# Groundstudio Carbon V3 development board

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# Board Pinout

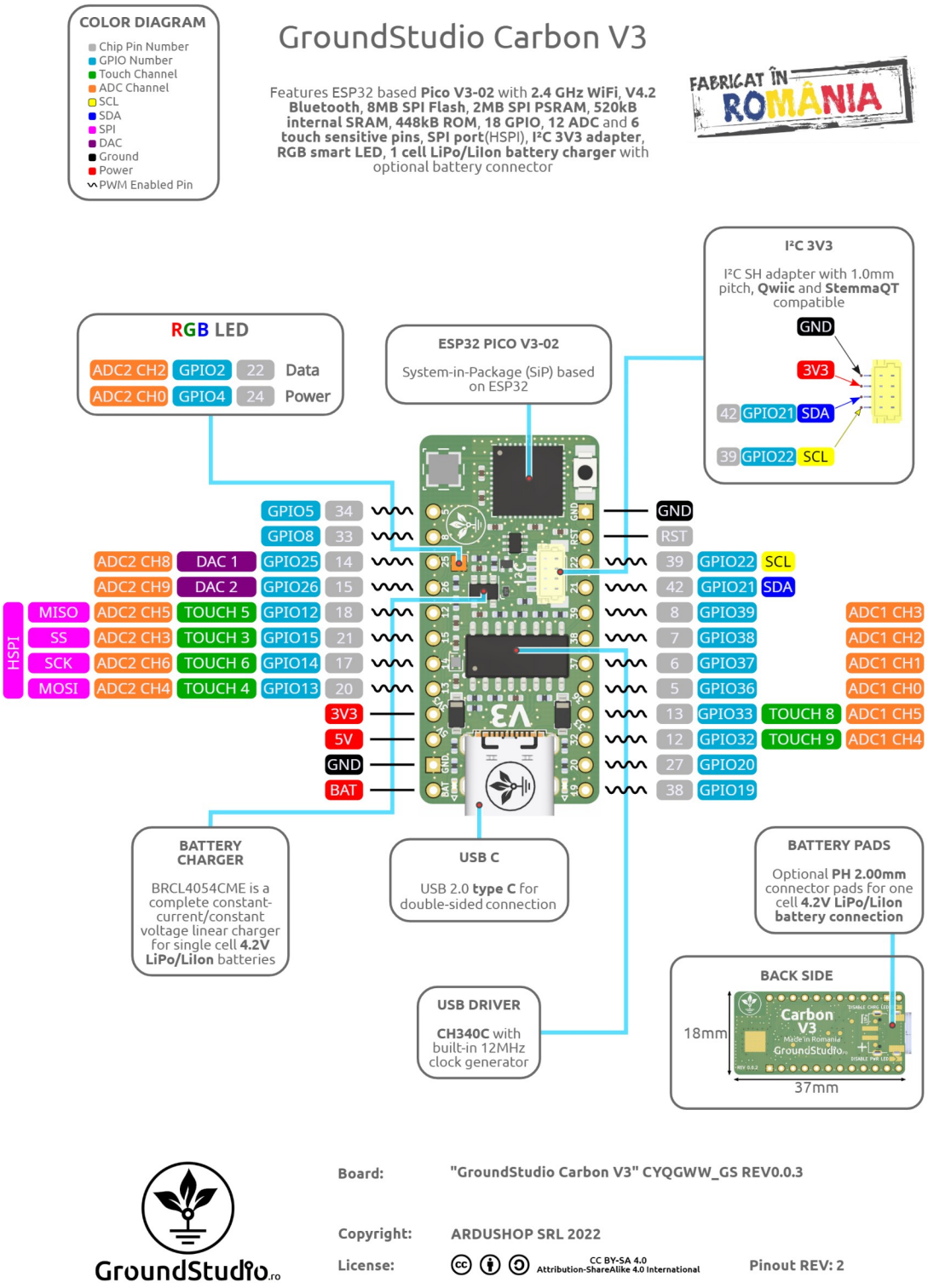


*Figure 1: GroundStudio Carbon V3 pinout [Revision 2]*

# Board Circuit Schematic

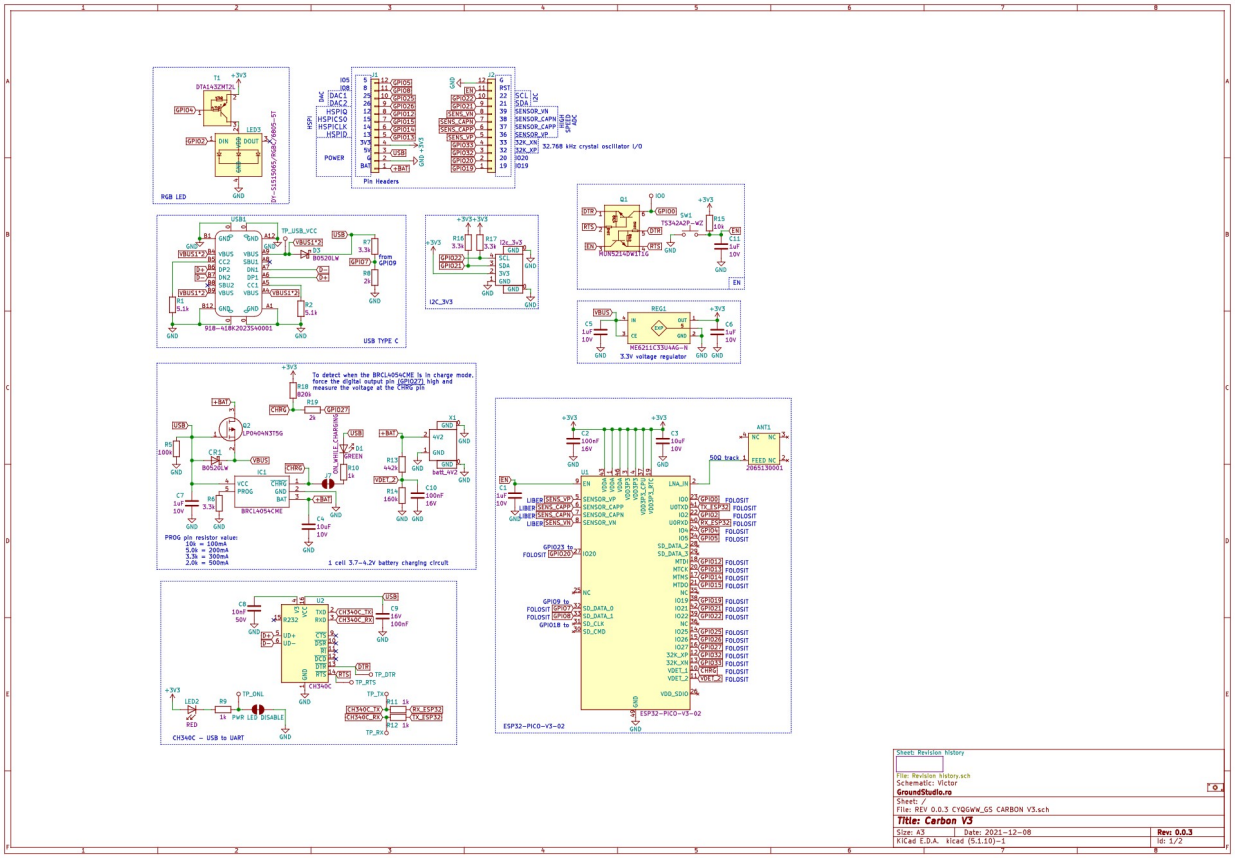


*Figure 2: GroundStudio Carbon V3 schematic circuit [Revision 0.0.3]*

# Open Source

This is an Open Source project, you can find all the technical documents online:

https://github.com/GroundStudio/GroundStudio_Carbon_V3

# License



# Overview

The GroundStudio Carbon V3 development board is based on the ESP32-PICO-V3-02 system, which is a System-in-Package (SiP) device based on ESP32, offering complete Wi-Fi and Bluetooth functionalities. It integrates 8MB SPI flash and 2MB SPI FSRAM.

The ESP32-PICO-V3-02 chip is practically an ESP32 microcontroller plus a series of decoupling capacitors, a filter for the power supply and three important components:

- 8MB spi flash memory
- memory spi psram of 2MB
- 40MHz crystal

Equipped with a usb type C adapter (upgrade from microUSB), it uses the CH340C chip for usb 2.0 to Serial (UART) conversion and an I²C 3V3 plug compatible with STEMMA QT or Qwiic connectors.

With a very small size, robustness and low power consumption, the ESP32-PICO-V3-02 is well designed for most limited spaces or battery-powered projects, both for wired electronics and sensors.

Compared to the rest of the ESP32 chip series, this one has an additional GPIO20 pin. For the security part of the chip, flash pins DI, DO, /HOLD, /WP and PSRAM pins such as SI/SIO0, SI/SIO1, SIO2, SIO3 do not have LED output.

To detect when the integrated BRCL4054CME is in charging mode, we must set the GPIO27 pin as a digital output by setting it to high and measuring the voltage on the CHRG pin.

NOTE:

The development board does not have under-voltage protection, it only has a charging circuit for a single Lithium-Ion (LiIon) or Lithium-Polymer (LiPo) cell of 3.7-4.2V.

If a battery without a protection circuit is connected, it will be destroyed after the first use!

If the board is powered by a battery without an additional protection circuit for under-voltage, the voltage level will drop below its minimum voltage, which will lead to its irreparable destruction.

## Technical specifications

**ESP32-PICO-V3-02** MCU:

- **448 KB ROM** for booting and basic functions

- **520KB SRAM** for data instructions

- **16 KB SRAM in RTC**

USB-Serial Converter: **CH340C**

Voltage regulator 3.3V: ME6211C33U4AG-N

Battery charging circuit: a single 3.7-4.2V Lithium-Ion (LiIon) or Lithium-Polymer (LiPo) cell. **The battery must include a discharge protection circuit.**

Battery connector: PH 2.0mm

GPIO pins: **14**

USB 2.0 **type C** adapter

Addressable **RGB** LED

FLASH memory: **8 MB**

PSRAM memory: **2 MB**

Processor: dual-core **240MHz**

Interfaces: ADC, DAC, SD/SDIO/MMC Host Controller, SPI, SDIO/SPI Slave Controller, EMAC, PWM motor, PWM LED, UART (used by CH340C USB-serial converter), I2C, I2S

Wi-Fi frequency: 2.4GHz

Dimensions approx. pcb: **37mm x 18mm**

# Legal disclaimer notice

This development board is considered a subassembly in accordance with FCC CFR Title 47 §15.101(e):

https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15/subpart-B/section-15.101#p-15.101(e)

The device does not have a standalone functionality and does not include an enclosure or power supply.

The device is mainly intended for development and prototyping but it can be integrated into a product. In this case it is the responsibility of the developer/manufacturer to obtain all the necessary certifications.

GroundStudio is a registered trademark of ARDUSHOP SRL:

https://www.tmdn.org/tmview/#/tmview/detail/EM500000018364087

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# Datasheet Revision History

[Revision 1] - Initial version release