
ESP32-C3-DevKit-RUST-2

This user guide is intended to help you get started with the ESP32-C3-DevKit-RUST-2 and to provide more detailed technical information for development and integration. The ESP32-C3-DevKit-RUST-2 is a development board based on the ESP32-C3-MINI-1 module, a general-purpose module featuring 4 MB of SPI flash. The board integrates full Wi-Fi and Bluetooth® Low Energy (BLE) connectivity, making it suitable for a wide range of IoT and embedded applications.

In addition to the ESP32-C3, the board integrates onboard sensors and a Li-Ion battery charging circuit, enabling portable and sensor-based applications without requiring external components.

Most I/O pins are routed to pin headers on both sides of the board, allowing easy access to the ESP32-C3 peripherals. Developers can connect external components using jumper wires or mount the ESP32-C3-DevKit-RUST-2 directly on a breadboard for rapid prototyping.



ESP32-C3-DevKit-RUST-2

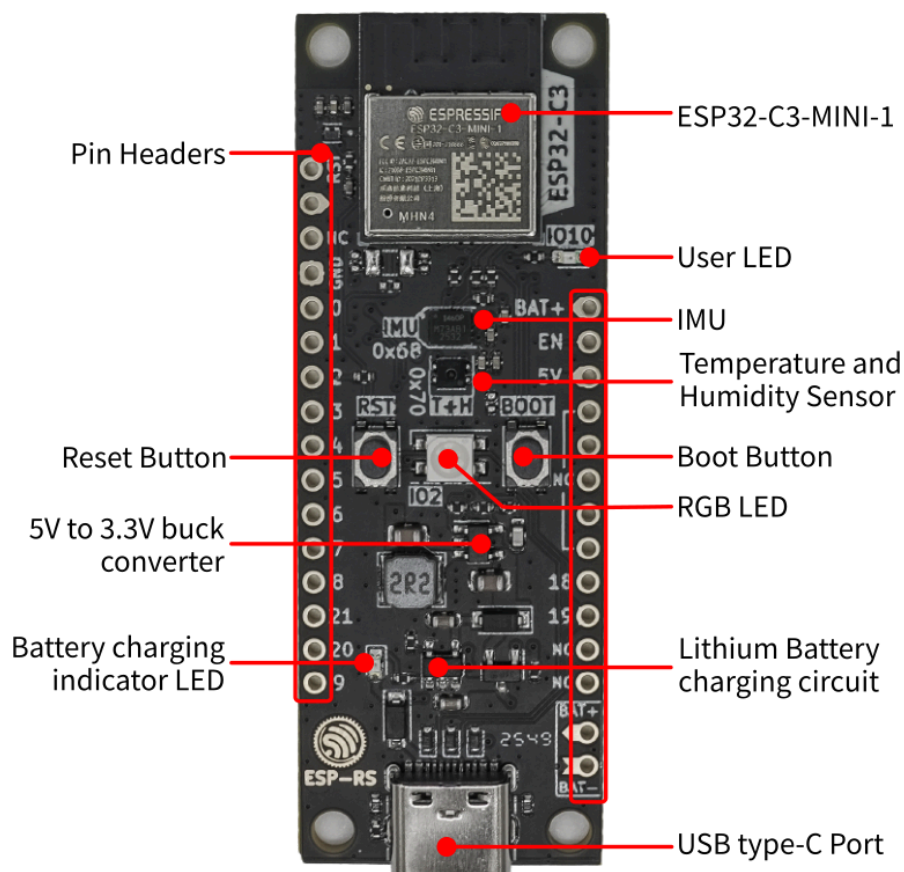
The document consists of the following major sections:

- [Getting Started](#): Overview of ESP32-C3-DevKit-RUST-2 and hardware/software setup instructions to get started.
- [Hardware Reference](#): More detailed information about the ESP32-C3-DevKit-RUST-2's hardware.
- [Hardware Revision Details](#): Revision history, known issues, and links to user guides for previous versions (if any) of ESP32-C3-DevKit-RUST-2.
- [Related Documents](#): Links to related documentation.

Getting Started

This section provides a brief introduction of ESP32-C3-DevKit-RUST-2, instructions on how to do the initial hardware setup and how to flash firmware onto it.

Description of Components



ESP32-C3-DevKit-RUST-2 (with the ESP32-C3-MINI-1 module) - front

The key components of the board are described starting from the module and continue in the clockwise direction.

Key Component	Description
ESP32-C3-MINI-1	ESP32-C3-MINI-1 is a powerful general-purpose Espressif mc
User LED	User GPIO LED, connected to GPIO10 .
IMU	Inertial Measurement Unit (IMU) ICM-42670-P, connected via
Temperature and Humidity Sensor	SHTC3, connected via I2C interface
Boot Button	Download button. Holding down Boot and then pressing Rese
RGB LED	Addressable RGB LED, driven by GPIO2 .
Lithium Battery charging circuit	Built-in charging circuit for single-cell lithium batteries
USB type-C Port	USB-CDC port. Power supply for the board as well as the com
Battery charging indicator LED	The red LED indicates that the battery is being charged.
5V to 3.3V buck converter	Power regulator that converts a 5 V supply into a 3.3 V output
Reset Button	Press this button to restart the system.
Pin Headers	Most of the available GPIO pins are broken out to the pin hea

Application Examples

The following application examples are available for ESP32-C3-DevKit-RUST-2:

- [ESP-IDF Basic Workshop](#)
- [ESP-IDF Advanced Workshop](#)

To explore the application examples or to develop your own, please follow the steps outlined in the [Start Application Development](#) section.

Start Application Development

Before powering up your ESP32-C3-DevKit-RUST-2, please make sure that it is in good condition with no obvious signs of damage.

Required Hardware

- ESP32-C3-DevKit-RUST-2
- USB 2.0 cable (USB Type-C)
- Computer running Windows, Linux, or macOS

Note

Be sure to use an appropriate USB cable. Some cables are for charging only and do not provide the needed data lines nor work for programming the boards.

Hardware Setup

Connect the board with the computer using the **USB type-C Port**.

Software Setup

Please proceed to [ESP-IDF Get Started](#), which will quickly help you set up the development environment then flash an application example onto your board.

Contents and Packaging

Retail Orders

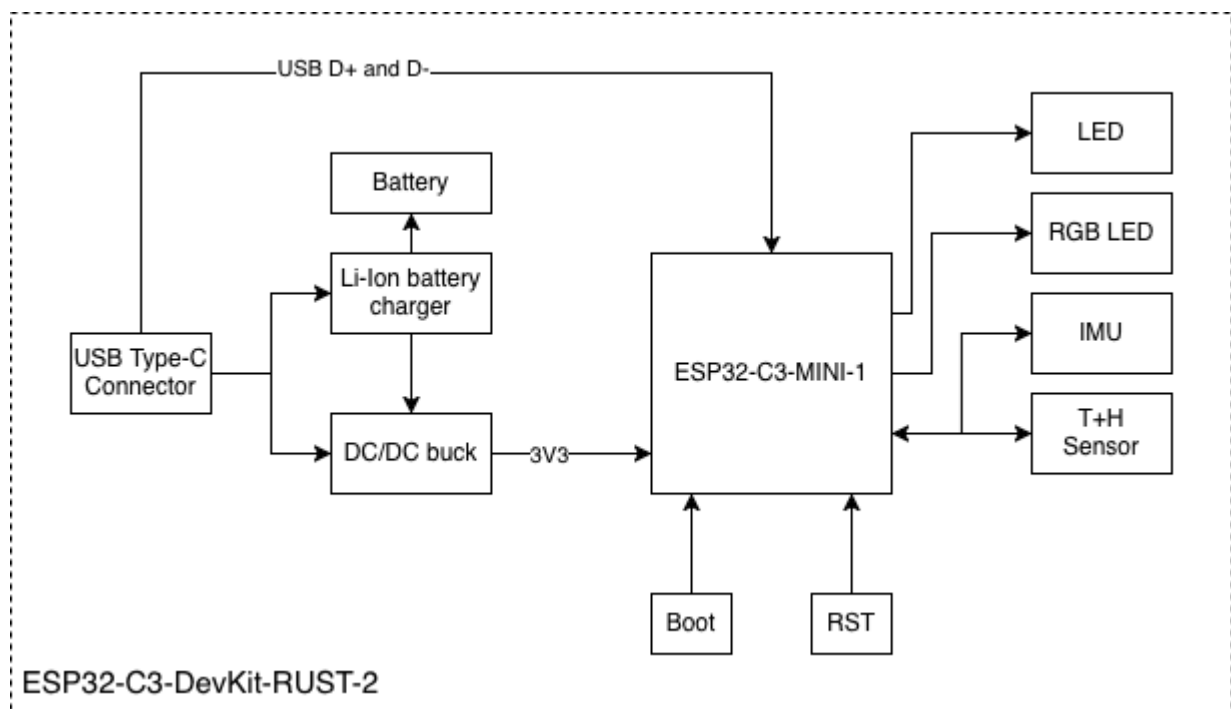
If you order a few samples, each ESP32-C3-DevKit-RUST-2 comes in an individual package in either antistatic bag or any packaging depending on your retailer.

For retail orders, please go to <https://www.espressif.com/en/contact-us/get-samples>.

Hardware Reference

Block Diagram

The block diagram below shows the components of ESP32-C3-DevKit-RUST-2 and their interconnections.



ESP32-C3-DevKit-RUST-2 (click to enlarge)

Power Supply Options

There are three mutually exclusive ways to provide power to the board:

- USB type-C port, default power supply
- 5V and GND pin headers
- BAT and GND pin headers (for single-cell lithium battery)

It is recommended to use the first option: USB type-C port.

Note

The board operates at a 5 V power supply and requires a minimum current of 0.5 A. If your application demands a current exceeding 0.5 A, consider connecting the board via a powered USB hub to ensure stable operation.

Header Block

The two tables below provide the **Name** and **Function** of the pin headers on both sides of the board (left and right). The pin header names are shown in [ESP32-C3-DevKit-RUST-2 \(with the ESP32-C3-MINI-1 module\) - front](#). The numbering is the same as in the [ESP32-C3-DevKit-RUST-2 Schematic](#) (PDF).

Left Header

No.	Name	Type ¹	Function
1	RST	I	EN / CHIP_PU
2	3V3	P	3.3 V power supply
3	N/C		Not connected
4	GND	G	Ground
5	IO0	I/O/T	GPIO0, ADC1_CH0
6	IO1	I/O/T	GPIO1, ADC1_CH1
7	IO2	I/O/T	GPIO2 ² , ADC1_CH2
8	IO3	I/O/T	GPIO3, ADC1_CH3
9	IO4	I/O/T	GPIO4, ADC2_CH0
10	IO5	I/O/T	GPIO5, ADC2_CH1
11	IO6	I/O/T	GPIO6, MTCK
12	IO7	I/O/T	GPIO7, MTDO, LED
13	IO8	I/O/T	GPIO8 ² , LOG
14	RX	I/O/T	GPIO21, U0RXD
15	TX	I/O/T	GPIO20, U0TXD

No.	Name	Type ¹	Function
16	IO9	I/O/T	GPIO9 ² , BOOT

Right Header

No.	Name	Type ¹	Function
1	BAT+	P	Battery supply
2	EN	I	Enable
3	5V	P	USB VBUS
4	N/C		Not connected
5	N/C		Not connected
6	N/C		Not connected
7	N/C		Not connected
8	N/C		Not connected
9	IO18	I/O/T	GPIO18, USB_D-
10	IO19	I/O/T	GPIO19, USB_D+
11	N/C		Not connected
12	N/C		Not connected

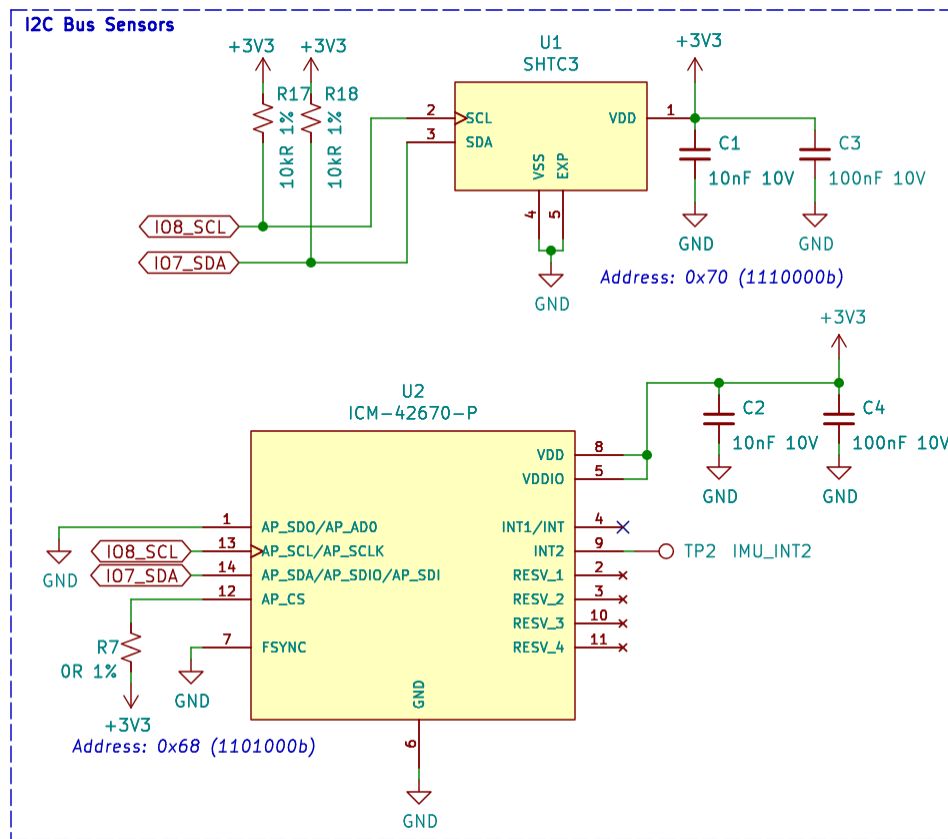
[1] (1,2) P: Power supply; I: Input; O: Output; T: High impedance.

[2] (1,2,3) GPIO2, GPIO8, and GPIO9 are strapping pins of the ESP32-C3 chip. These pins are used to control several chip functions depending on binary voltage values applied to the pins during chip power-up or system reset. For description and application of the strapping pins, please refer to Section Boot Configurations in [ESP32-C3 Datasheet](#).

I2C Peripherals

Peripheral	Part number	Address
IMU	ICM-42670-P	0x68
Temperature and Humidity	SHTC3	0x70

Sensors



Sensors on I2C bus (click to enlarge)

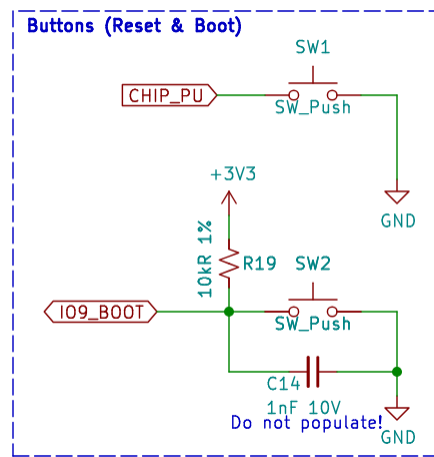
I2C Signal Mapping

Signal	GPIO
SDA	GPIO10
SCL	GPIO8

Peripherals Connected to GPIOs

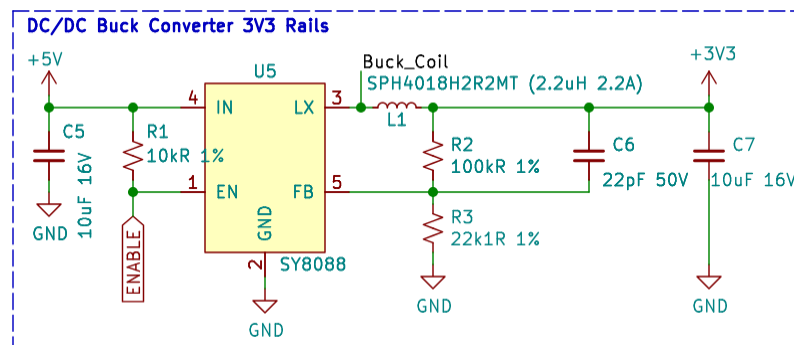
I/O Device	GPIO
WS2812 LED	GPIO2
LED	GPIO7
Button/Boot	GPIO9

Buttons



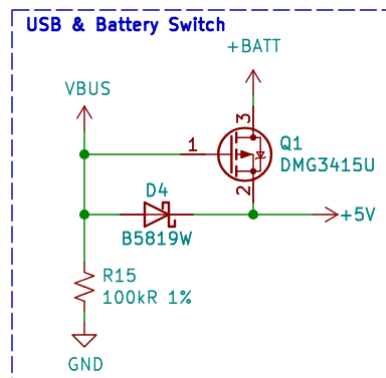
Buttons Circuit (click to enlarge)

Power Supply



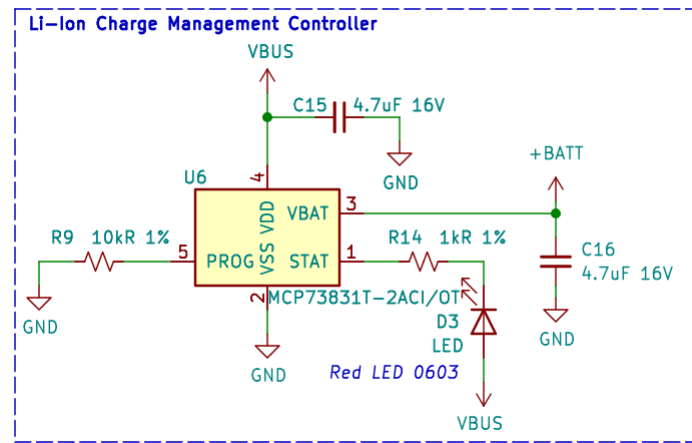
Power Supply Circuit (click to enlarge)

Power Supply from USB



Power Switch Circuit (click to enlarge)

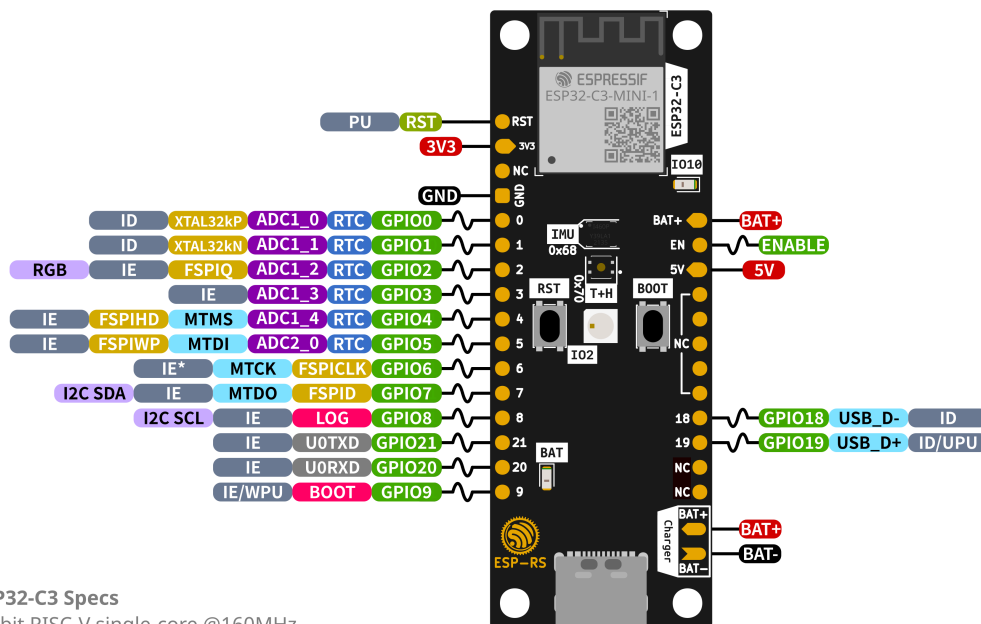
Lithium Battery Charging



Lithium Battery charging circuit (click to enlarge)

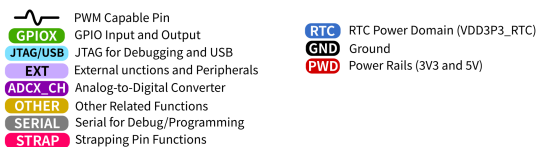
Pin Layout

ESP32-C3-DevKit-RUST-2



ESP32-C3 Specs

32-bit RISC-V single-core @160MHz
 Wi-Fi IEEE 802.11 b/g/n 2.4GHz
 Bluetooth LE 5
 400 KB SRAM (16 KB for cache)
 384 KB ROM
 22 GPIOs, 3x SPI, 2x UART, I2C,
 I2S, RMT, LED PWM, USB Serial/JTAG,
 GDMA, TWAI®, 12-bit ADC



GPIO STATE
UPU: USB Weak Pull-up
WPU: Weak Pull-up (Internal)
WPD: Weak Pull-down (Internal)
PU: Pull-up (External)
IE: Input Enable (After Reset)
IE*: Input Enable (Depends of FUSE_DIS_PAD_JTAG)
ID: Input Disabled (After Reset)
OE: Output Enable (After Reset)
OD: Output Disabled (After Reset)

ESP32-C3-DevKit-RUST-2 Pin Layout (with the ESP32-C3-MINI-1 module, click to enlarge)

Hardware Revision Details

This is a new version with minor changes from the previous [ESP32-C3-DevKit-RUST-1](#) board. The list of changes are as follows:

- Changed the GPIO for the user LED from GPIO7 to GPIO10.
- Changed the pin header hole diameter from 0.8 mm to 1.0 mm.
- Fixed issues on the silkscreen layer.
- Changes on the traces on the I2C bus for better signal integrity.

Related Documents

- [ESP32-C3 Datasheet](#) (PDF)
- [ESP32-C3-MINI-1 & ESP32-C3-MINI-1U Datasheet](#) (PDF)
- [ESP32-C3-DevKit-RUST-2 Schematic](#) (PDF)
- [ESP32-C3-DevKit-RUST-2 PCB Layout](#) (PDF)
- [ESP-IDF Programming Guide](#)
- [ESP32-C3-DevKit-RUST-2 training](#)