

Espressif Systems ESP32-DevKitM-1 ESP IDF Programming User Manual

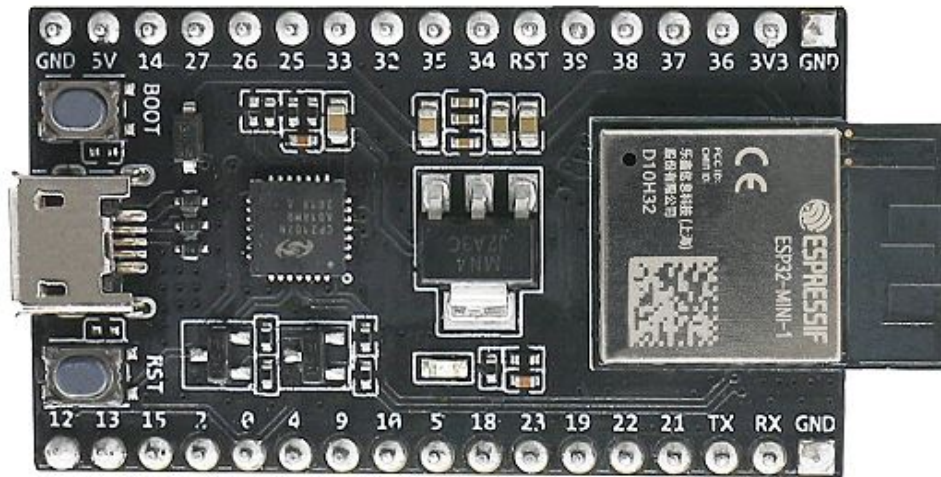
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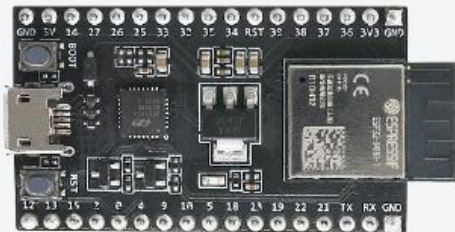


Espressif Systems ESP32-DevKitM-1 ESP IDF Programming

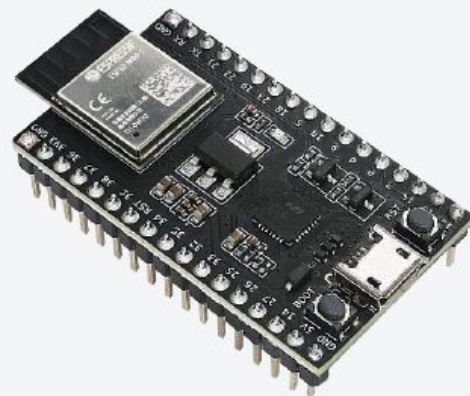


ESP32-DevKitM-1

This user guide will help you get started with ESP32-DevKitM-1 and will also provide more in-depth information. ESP32-DevKitM-1 is an ESP32-MINI-1(1U)-based development board produced by Espressif. Most of the I/O pins are broken out to the pin headers on both sides for easy interfacing. Users can either connect peripherals with jumper wires or mount ESP32- DevKitM-1 on a breadboard.



ESP32-DevKitM-1 - front



ESP32-DevKitM-1 - isometric

The document consists of the following major sections:

- Getting started: Provides an overview of the ESP32-DevKitM-1 and hardware/software setup instructions to get started.
- Hardware reference: Provides more detailed information about the ESP32-DevKitM-1's hardware.
- Related Documents: Gives links to related documentaiton.

Getting Started

This section describes how to get started with ESP32-DevKitM-1. It begins with a few introductory sections about the ESP32-DevKitM-1, then Section Start Application Development provides instructions on how to do the initial hardware setup and then how to flash firmware onto the ESP32-DevKitM-1.

Overview

This is a small and convenient development board that features:

- ESP32-MINI-1, or ESP32-MINI-1U module
- USB-to-serial programming interface that also provides power supply for the board
- pin headers
- pushbuttons for reset and activation of Firmware Download mode
- a few other components

Contents and Packaging

Retail orders

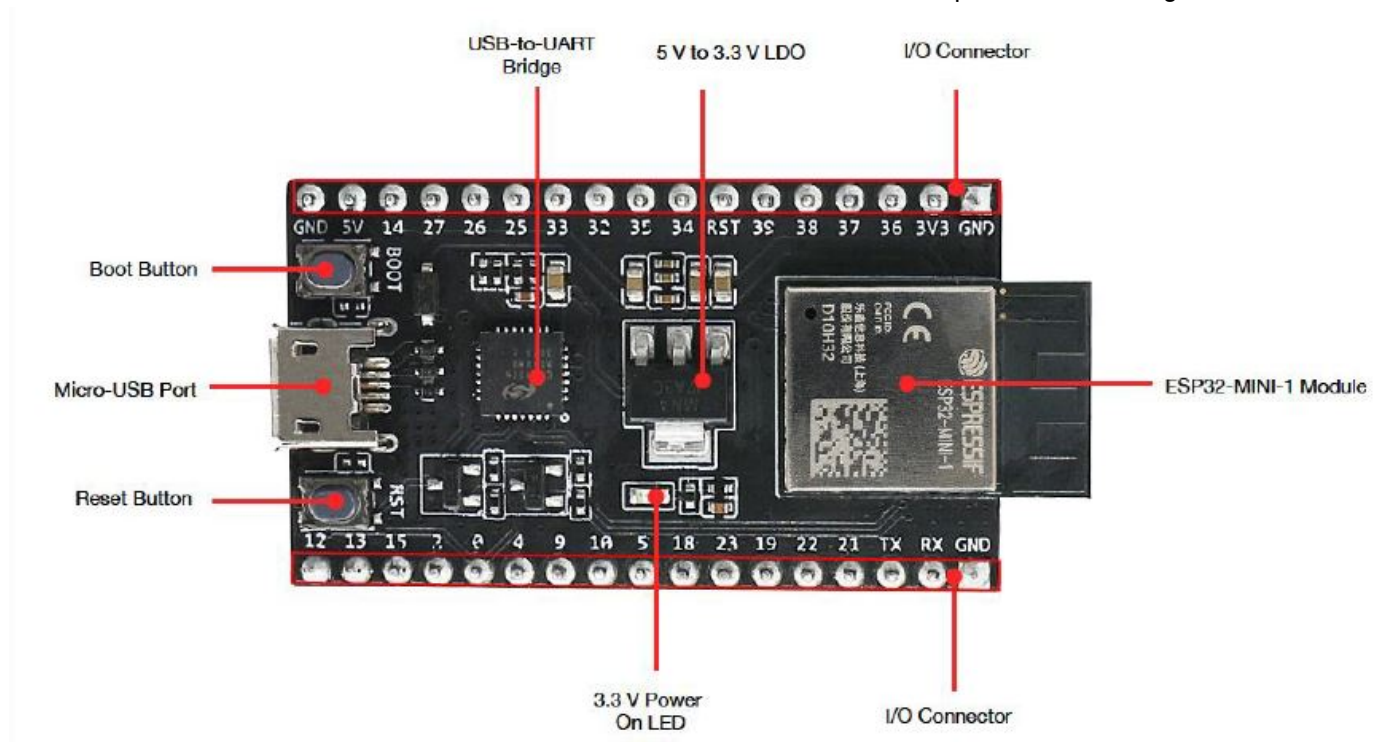
If you order a few samples, each ESP32-DevKitM-1 comes in an individual package in either antistatic bag or any packaging depending on your retailer. For retail orders, please go to <https://www.espressif.com/en/company/contact/buy-a-sample>.

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>.

Description of Components

The following figure and the table below describe the key components, interfaces and controls of the ESP32-DevKitM-1 board. We take the board with a ESP32-MINI-1 module as an example in the following sections.



ESP32-DevKitM-1 – front

On-board module	ESP32-MINI-1 module or ESP32-MINI-1U module. ESP32-MINI-1 comes with an on-board PCB antenna. ESP32-MINI-1U comes with an external antenna connector. The two modules both have a 4 MB flash in chip package. For details, please see ESP32-MINI-1 & ESP32-MINI-1U Datasheet .
5 V to 3.3 V LDO	Power regulator converts 5 V to 3.3 V.
Boot Button	Download button. Holding down Boot and then pressing Reset initiates Firmware Download mode for downloading firmware through the serial port.
Reset Button	Reset Button
Micro-USB Port	USB interface. Power supply for the board as well as the communication interface between a computer and the ESP32 chip.
USB-to-UART Bridge	Single USB-UART bridge chip provides transfer rates up to 3 Mbps.
3.3 V Power On LED	Turns on when the USB is connected to the board. For details, please see the schematics in Related Documents .
I/O Connector	All available GPIO pins (except for the SPI bus for flash) are broken out to the pin headers on the board. Users can program ESP32 chip to enable multiple functions.

Start Application Development

Before powering up your ESP32-DevKitM-1, please make sure that it is in good condition with no obvious signs of damage.

Required Hardware

- ESP32-DevKitM-1
- USB 2.0 cable (Standard-A to Micro-B)
- Computer running Windows, Linux, or macOS

Software Setup

Please proceed to Get Started, where Section Installation Step by Step will quickly help you set up the development environment and then flash an application example onto your ESP32-DevKitM-1

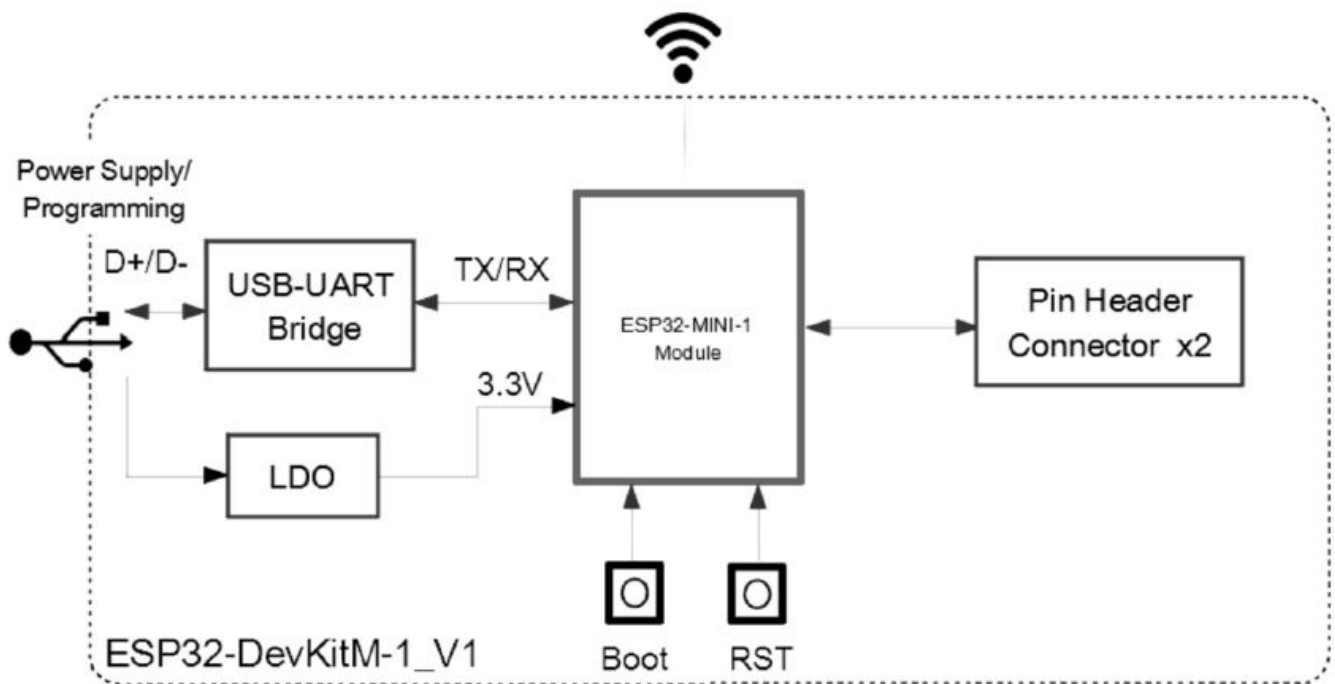
Attention

ESP32-DevKitM-1 is a board with a single core module, please enable single core mode (CONFIG_FREERTOS_UNICORE) in menuconfig before flashing your applications.

Hardware Reference

Block Diagram

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



Power Source Select

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

- Micro USB port, default power supply
- 5V and GND header pins
- 3V3 and GND header pins
- Warning: The power supply must be provided using one and only one of the options above, otherwise the board and/or the power supply source can be damaged.
- Power supply by micro USB port is recommended.


Pin Descriptions

The table below provides the Name and Function of pins on both sides of the board. For peripheral pin configurations, please refer to ESP32 Datasheet.

1	GND	P	Ground
2	3V3	P	3.3 V power supply
3	I36	I	GPIO36, ADC1_CH0, RTC_GPIO0
4	I37	I	GPIO37, ADC1_CH1, RTC_GPIO1
5	I38	I	GPIO38, ADC1_CH2, RTC_GPIO2
6	I39	I	GPIO39, ADC1_CH3, RTC_GPIO3
7	RST	I	Reset; High: enable; Low: powers off
8	I34	I	GPIO34, ADC1_CH6, RTC_GPIO4
9	I35	I	GPIO35, ADC1_CH7, RTC_GPIO5
10	IO32	I/O	GPIO32, XTAL_32K_P (32.768 kHz crystal oscillator input), ADC1_CH4, TOUCH9, RTC_GPIO9
11	IO33	I/O	GPIO33, XTAL_32K_N (32.768 kHz crystal oscillator output), ADC1_CH5, TOUCH8, RTC_GPIO8
12	IO25	I/O	GPIO25, DAC_1, ADC2_CH8, RTC_GPIO6, EMAC_RXD0
13	IO26	I/O	GPIO26, DAC_2, ADC2_CH9, RTC_GPIO7, EMAC_RXD1
14	IO27	I/O	GPIO27, ADC2_CH7, TOUCH7, RTC_GPIO17, EMAC_RX_DV
15	IO14	I/O	GPIO14, ADC2_CH6, TOUCH6, RTC_GPIO16, MTMS, HSPICLK, HS2_CLK, SD_CLK, EMAC_TXD2
16	5V	P	5 V power supply
17	IO12	I/O	GPIO12, ADC2_CH5, TOUCH5, RTC_GPIO15, MTDI, HSPIQ, HS2_DATA2, SD_DATA2, EMAC_TXD3
18	IO13	I/O	GPIO13, ADC2_CH4, TOUCH4, RTC_GPIO14, MTCK, HSPID, HS2_DATA3, SD_DATA3, EMAC_RX_ER
19	IO15	I/O	GPIO15, ADC2_CH3, TOUCH3, RTC_GPIO13, MTDO, HSPICS0, HS2_CMD, SD_CMD, EMAC_RXD3

No.	Name	Type	Function
20	IO2	I/O	GPIO2, ADC2_CH2, TOUCH2, RTC_GPIO12, HSPIWP, HS2_DATA0, SD_DATA0
21	IO0	I/O	GPIO0, ADC2_CH1, TOUCH1, RTC_GPIO11, CLK_OUT1, EMAC_TX_CLK
22	IO4	I/O	GPIO4, ADC2_CH0, TOUCH0, RTC_GPIO10, HSPIHD, HS2_DATA1, SD_DATA1, EMAC_TX_ER
23	IO9	I/O	GPIO9, HS1_DATA2, U1RXD, SD_DATA2
24	IO10	I/O	GPIO10, HS1_DATA3, U1TXD, SD_DATA3
25	IO5	I/O	GPIO5, HS1_DATA6, VSPICS0, EMAC_RX_CLK
26	IO18	I/O	GPIO18, HS1_DATA7, VSPICLK
27	IO23	I/O	GPIO23, HS1_STROBE, VSPID
28	IO19	I/O	GPIO19, VSPIQ, U0CTS, EMAC_TXD0
29	IO22	I/O	GPIO22, VSPIWP, U0RTS, EMAC_TXD1
30	IO21	I/O	GPIO21, VSPIHD, EMAC_TX_EN
31	TXD0	I/O	GPIO1, U0TXD, CLK_OUT3, EMAC_RXD2
32	RXD0	I/O	GPIO3, U0RXD, CLK_OUT2

Documents / Resources

 <p>ESP32-DevKitM-1</p> <p>ESP32-DevKitM-1 is a development board based on the ESP32 SoC. It features a dual-core 64-bit microcontroller with integrated Wi-Fi and Bluetooth. The board includes various peripherals such as GPIOs, ADCs, DACs, and UARTs. It is designed for easy prototyping and development of IoT applications.</p>	<p>Espressif Systems ESP32-DevKitM-1 ESP IDF Programming [pdf] User Manual ESP32-DevKitM-1, ESP IDF Programming, ESP32-DevKitM-1 ESP IDF Programming, IDF Programming, Programming</p>
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References

- [Project Configuration - ESP32 - — ESP-IDF Programming Guide latest documentation](#)
- [Get Started - ESP32 - — ESP-IDF Programming Guide latest documentation](#)
- [Get Started - ESP32 - — ESP-IDF Programming Guide latest documentation](#)
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