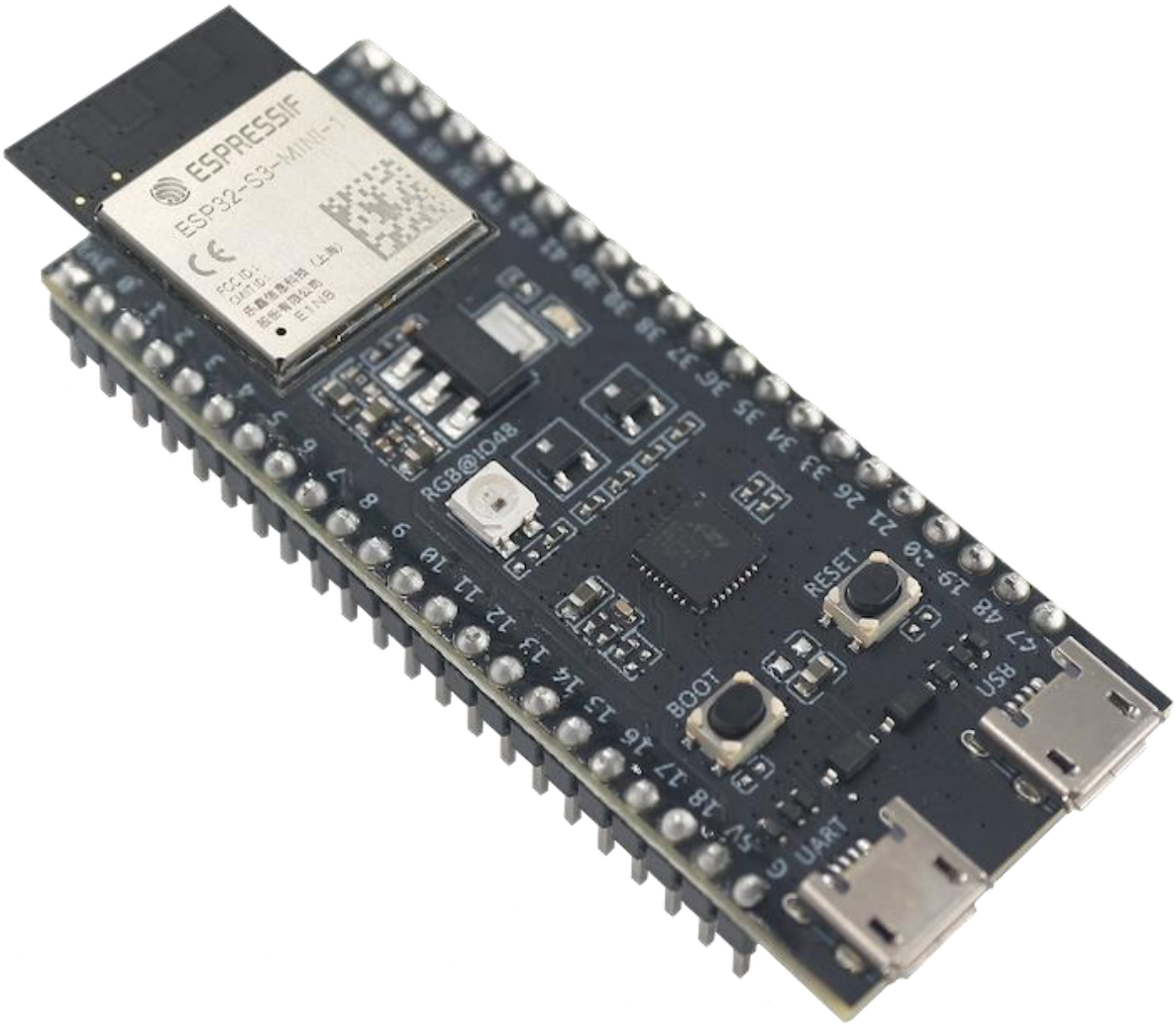
ESP32-S3-DevKitM-1

This user guide will help you get started with ESP32-S3-DevKitM-1 and will also provide more in-depth information.

The ESP32-S3-DevKitM-1 is an entry-level development board equipped with either ESP32-S3-MINI-1 or ESP32-S3-MINI-1U, a module named for its small size. This board integrates complete Wi-Fi and Bluetooth Low Energy functions.

Most of the I/O pins on the module are broken out to the pin headers on both sides of this board for easy interfacing. Developers can either connect peripherals with jumper wires or mount ESP32-S3-DevKitM-1 on a breadboard.



ESP32-S3-DevKitM-1 with ESP32-S3-MINI-1 Module

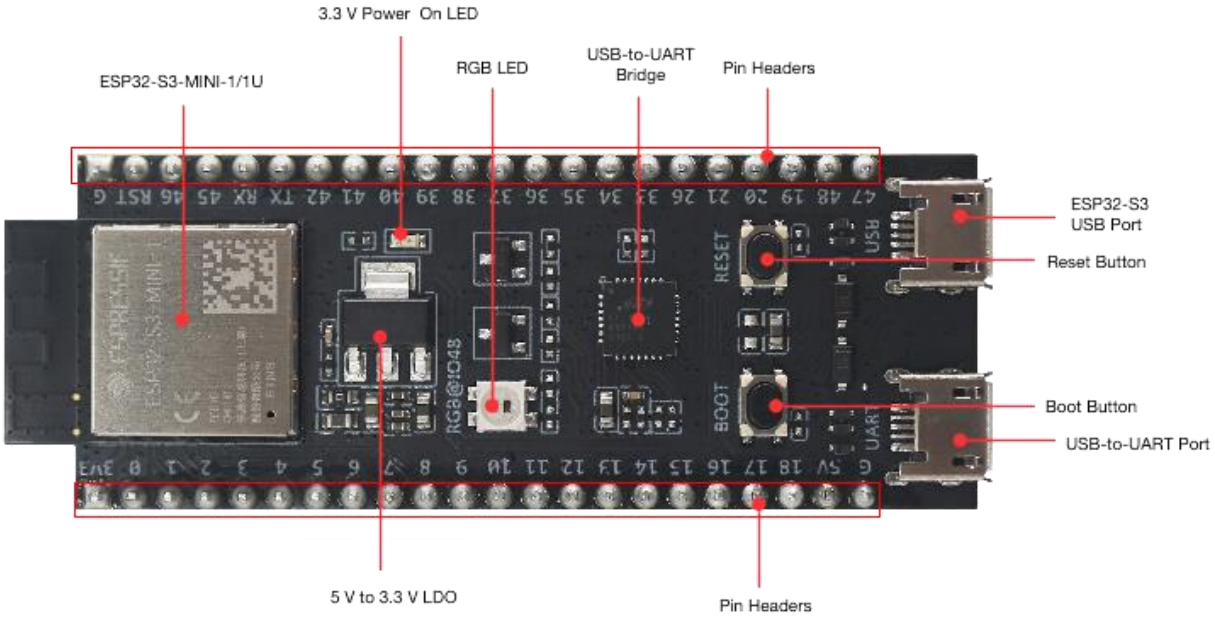
The document consists of the following major sections:

- Getting Started: Overview of the board and hardware/software setup instructions to get started.
- Hardware Reference: More detailed information about the board's hardware.
- Related Documents: Links to related documentation.

Getting Started

This section provides a brief introduction of ESP32-S3-DevKitM-1, instructions on how to do the initial hardware setup and how to flash firmware onto it.

Description of Components



ESP32-S3-DevKitM-1 - front

The key components of the board are described in a counter-clockwise direction, starting from the ESP32-S3-MINI-1/1U module.

Key Component	Description
ESP32-S3-MINI-1/1U	ESP32-S3-MINI-1 and ESP32-S3-MINI-1U are two general-purpose Wi-Fi and Bluetooth LE combo modules that have a rich set of peripherals. ESP32-S3-MINI-1 comes with a PCB antenna. ESP32-S3-MINI-1U comes with an external antenna connector. At the core of the modules is ESP32-S3FN8, a chip equipped with an 8 MB flash. Since flash is packaged in the chip, rather than integrated into the module, ESP32-S3-MINI-1/1U has a smaller package size.
5 V to 3.3 V LDO	Power regulator that converts a 5 V supply into a 3.3 V output.
Pin Headers	All available GPIO pins (except for the SPI bus for flash) are broken out to the pin headers on the board for easy interfacing and programming. For details, please see Header Block.
USB-to-UART Port	A Micro-USB port used for power supply to the board, for flashing applications to the chip, as well as for communication with the chip via the on-board USB-to-UART bridge.
Boot Button	Download button. Holding down **Boot** and then pressing **Reset** initiates Firmware

Key Component	Description
	Download mode for downloading firmware through the serial port.
Reset Button	Press this button to restart ESP32-S3.
ESP32-S3 USB Port	ESP32-S3 full-speed USB OTG interface, compliant with the USB 1.1 specification. The interface is used for power supply to the board, for flashing applications to the chip, for communication with the chip using USB 1.1 protocols, as well as for JTAG debugging.
USB-to-UART Bridge	Single USB-to-UART bridge chip provides transfer rates up to 3 Mbps.
RGB LED	Addressable RGB LED, driven by GPIO48.
3.3 V Power On LED	Turns on when the USB power is connected to the board.

Start Application Development

Before powering up your board, please make sure that it is in good condition with no obvious signs of damage.

Required Hardware

- ESP32-S3-DevKitM-1
- USB 2.0 cable (Standard-A to Micro-B)
- 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 **USB-to-UART Port**. Connection using **ESP32-S3 USB Port** is not fully implemented in software. In subsequent steps, **USB-to-UART Port** will be used by default.

Software Setup

Please proceed to Get Started, where Section Installation will quickly help you set up the development environment and then flash an application example onto your board.

Contents and Packaging

Retail Orders

If you order a few samples, each board 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.

Wholesale Orders

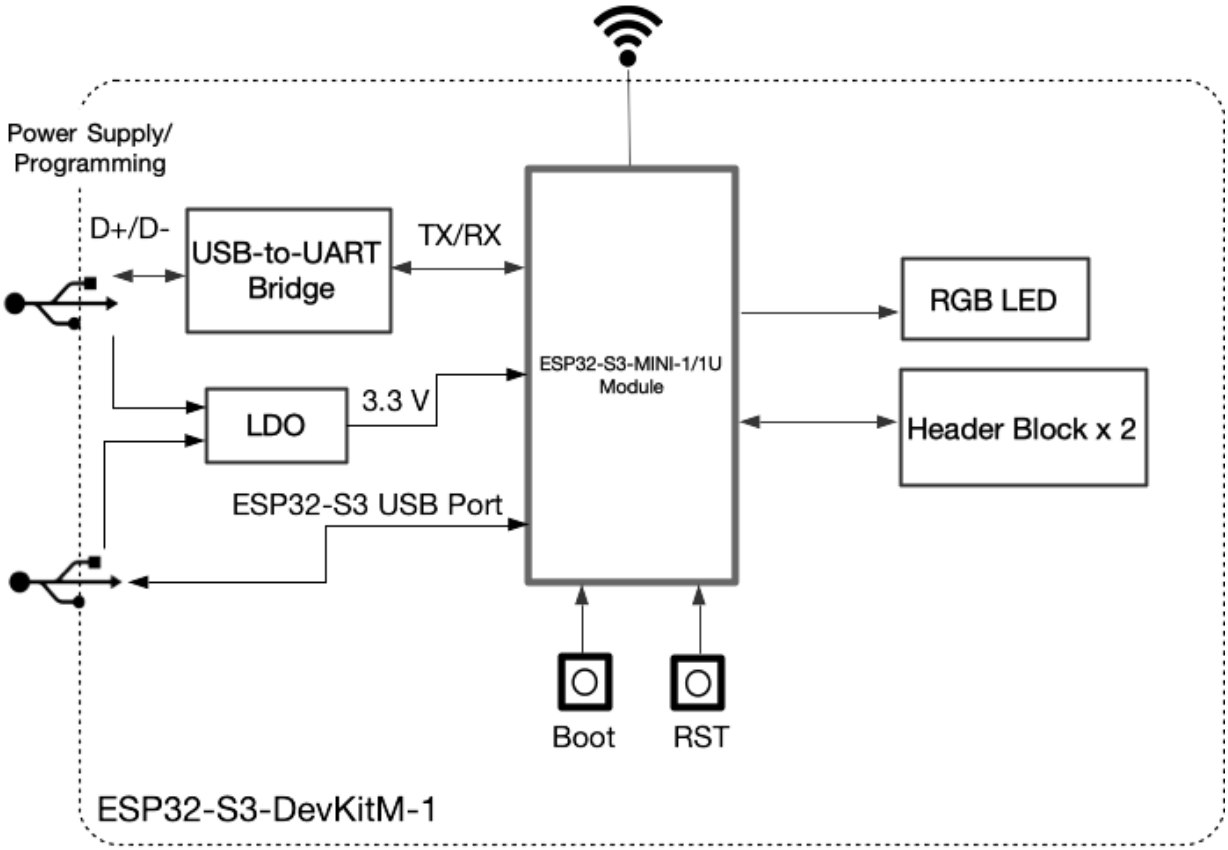
If you order in bulk, the boards come in large cardboard boxes.

For wholesale orders, please go to https://www.espressif.com/en/contact-us/sales-questions.

Hardware Reference

Block Diagram

The block diagram below shows the components of ESP32-S3-DevKitM-1 and their interconnections.



ESP32-S3-DevKitM-1 (click to enlarge)

Power Supply Options

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

- USB-to-UART Port and ESP32-S3 USB Port (either one or both), default power supply (recommended)
- 5V and G (GND) pins
- 3V3 and G (GND) pins

Header Block

The two tables below provide the **Name** and **Function** of the pins on both sides of the board (J1 and J3). The pin names are shown in ESP32-S3-DevKitM-1 - front. The numbering is the same as in the Board Schematic (PDF).

J1

No.	Name	Type [1]	Function
1	3V3	P	3.3 V power supply
2	0	I/O/T	RTC_GPIO0, GPIO0
3	1	I/O/T	RTC_GPIO1, GPIO1, TOUCH1, ADC1_CH0
4	2	I/O/T	RTC_GPIO2, GPIO2, TOUCH2, ADC1_CH1
5	3	I/O/T	RTC_GPIO3, GPIO3, TOUCH3, ADC1_CH2
6	4	I/O/T	RTC_GPIO4, GPIO4, TOUCH4, ADC1_CH3
7	5	I/O/T	RTC_GPIO5, GPIO5, TOUCH5, ADC1_CH4
8	6	I/O/T	RTC_GPIO6, GPIO6, TOUCH6, ADC1_CH5
9	7	I/O/T	RTC_GPIO7, GPIO7, TOUCH7, ADC1_CH6
10	8	I/O/T	RTC_GPIO8, GPIO8, TOUCH8, ADC1_CH7, SUBSPICS1
11	9	I/O/T	RTC_GPIO9, GPIO9, TOUCH9, ADC1_CH8, FSPIHD, SUBSPIHD
12	10	I/O/T	RTC_GPIO10, GPIO10, TOUCH10, ADC1_CH9, FSPICS0, FSPIIO4, SUBSPICS0
13	11	I/O/T	RTC_GPIO11, GPIO11, TOUCH11, ADC2_CH0, FSPID, FSPIIO5, SUBSPID
14	12	I/O/T	RTC_GPIO12, GPIO12, TOUCH12, ADC2_CH1, FSPICLK, FSPIIO6, SUBSPICLK
15	13	I/O/T	RTC_GPIO13, GPIO13, TOUCH13, ADC2_CH2, FSPIQ, FSPIIO7, SUBSPIQ
16	14	I/O/T	RTC_GPIO14, GPIO14, TOUCH14, ADC2_CH3, FSPIWP, FSPIDQS, SUBSPIWP
17	15	I/O/T	RTC_GPIO15, GPIO15, U0RTS, ADC2_CH4, XTAL_32K_P
18	16	I/O/T	RTC_GPIO16, GPIO16, U0CTS, ADC2_CH5, XTAL_32K_N
19	17	I/O/T	RTC_GPIO17, GPIO17, U1TXD, ADC2_CH6
20	18	I/O/T	RTC_GPIO18, GPIO18, U1RXD, ADC2_CH7, CLK_OUT3
21	5V	P	5 V power supply
22	G	G	Ground

J3[3]

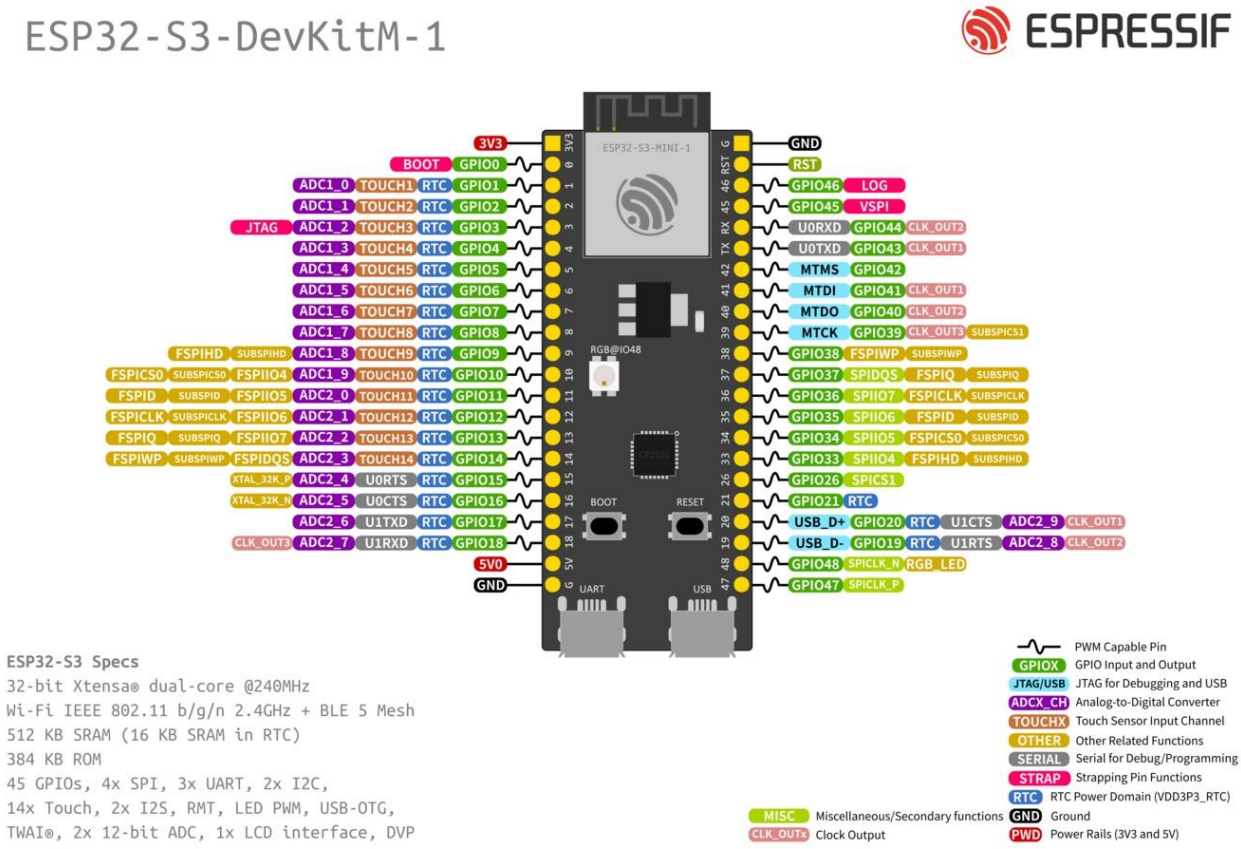
No.	Name	Type	Function
1	G	G	Ground
2	RST	I	EN
3	46	I/O/T	GPIO46
4	45	I/O/T	GPIO45
5	RX	I/O/T	U0RXD, GPIO44, CLK_OUT2
6	TX	I/O/T	U0TXD, GPIO43, CLK_OUT1
7	42	I/O/T	MTMS, GPIO42
8	41	I/O/T	MTDI, GPIO41, CLK_OUT1
9	40	I/O/T	MTDO, GPIO40, CLK_OUT2
10	39	I/O/T	MTCK, GPIO39, CLK_OUT3, SUBSPICS1
11	38	I/O/T	GPIO38, FSPIWP, SUBSPIWP
12	37	I/O/T	SPIDQS, GPIO37, FSPIQ, SUBSPIQ
13	36	I/O/T	SPIIO7, GPIO36, FSPICLK, SUBSPICLK
14	35	I/O/T	SPIIO6, GPIO35, FSPID, SUBSPID
15	34	I/O/T	SPIIO5, GPIO34, FSPICS0, SUBSPICS0
16	33	I/O/T	SPIIO4, GPIO33, FSPIHD, SUBSPIHD
17	26	I/O/T	SPICS1, GPIO26
18	21	I/O/T	RTC_GPIO21, GPIO21
19	20	I/O/T	RTC_GPIO20, GPIO20, U1CTS, ADC2_CH9, CLK_OUT1, USB_D+
20	19	I/O/T	RTC_GPIO19, GPIO19, U1RTS, ADC2_CH8, CLK_OUT2, USB_D-
21	48	I/O/T	SPICLK_N, GPIO48, SUBSPICLK_N_DIFF, RGB LED
22	47	I/O/T	SPICLK_P, GPIO47, SUBSPICLK_P_DIFF

[1]

P: Power supply; I: Input; O: Output; T: High impedance.

For description of function names, please refer to ESP32-S3 Datasheet (PDF).

Pin Layout



ESP32-S3-DevKitM-1 Pin Layout (click to enlarge)

Hardware Revision Details

This is the first revision of this board released.

Related Documents

- ESP32-S3 Datasheet (PDF)
- ESP32-S3-MINI-1 & ESP32-S3-MINI-1U Datasheet (PDF)
- ESP32-S3-DevKitM-1 Schematic (PDF)
- ESP32-S3-DevKitM-1 PCB layout (PDF)
- ESP32-S3-DevKitM-1 Dimensions (PDF)
- ESP32-S3-DevKitM-1 Dimensions source file (DXF) - You can view it with Autodesk Viewer online

For further design documentation for the board, please contact us at sales@espressif.com.