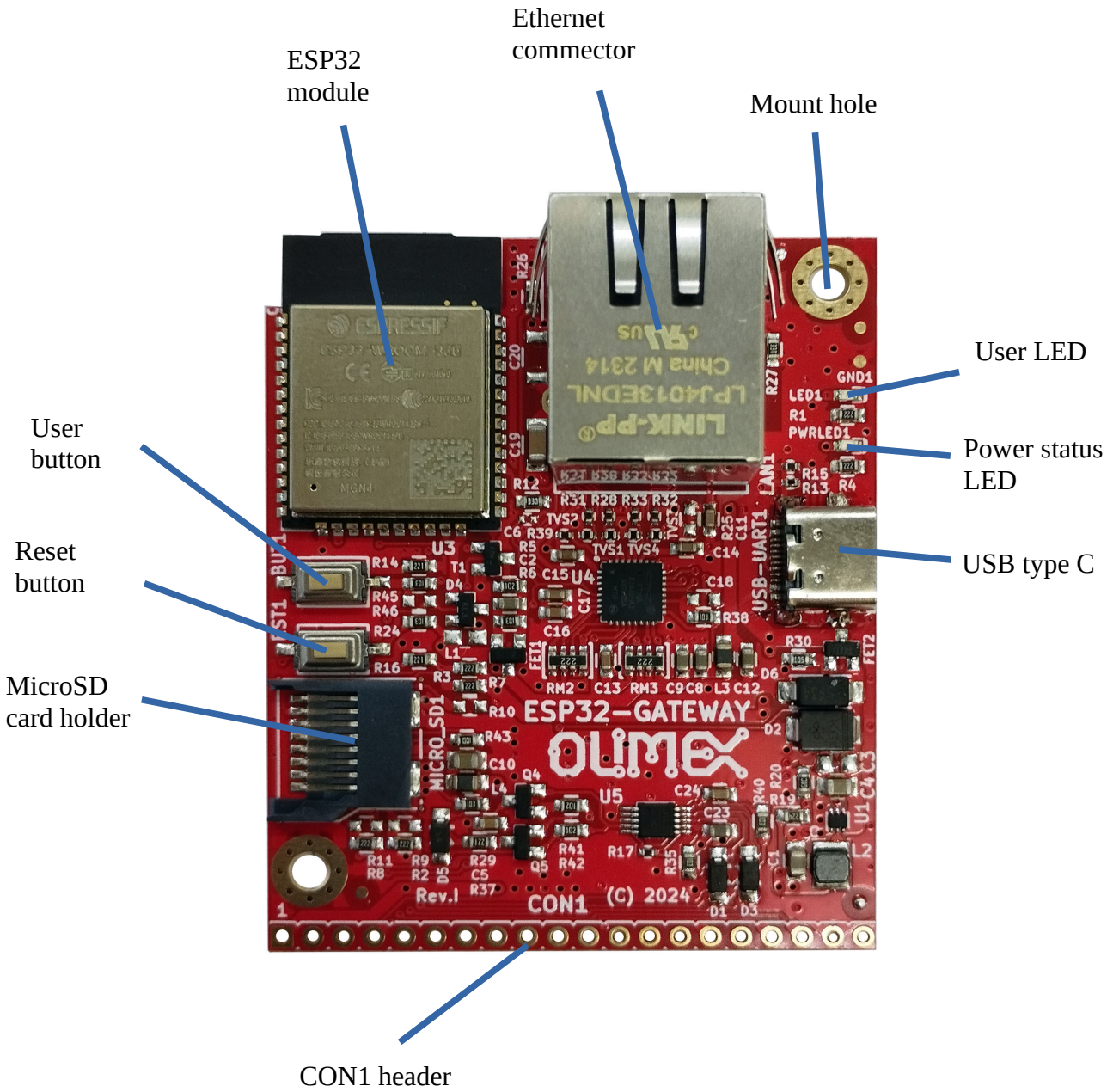
1.3 ESP32-GATEWAY Open Source Licenses

ESP32-GATEWAY is Open Source Hardware, listed in OSHWA.org here:

https://certification.oshwa.org/bg000012.html

The hardware files are released under CERN OSHW license.
The software is released under GPL 3 license.
The documentation is released under CC BY-SA 3.0 license.

2. ESP32-GATEWAY general layout



3. ESP32-GATEWAY power supply and consumption

ESP32-GATEWAY typically consumes around 50mA of current depending on the software. The board can consume much less (uA) using the ESP32 power saving modes.

The absolute maximum power ESP32-GATEWAY can draw from the power supply would be the determined by the maximum input of the regulator on the power input line. Of course, consider that on-board peripherals and the main module would use some of that current. When you power the board from either the USB or the +5V pin of the CON1 header → the regulator is TPS62A02ADRLR can output maximum 2000mA continuously.

4. ESP32-GATEWAY schematics and dimensions

ESP32-GATEWAY was designed with KiCAD (free and open-source CAD tool). ESP32-GATEWAY schematics and sources can be found at GitHub here:

https://github.com/OLIMEX/ESP32-GATEWAY/tree/master/HARDWARE

There are also PDF exports if you don't want to install KiCAD.

Board dimensions can be found here:

https://www.olimex.com/Products/IoT/ESP32/ESP32-GATEWAY/resources/ESP32-GATEWAY-general-dim.png

5. ESP32-GATEWAY pinout description:

The board's pinout can be seen here:

https://www.olimex.com/Products/IoT/ESP32/ESP32-GATEWAY/resources/ESP32-GATEWAY-GPIOs-Rev.F-up.pdf

The ESP32 chip has very good multiplexer so you can set the free GPIO pins for alternative functions via software means.

The SD card interface is in 1-bit eMMC mode.

By default GPIO17 is not lead to the CON1 header to reduce noise on the Ethernet clock line. You can solder together the pads of jumper GPIO17_E1 if you wish to lead it to the CON1 header.

6. ESP32-GATEWAY software installation

Esspresif guide for Arduino IDE installation – after installation – there is own entry for the board, it should be listed as OLIMEX ESP32-GATEWAY in the board selection.

Espressif ESP-IDF installation.

Esspressif guide for PlatformIO installation.

Olimex provides some ESP-IDF and Arduino examples here:

https://github.com/OLIMEX/ESP32-GATEWAY/tree/master/SOFTWARE

7. FAQ

- I received ESP32-GATEWAY and expected USB micro connector but the board came with USB type C connector. Was there a mistake?
  - No. We updated the design with USB type C connector in 2024. It is the more popular connector nowadays.
- I have ESP32-GATEWAY and it appears Ethernet is generating a lot of noise. How can I lower the noise?
  - In hardware revisions prior to revision H, this might be caused by bigger than needed driver strength set by the software on the Ethernet clock pin (GPIO17). Lower the drive strength of the digital output num 17 from the default value 20mA to 5mA. There are usually 4 levels of strength from 0 to 3.

    In Arduino this can be done with:

    gpio_set_drive_capability((gpio_num_t)GPIO_NUM_17, GPIO_DRIVE_CAP_0);

    and also you need to include at top:

    #include "driver/gpio.h"

8. Document revision history

Revision 2.1 October 2024

- Added FAQ section

- Updated pictures

Revision 2.0 October 2024

- Hardware design changed – main changes are USB connector now USB type C and Ethernet clock routing improved, jumpers added at bottom

Revision 1.0 August 2024