

ESP32-C3-LCDkit

[\[中文\]](#)

This user guide will help you get started with ESP32-C3-LCDkit and will also provide more in-depth information.

The document consists of the following sections:

- [Board Overview](#): Overview of the board hardware/software.
- [Start Application Development](#): How to set up hardware/software to develop applications.
- [Hardware Reference](#): More detailed information about the board's hardware.
- [Hardware Revision Details](#): This is the first revision of this board released.
- [Sample Request](#): How to get a sample board.
- [Related Documents](#): Links to related documentation.

Board Overview

ESP32-C3-LCDkit is an ESP32-C3-based evaluation development board with an SPI interface display. It also has an integrated rotary encoder switch and features screen interaction. Due to its low cost, low power consumption, and high performance, ESP32-C3 satisfies the basic GUI interaction needs, gaining ground in scenarios with small screen sizes.



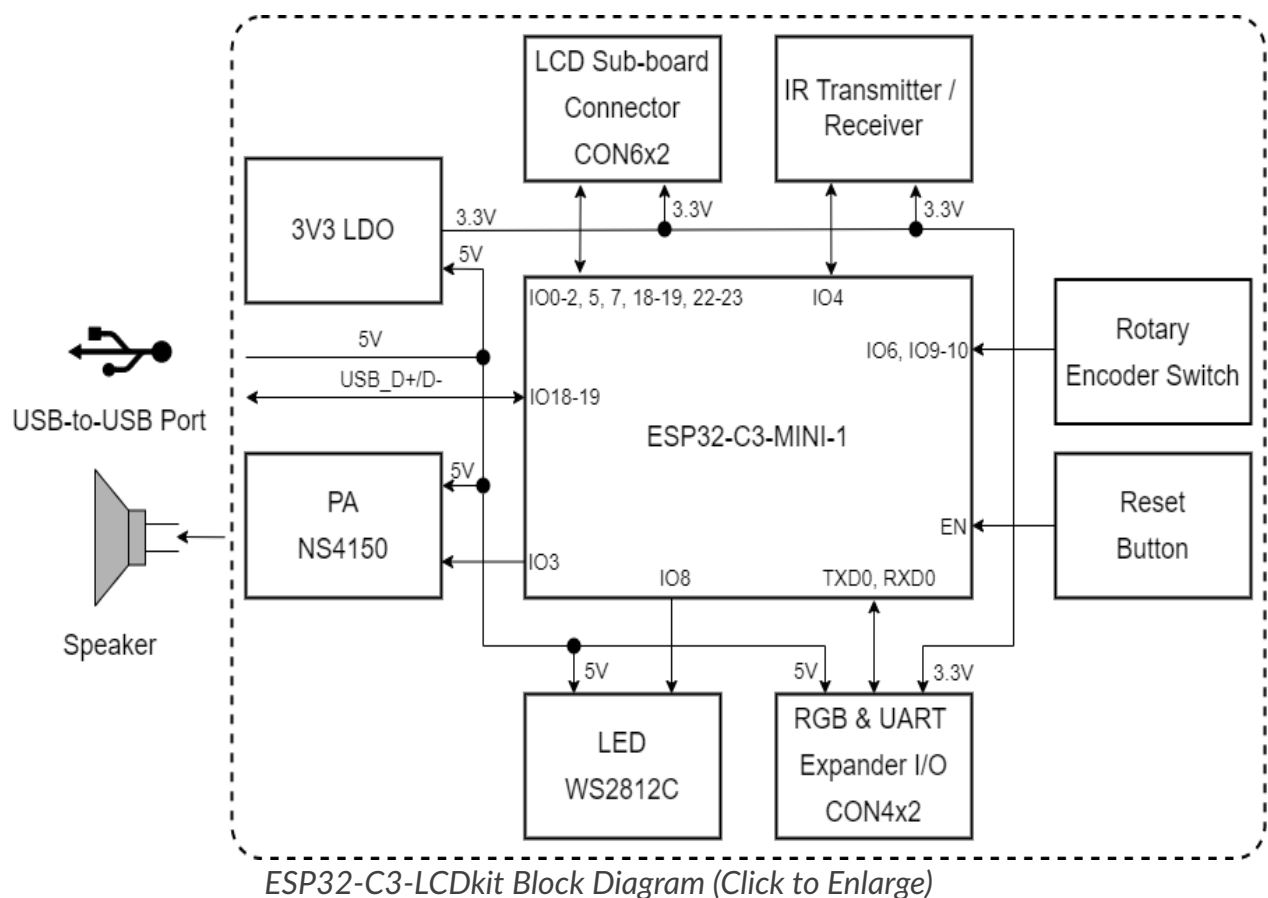
Feature List

The main features of the board are listed below:

- **Module Embedded:** ESP32-C3-MINI-1 module with 4 MB flash and 400 KB SRAM
- **Display:** Compatibility with various subboards and support for displays with **I2C** and **SPI** interfaces. Please refer to [LCD Subboards](#) for more information
- **Rotary Encoder Switch:** Key switches and 360° rotation for on-screen GUI control
- **Infrared module:** Infrared transmitter and infrared receiver for infrared wireless control
- **Audio:** On-board audio amplifier and speaker for audio playback
- **USB:** USB Type-C download/debug

Block Diagram

The block diagram below shows the components of ESP32-C3-LCDkit and their interconnections.

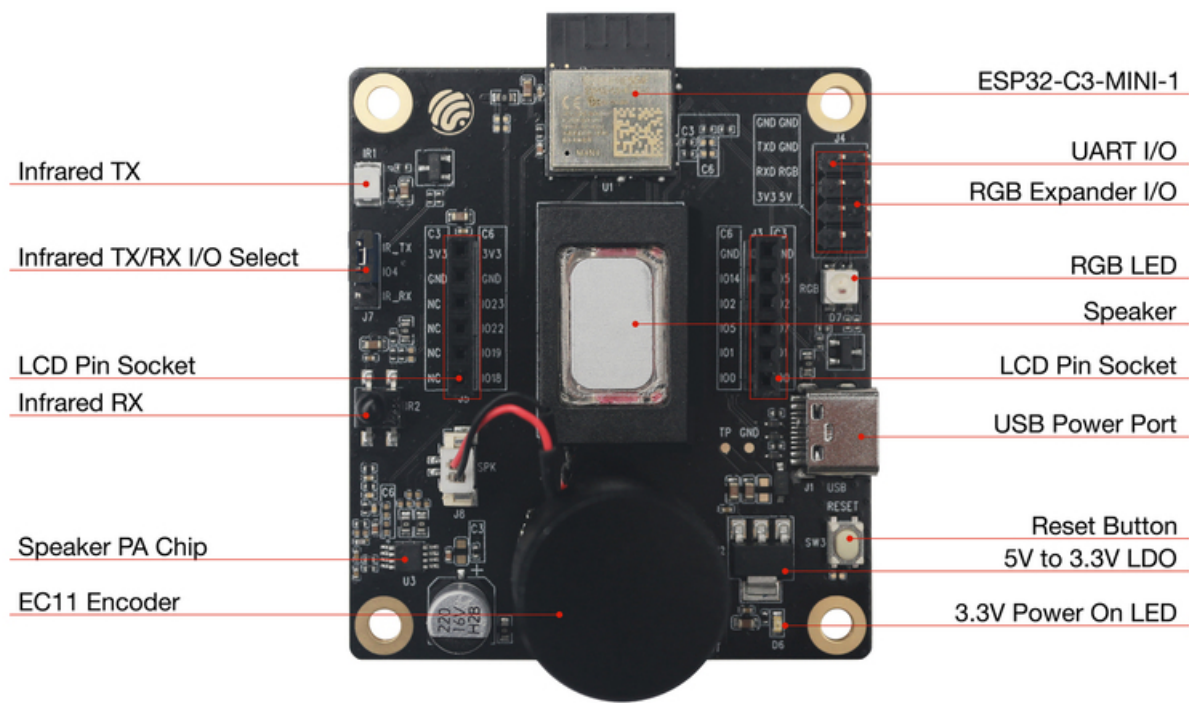


Description of Components

ESP32-C3-LCDkit is a development board designed for wildlife protection. It contains a mainboard and a subboard.

Mainboard

ESP32-C3-LCDkit_MB is the core of the kit, which integrates the ESP32-C3-MINI-1 module and provides ports for connection to the LCD subboard.



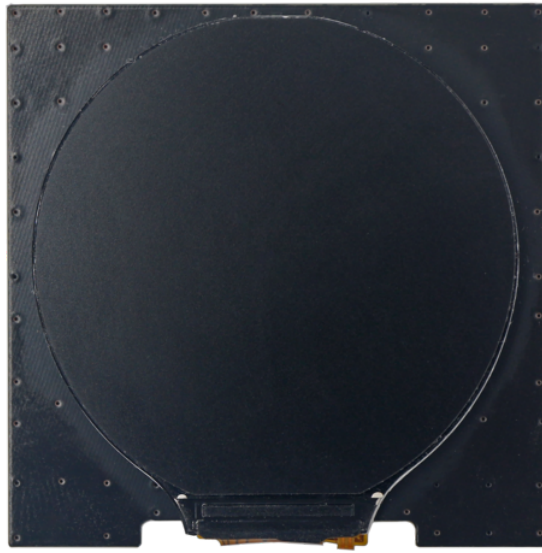
ESP32-C3-LCDkit - Front (Click to Enlarge)

The key components of the board are described in a clockwise direction.

Key Component	Description
ESP32-C3-MINI-1 Module	ESP32-C3-MINI-1 is a generic Wi-Fi + Bluetooth LE MCU module t
UART & RGB Expander I/O	Connects the system power supply pins and UART and RGB data pi
RGB LED	Supports configuring the RGB LED display to indicate status or beh
Speaker	Supports speaker playback through an audio power amplifier.
LCD Display Connector	Connects the 1.28" LCD subboard via a 2.54 mm pitch female head
USB Power Port	Provides power to the entire system. It is recommended to use at le
Reset Button	Press this button to reset the system.
5V-to-3.3V LDO	Low Dropout Regulator (LDO).
3.3 V Power On LED	Indicates the status of the system power supply.
EC11 Rotary Encoder Switch	Features both a 360° rotary encoder and a key switch to enable cor
Speaker PA Chip	Supports speaker playback.
Infrared RX	Receives external infrared signals.
Infrared TX/RX I/O Select	Select the infrared RX/TX function via a 2.54 mm pitch pin header a
Infrared TX	Sends out infrared signals.

LCD Subboards

The **ESP32-C3-LCDkit_DB** subboard supports a 1.28" LCD screen with SPI interface and 240x240 resolution. The driver chip used for this screen is GC9A01.



ESP32-C3-LCDkit_DB - Front (Click to Enlarge)



ESP32-C3-LCDkit_DB - Back (Click to Enlarge)

Software Support

The ESP32-C3-LCDkit development framework is [ESP-IDF](#). ESP-IDF is a FreeRTOS-based SoC development framework with a bunch of components including LCD, ADC, RMT, and SPI. An example is provided for ESP32-C3-LCDkit under the folder [Examples](#) . You can configure project options by entering `idf.py menuconfig` in the example directory.

Start Application Development

This section provides instructions on how to do hardware and software setup and flash firmware onto the board to develop your own application.

Required Hardware

- 1 x ESP32-C3-LCDkit_MB
- 1 x LCD subboard
- 1 x USB 2.0 cable (standard Type-A to Type-C)
- 1 x PC (Windows, Linux, or macOS)

Note

Please make sure to use the appropriate USB cable. Some cables can only be used for charging, not for data transfer or program flashing.

Hardware Setup

Prepare the board for loading of the first sample application:

1. Connect the LCD subboard to the **LCD Display Connector**.
2. Plug in the USB cable to connect the PC with the board.
3. The LCD lights up and you can now control GUI through the rotary encoder switch.

Now the board is ready for software setup.

Software Setup

To learn how to quickly set up your development environment, please go to [Get Started > Installation](#).

For more software information on developing applications, please go to [Software Support](#).

Hardware Reference

This section provides more detailed information about the board's hardware.

GPIO Allocation

The table below provides the allocation of GPIOs exposed on terminals of ESP32-C3-MINI-1 module to control specific components or functions of the board.

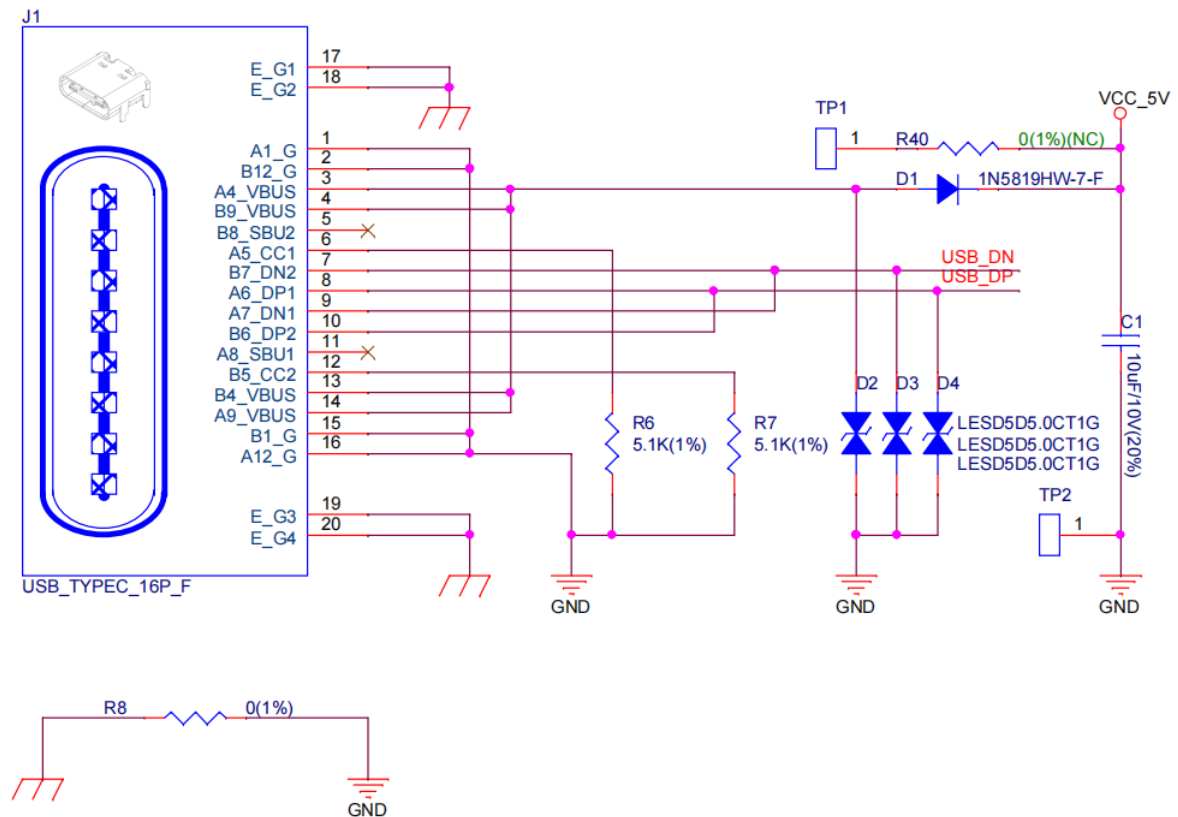
ESP32-C3-MINI-1 GPIO Allocation

Pin	Pin Name	Function
1	GND	Ground
2	GND	Ground
3	3V3	3.3 V power supply

Pin	Pin Name	Function
4	NC	No connection
5	IO2	LCD_D/C
6	IO3	AUDIO_PA
7	NC	No connection
8	EN	Reset
9	NC	No connection
10	NC	No connection
11	GND	Ground
12	IO0	LCD_SDA
13	IO1	LCD_SCL
14	GND	Ground
15	NC	No connection
16	IO10	ENCODER_A
17	NC	No connection
18	IO4	IR_RX/IR_TX
19	IO5	LCD_BL_CTRL
20	IO6	ENCODER_A
21	IO7	LCD_CS
22	IO8	RGB_LED
23	IO9	ENCODER_SW
24	NC	No connection
25	NC	No connection
26	IO18	USB_DN
27	IO19	USB_DP
28	NC	No connection
29	NC	No connection
30	RXD0	Reserved
31	TXD0	Reserved
32-35	NC	No connection
36-53	GND	Ground

Power Distribution

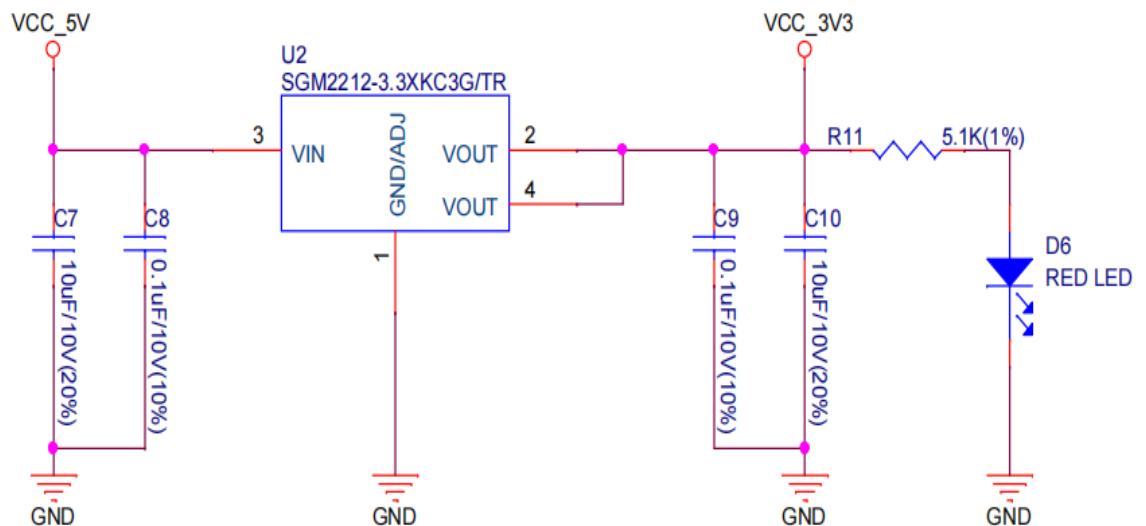
The development board is powered via the USB-to-USB port:



ESP32-C3-LCDkit - USB-to-USB Power Supply

Output system power supply:

3V3 LDO

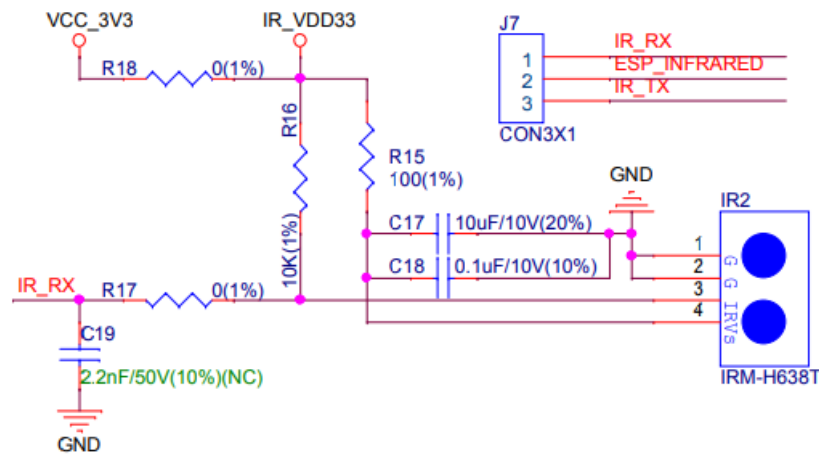


ESP32-C3-LCDkit - System Power Supply

Infrared TX/RX Select

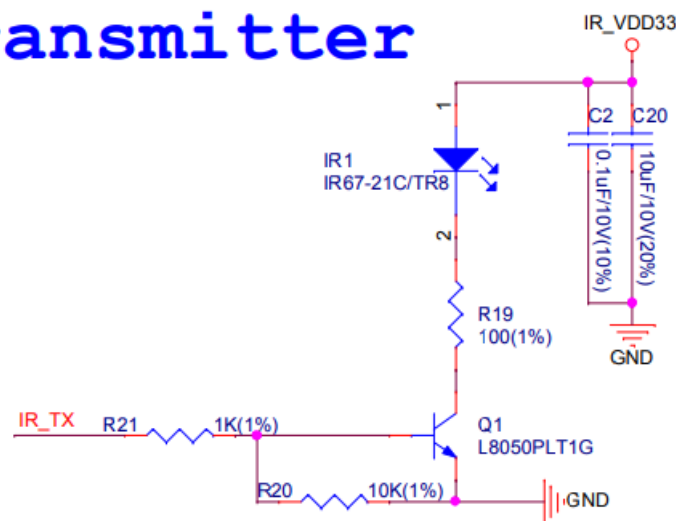
Since the Infrared TX and Infrared RX modules share the same signal line on the chip, it is required to short-circuit specific pins in **Infrared TX/RX Select Port** via jumper caps to choose between the TX/RX function:

IR Receiver



ESP32-C3-LCDkit - Infrared RX Module

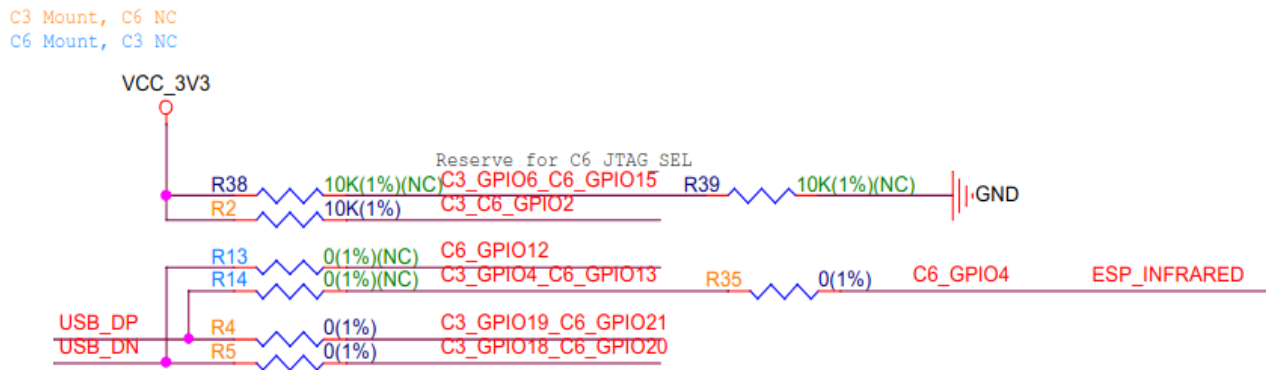
IR Transmitter



ESP32-C3-LCDkit - Infrared TX Module

C6 Module Compatibility Design

ESP32-C3-LCDkit development board uses the ESP32-C3-MINI-1 module by default, with resistors R2, R4, R5, and R35 connected to the mainboard:



ESP32-C3-LCDkit - C3/C6 Resistor Settings

The development board is also designed to be compatible with the ESP32-C6-MINI-1 module, where resistors R2, R4, R5, and R35 need to be removed and resistors R13 and R14 need to be connected.

Hardware Setup Options

Automatic Download

After the development board is powered on, press the rotary encoder switch and Reset button, then release Reset first and the encoder second, to put the ESP development board into download mode.

Hardware Revision Details

- ESP32-C3-LCD-Ev-Board: This older-version board is an engineering sample and is minimally maintained by Espressif. For historical documentation for this board, please refer to [ESP32-C3-LCD-Ev-Board User Guide](#).

Sample Request

ESP32-C3 is a cost-effective and industry-leading low-power performance solution for building rotary or small displays driven by an SPI interface. For sample requests, please contact us at sales@espressif.com.

Related Documents

- [ESP32-C3 Datasheet](#)
- [ESP32-C3-MINI-1 Datasheet](#)
- [ESP Product Selector](#)
- [ESP32-C3-LCDkit_MB Schematics](#)
- [ESP32-C3-LCDkit_MB PCB Layout](#)
- [ESP32-C3-LCDkit_DB Schematics](#)
- [ESP32-C3-LCDkit_DB PCB Layout](#)
- [1.28_TFT_240x240_SPI_Display](#)
- [Infrared Transmitter \(IR67-21CTR8\)](#)

- Infrared Receiver (IRM-H638TTR2)
- Audio Amplifier (NS4150)
- RGB LED (WS2812B)
- 2415 Voice Cavity Horn

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

[Provide feedback about this document](#)