

ESP32-S31

esp-dev-kits Documentation



Release master
Espressif Systems
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This document provides detailed user guides and examples for ESP32-S31 series development boards.

Note: For the full list of Espressif development boards, please go to [ESP DevKits](#).

Chapter 1

ESP32-S31-Function-CoreBoard-1

The ESP32-S31-Function-CoreBoard-1 is a development board for connected AIoT prototyping based on the ESP32-S31-WROOM-3 module. It supports Wi-Fi 6, IEEE 802.15.4, Bluetooth 5.4 (LE + BR/EDR), and Gigabit Ethernet; provides an onboard microphone and speaker output; routes out all key GPIOs; and supports out-of-the-box AI voice interaction evaluation.

1.1 ESP32-S31-Function-CoreBoard-1

This user guide will help you get started with ESP32-S31-Function-CoreBoard-1 and provides detailed information about this development board.

The ESP32-S31-Function-CoreBoard-1 is a development board for connected AIoT prototyping based on the ESP32-S31-WROOM-3 module. It supports Wi-Fi 6, IEEE 802.15.4, Bluetooth 5.4 (LE + BR/EDR), and Gigabit Ethernet; provides an onboard microphone and speaker output; routes out all key GPIOs; and supports out-of-the-box AI voice interaction evaluation.

Most of the I/O pins on the module are broken out to pin header **J2** for easy interfacing.

The document consists of the following major sections:

- [Getting Started](#): Overview of ESP32-S31-Function-CoreBoard-1 and hardware/software setup instructions to get started.
- [Hardware Reference](#): More detailed information about the ESP32-S31-Function-CoreBoard-1's hardware.
- [Hardware Revision Details](#): Information about revision history, known issues, and links to user guides for previous versions (if any).
- [Related Documents](#): Links to related documentation.
- [Disclaimer and Copyright Notice](#): Link to the disclaimer and copyright notice.

1.1.1 Getting Started

This section briefly introduces ESP32-S31-Function-CoreBoard-1 and explains how to perform the initial hardware setup and how to flash firmware onto the board.

Description of Components

The following table lists the key components on the front and back of the board in clockwise order.

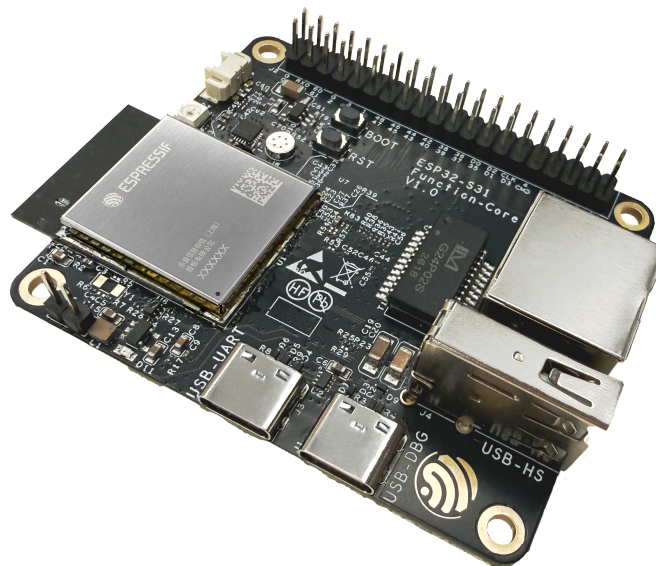


Fig. 1: ESP32-S31-Function-CoreBoard-1 (with ESP32-S31-WROOM-3 module on board)

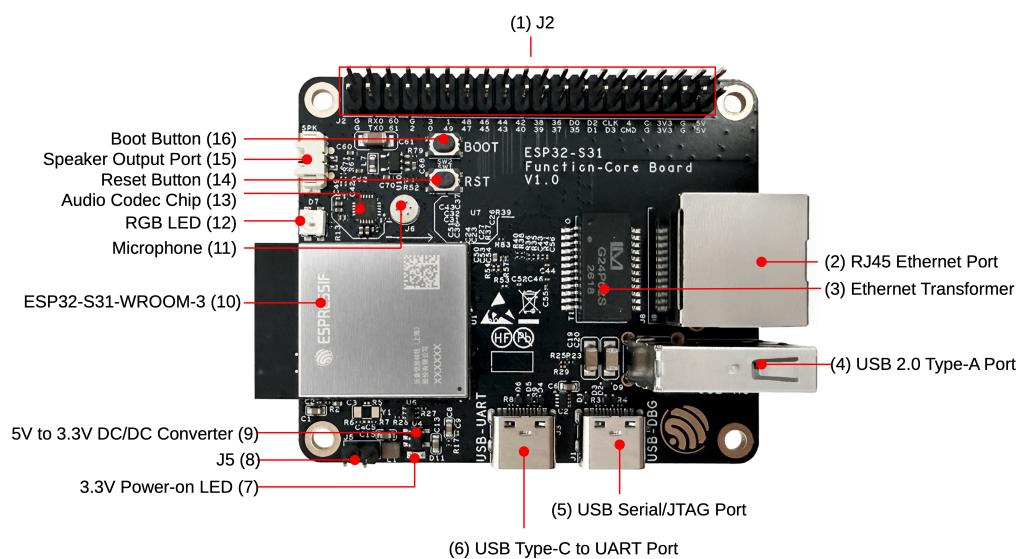


Fig. 2: ESP32-S31-Function-CoreBoard-1 - front (click to enlarge)

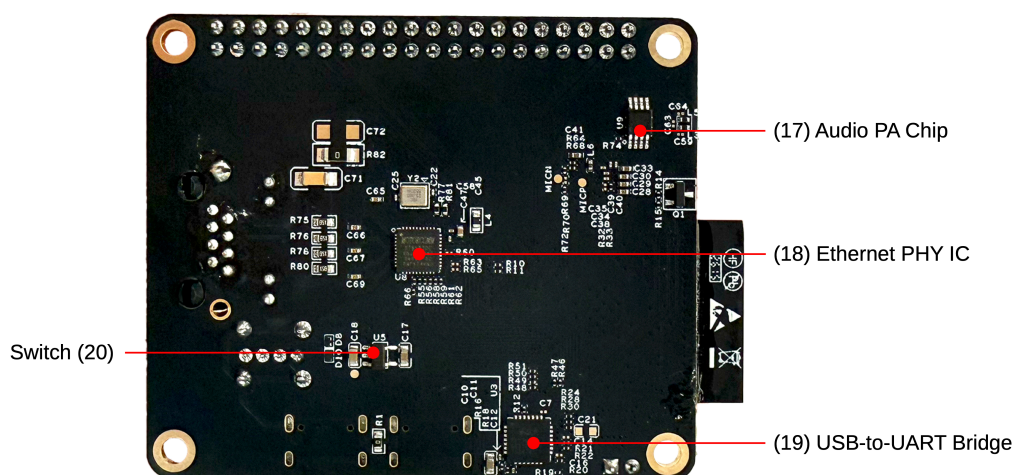


Fig. 3: ESP32-S31-Function-CoreBoard-1 - back (click to enlarge)

No.	Key Component	Description
1	J2	All available GPIO pins are broken out to header J2 for easy interfacing. For more details, see Header Block .
2	RJ45 Ethernet Port	An Ethernet port supporting 10/100/1000 Mbps auto-negotiation.
3	Ethernet Transformer	Transformer module for the RJ45 Ethernet port.
4	USB 2.0 Type-A Port	The USB 2.0 Type-A port is connected to the USB 2.0 OTG High-Speed interface of the ESP32-S31, compliant with the USB 2.0 specification. When communicating with other devices via this port, the ESP32-S31 acts as a USB host, providing up to 500 mA of current.
5	USB Serial/JTAG Port	USB Type-C port that supports USB 2.0 Full-Speed data rate. It can be used to supply power to the board, flash firmware to the ESP32-S31 chip, communicate with the chip via the USB protocol, and perform JTAG debugging.
6	USB Type-C to UART Port	Used for power supply to the board, flashing applications to the chip, as well as communication with the ESP32-S31 chip via the on-board USB-to-UART bridge.
7	3.3 V Power-on LED	Turns on when the board is connected to USB power.
8	J5	Used for current measurement. See details in section Current Measurement .
9	5 V to 3.3 V DC/DC Converter	Power regulator that converts a 5 V supply into a 3.3 V output.
10	ESP32-S31-WROOM-3	ESP32-S31-WROOM-3 integrates the ESP32-S31 chip and supports Bluetooth 5.4 (LE) and IEEE 802.15.4 (Zigbee/Thread/Matter), suitable for a wide range of low-power IoT applications.

No.	Key Component	Description
11	Microphone	Onboard microphone connected to the interface of the audio codec chip.
12	RGB LED	Addressable RGB LED, driven by GPIO60.
13	Audio Codec Chip	ES8311 is a low-power mono audio codec. It includes a single-channel ADC, a single-channel DAC, a low-noise pre-amplifier, a headphone driver, digital sound effects, analog mixing, and gain functions. It interfaces with the ESP32-S31 chip over I2S and I2C buses to provide hardware audio processing independent of the audio application.
14	Reset Button	Press this button to reset the ESP32-S31.
15	Speaker Output Port	This port is used to connect a speaker. The maximum output power can drive a 4 Ω , 3 W speaker. The pin spacing is 1.25 mm (0.08").
16	Boot Button	Download button. Holding down Boot and then pressing Reset initiates Firmware Download mode for downloading firmware through the UART port or USB Serial/JTAG port.
17	Audio PA Chip	NS4150B is an EMI-compliant, 3 W mono Class D audio power amplifier that amplifies audio signals from the audio codec chip to drive speakers.
18	Ethernet PHY IC	Ethernet PHY chip connected to the ESP32-S31 RGMII interface and the RJ45 Ethernet port.
19	USB-to-UART Bridge	Single-chip USB-to-UART bridge that works with the USB Type-C to UART Port for board power, firmware flashing, and serial communication with the ESP32-S31 chip.
20	Switch	TPS2051C is a USB power switch that provides a 500 mA output current limit.

Start Application Development

Before powering up your ESP32-S31-Function-CoreBoard-1, please make sure that it is in good condition with no obvious sign of damage.

Required Hardware

- ESP32-S31-Function-CoreBoard-1
- USB 2.0 cable (USB-A to Type-C)
- Computer running Windows, Linux, or macOS

Note: Be sure to use a good quality USB cable. Some cables are for charging only and do not provide the needed data lines and will not work for programming this board.

Hardware Setup Connect the ESP32-S31-Function-CoreBoard-1 to your computer using a USB cable. The board can be powered through any of the USB Type-C ports.

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

Note: The board uses a USB port to communicate with the computer. Most operating systems (Windows, Linux, macOS) come with the required drivers pre-installed and the board is recognized automatically once plugged in. If the device cannot be recognized or a serial connection cannot be established, refer to [Establish Serial Connection with ESP32-S31](#) for detailed driver installation steps.

Espressif provides board peripheral management components for many development boards to help you initialize and use key onboard peripherals such as LCD, audio codec, keys, and LEDs more easily and efficiently. Please visit the [esp_board_manager component in ESP Component Registry](#) for support coverage.

Other Development Framework Options In addition to ESP-IDF, this board supports the following frameworks and options for different user needs:

- Espressif Bluetooth LE ecosystem: Develop Bluetooth LE applications using solutions such as ESP-BLE-MESH and ESP-BLE-AUDIO to accelerate time-to-market and mass production.
- [ESP-GMF](#): Espressif general multimedia framework with audio/video processing components for multimedia applications.
 - [Wi-Fi audio/video examples](#): Sample Wi-Fi audio and video applications to help integrate multimedia features into your project.
 - [Bluetooth audio](#): Unified Bluetooth audio APIs supporting Bluetooth Classic and LE Audio.
- [ESP-Matter](#): Build Matter and Thread devices suited to low-power and battery-powered scenarios.

Contents and Packaging

Retail Orders If you order a few samples, each ESP32-S31-Function-CoreBoard-1 comes in an individual package in either an antistatic bag or any other packaging depending on your retailer.

For retail orders, please go to [Get Samples](#).

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

For wholesale orders, please go to [Contact Us](#).

1.1.2 Hardware Reference

Block Diagram

The main components of ESP32-S31-Function-CoreBoard-1 and their interconnections are shown in the block diagram below.

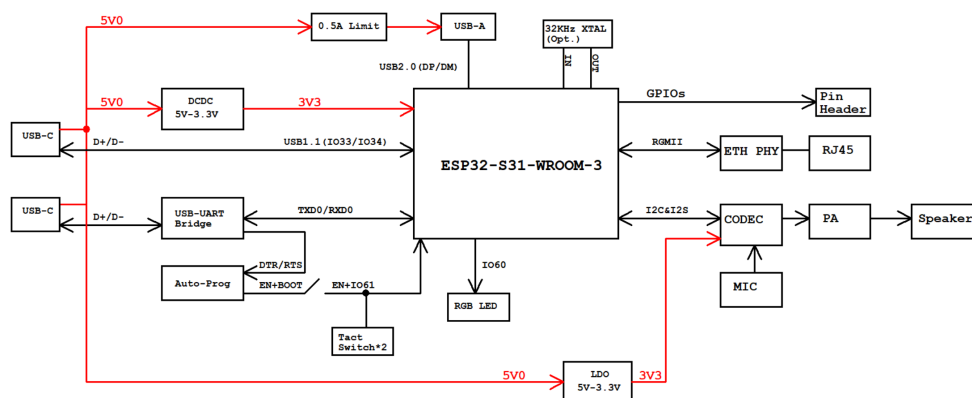


Fig. 4: ESP32-S31-Function-CoreBoard-1 block diagram (click to enlarge)

Power Supply Options The board can be powered using one of the following options:

- Via the USB-to-UART port or the ESP32-S31 USB port (either port or both), default method (recommended)
- 5V and G (GND) pin headers

Current Measurement

The J5 headers on ESP32-S31-Function-CoreBoard-1 (see J5 in Figure [ESP32-S31-Function-CoreBoard-1 - front \(click to enlarge\)](#)) can be used for measuring the current drawn by the ESP32-S31-WROOM-3 module:

- Remove the jumper: Power supply between the module and peripherals on the board is cut off. To measure the module's current, connect an ammeter in series via the J5 headers.
- Apply the jumper (factory default): Restore the board's normal functionality.

Header Block

The table below provides the **Name** and **Function** of pin header **J2**. The pin names are shown in Figure [ESP32-S31-Function-CoreBoard-1 - front \(click to enlarge\)](#). The numbering is the same as in the [ESP32-S31-Function-CoreBoard-1 schematic \(PDF\)](#).

No.	Name	Type Page 9, 1	Function
1	G	G	Ground
2	G	G	Ground
3	TX0	I/O/T	U0TXD, GPIO58
4	RXD	I/O/T	U0RXD, GPIO59
5	61	I/O/T	BOOT, GPIO61
6	60	I/O/T	GPIO60 ²
7	2	I/O/T	GPIO2
8	G	G	Ground
9	0	I/O/T	GPIO0
10	3	I/O/T	GPIO3
11	49	I/O/T	GPIO49
12	1	I/O/T	GPIO1
13	47	I/O/T	GPIO47
14	48	I/O/T	GPIO48
15	45	I/O/T	GPIO45
16	46	I/O/T	GPIO46
17	43	I/O/T	GPIO43
18	44	I/O/T	GPIO44
19	40	I/O/T	GPIO40
20	42	I/O/T	GPIO42
21	39	I/O/T	GPIO39
22	38	I/O/T	GPIO38
23	37	I/O/T	GPIO37
24	36	I/O/T	GPIO36
25	35	I/O/T	GPIO35
26	D0	I/O/T	SDIO_DATA0, GPIO20
27	D1	I/O/T	SDIO_DATA1, GPIO21
28	D2	I/O/T	SDIO_DATA2, GPIO22
29	D3	I/O/T	SDIO_DATA3, GPIO23
30	CLK	I/O/T	SDIO_CLK, GPIO24
31	CMD	I/O/T	SDIO_CMD, GPIO25
32	4	I/O/T	GPIO4
33	G	G	Ground
34	G	G	Ground
35	3V3	P	3.3 V power supply
36	3V3	P	3.3 V power supply
37	G	G	Ground
38	G	G	Ground
39	5V	P	5 V power supply

continues on next page

Table 1 – continued from previous page

No.	Name	Type ^{Page 9, 1}	Function
40	5V	P	5 V power supply

J2

1.1.3 Hardware Revision Details

No previous versions available.

1.1.4 Related Documents

Please download the following documents from the [HTML version of esp-dev-kits Documentation](#).

- [ESP32-S31 Datasheet \(PDF\)](#)
- [ESP32-S31-WROOM-3 Datasheet \(PDF\)](#)
- [ESP32-S31-Function-CoreBoard-1 schematic \(PDF\)](#)
- [ESP32-S31-Function-CoreBoard-1 PCB layout \(PDF\)](#)
- [ESP32-S31-Function-CoreBoard-1 dimensions \(PDF\)](#)
- [ESP32-S31-Function-CoreBoard-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.

1.1.5 Disclaimer and Copyright Notice

See [Disclaimer and Copyright Notice](#).

¹ P: Power; I: Input; O: Output; T: High-impedance; G: Ground.

² Used to drive the addressable RGB LED (GPIO60).

Chapter 2

ESP32-S31-Korvo-1

The ESP32-S31-Korvo-1 is a multimedia development board based on the ESP32-S31-WROOM-3 module for smart audio and HMI applications. It features a dual-microphone array, speaker output, and a microSD card slot; supports speech recognition and voice wake-up; and can connect to a 4.3-inch LCD subboard and DVP camera. This document describes revision V1.1.

2.1 ESP32-S31-Korvo-1 V1.1

This user guide will help you get started with ESP32-S31-Korvo-1 V1.1 and provides detailed information about this development board.

The ESP32-S31-Korvo-1 V1.1 is a multimedia development board based on the ESP32-S31-WROOM-3 module for smart audio and HMI applications. It features a dual-microphone array, speaker output, and a microSD card slot; supports speech recognition and voice wake-up; and can connect to a 4.3-inch LCD subboard and DVP camera.

The document consists of the following major sections:

- *Getting Started*: Overview of ESP32-S31-Korvo-1 V1.1 and hardware/software setup instructions to get started.
- *Hardware Reference*: More detailed information about the ESP32-S31-Korvo-1 V1.1 hardware.
- *Hardware Revision Details*: Information about revision history, known issues, and links to user guides for previous versions.
- *Related Documents*: Links to related documentation.
- *Disclaimer and Copyright Notice*: Link to the disclaimer and copyright notice.

2.1.1 Getting Started

This section briefly introduces ESP32-S31-Korvo-1 V1.1 and explains how to perform the initial hardware setup and how to flash firmware onto the board.

Description of Components

The following list describes the key components on the board in a clockwise direction.



Fig. 1: ESP32-S31-Korvo-1 V1.1 (with ESP32-S31-WROOM-3 module on board)

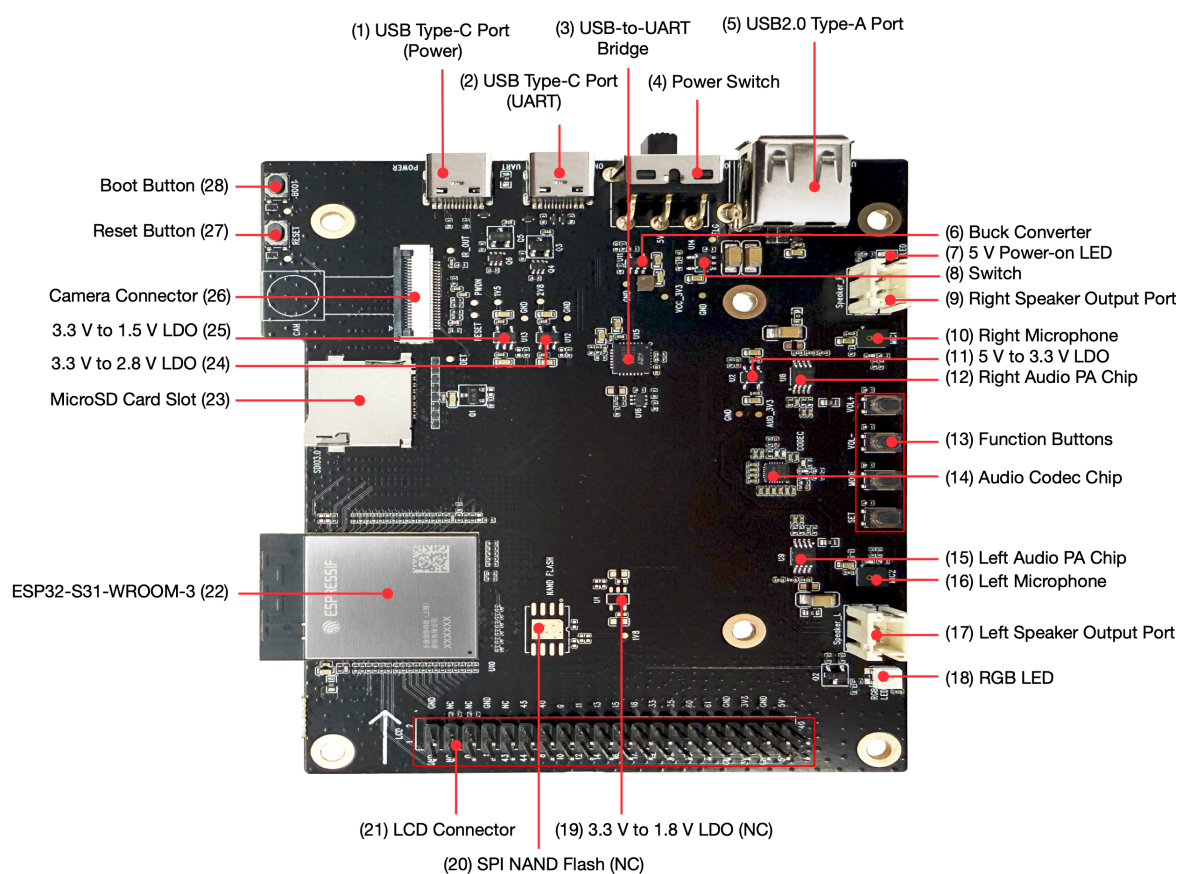


Fig. 2: ESP32-S31-Korvo-1 V1.1 (click to enlarge)

No.	Component	Description
1	USB Type-C Port (Power)	Power input only; no data communication.
2	USB Type-C Port (UART)	Can power the board, flash firmware to the chip, and communicate with the ESP32-S31 via the onboard USB-to-UART bridge.
3	USB-to-UART Bridge	Single-chip USB-to-UART bridge supporting up to 3 Mbps.
4	Power Switch	Slide toward ON to apply 5 V power; slide away from ON to disconnect 5 V power.
5	USB 2.0 Type-A Port	Connected to the ESP32-S31 USB 2.0 OTG High-Speed interface and supports the USB 2.0 standard. When used for USB communication, ESP32-S31 acts as a USB Host connected to downstream USB devices, providing up to 500 mA output current.
6	Buck Converter	Buck DC-DC converter for 3.3 V system power.
7	5 V Power-on LED	Lights when USB power is connected to the board.
8	Switch	TPS2051C USB power switch with 500 mA current limit.
9	Right Speaker Output Port	Right-channel speaker output; can drive a 4 Ω , 3 W speaker. The pin spacing is 2.00 mm (0.08").
10	Right Microphone	Onboard right analog microphone routed to the audio codec.
11	5 V to 3.3 V LDO	Converts 5 V to 3.3 V for the audio circuitry.
12	Right Audio PA Chip	NS4150B low-EMI 3 W mono class-D amplifier driving the right speaker from the codec output.
13	Function Buttons	Four buttons: PLAY, SET, VOL-, and VOL+, connected to ESP32-S31-WROOM-3 for UI control and audio application testing via dedicated APIs.
14	Audio Codec Chip	ES8389 low-power stereo codec with dual ADC/DAC, low-noise preamp, headphone driver, digital effects, analog mixing, and gain control. Connected to the ESP32-S31 over I2S and I2C for hardware audio processing independent of application software.
15	Left Audio PA Chip	NS4150B low-EMI 3 W mono class-D amplifier driving the left speaker from the codec output.
16	Left Microphone	Onboard left analog microphone routed to the audio codec.
17	Left Speaker Output Port	Left-channel speaker output; can drive a 4 Ω , 3 W speaker. The pin spacing is 2.00 mm (0.08").
18	RGB LED	Addressable RGB LED driven by GPIO8.

No.	Component	Description
19	3.3 V to 1.8 V LDO (NC)	Converts 3.3 V to 1.8 V for 1.8 V SPI NAND flash. Not populated by default (NC).
20	SPI NAND Flash (NC)	Quad SPI NAND flash sharing ESP32-S31-WROOM-3 signals with the microSD interface. Not populated by default (NC).
21	LCD Connector	Connector for the LCD subboard.
22	ESP32-S31-WROOM-3	ESP32-S31-WROOM-3 is a general-purpose module supporting 2.4 GHz Wi-Fi 6, Bluetooth 5.4, Bluetooth Classic, and IEEE 802.15.4 (Zigbee 3.0 and Thread 1.4). The module integrates ESP32-S31, 16 MB SPI flash, and 16 MB PSRAM, and uses an onboard PCB antenna.
23	microSD Card Slot	Supports 4-bit microSD for audio storage and playback. SDIO 3.0 capable.
24	3.3 V to 2.8 V LDO	Converts 3.3 V to 2.8 V for the external camera module.
25	3.3 V to 1.5 V LDO	Converts 3.3 V to 1.5 V for the external camera module.
26	Camera Connector	Connector for an external camera module for image transfer.
27	Reset Button	System reset.
28	Boot Button	Firmware download: hold Boot, press and release Reset to enter download mode; flash over the serial port.

Development Board Accessories

The ESP32-S31-Korvo-1 V1.1 package may include the following optional accessories. The main board and accessories can also be purchased separately. Available accessories include:

- LCD subboard: ESP32-S3-LCD-EV-Board-SUB3
- OV3660 camera module

Start Application Development

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

Required Hardware

- ESP32-S31-Korvo-1 V1.1
- One or two speakers
- Two USB 2.0 cables (Standard-A to Type-C)
- Computer running Windows, Linux, or macOS

Note: Be sure to use a good-quality USB cable. Some cables are for charging only and do not provide the needed data lines nor work for programming the board.

Optional Hardware

- microSD card

Hardware Setup

1. Connect one or two speakers to the **speaker output** port(s).
2. Plug in two USB cables from the PC to both USB ports on the board.
3. Turn on the **power switch**.
4. The red power LED should light.

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

Note: The board uses USB ports to communicate with the computer. Most operating systems (Windows, Linux, macOS) come with the required drivers pre-installed and the board is recognized automatically once plugged in. If the device cannot be recognized or a serial connection cannot be established, refer to [Establish Serial Connection with ESP32-S31](#) for detailed driver installation steps.

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Other Development Framework Options In addition to ESP-IDF, this board supports the following frameworks and options for different user needs:

- Espressif Bluetooth LE ecosystem: Develop Bluetooth LE applications using solutions such as ESP-BLE-MESH and ESP-BLE-AUDIO to accelerate time-to-market and mass production.
- [ESP-Brookesia](#): Human-machine interaction framework for AIoT devices for graphical UI and smart display applications.
- [ESP-GMF](#): Espressif general multimedia framework with audio/video processing components for multimedia applications.

- **Bluetooth audio:** Unified Bluetooth audio APIs supporting Bluetooth Classic and LE Audio.
- **ESP Video Components:** Camera, video streaming, and video processing components for image capture and video applications.
- **ESP-Matter:** Build Matter and Thread devices suited to low-power and battery-powered scenarios.

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2.1.2 Hardware Reference

Block Diagram

The main components of ESP32-S31-Korvo-1 V1.1 and their interconnections are shown in the block diagram below.

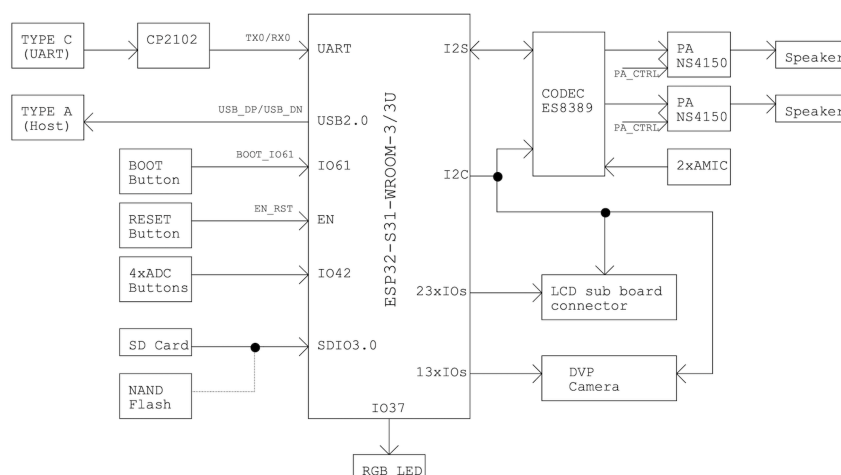


Fig. 3: ESP32-S31-Korvo-1 V1.1 electrical block diagram (click to enlarge)

Power Supply Description

USB Power Both USB Type-C ports can power the board: the Power port is power-only, while the UART port can supply power and carry data. When driving high-power speakers and using the USB Type-A port to power external devices at the same time, ensure the total input current to the board meets 3 A. Use a dedicated cable for USB power delivery, separate from the USB cable used for flashing applications.

Separate Audio Power ESP32-S31-Korvo-1 V1.1 provides independent power supplies for audio components to reduce digital noise in audio signals and improve overall performance.

ES8389 Audio Codec Notes

ESP32-S31-Korvo-1 V1.1 uses the ES8389 audio codec. When transferring audio data with the SoC, note the following:

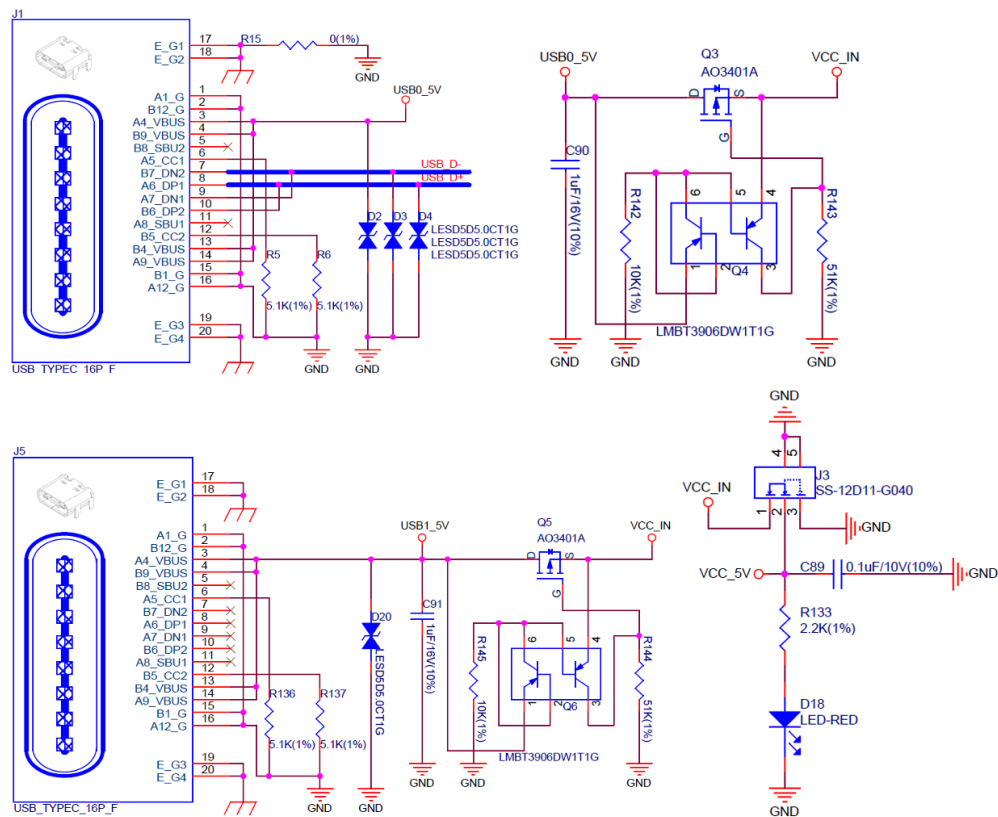


Fig. 4: ESP32-S31-Korvo-1 V1.1 - USB power supply (click to enlarge)

Aud 3V3

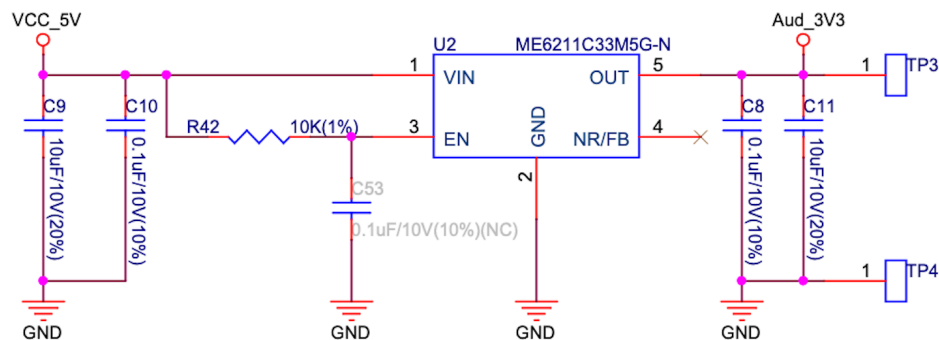


Fig. 5: ESP32-S31-Korvo-1 V1.1 - audio power supply (click to enlarge)

- Both DAC and ADC signals must be sent to the SoC in **TDM (Time Division Multiplexing)** format.
- Pin 4 (MCLK)** of the ES8389 can be muxed to **TDMIN** via register configuration.

Codec

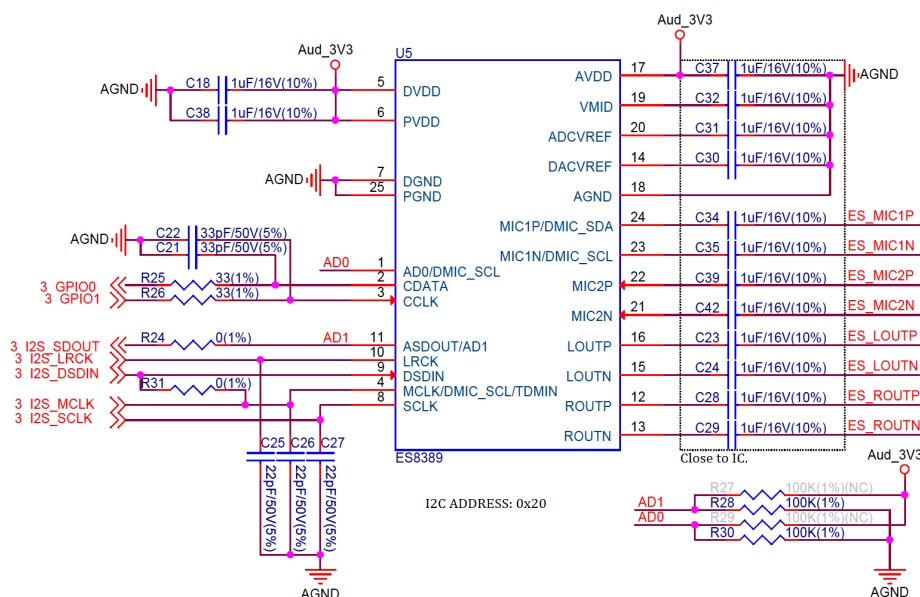


Fig. 6: ESP32-S31-Korvo-1 V1.1 - ES8389 audio codec schematic (click to enlarge)

microSD Card and SPI NAND Flash

The microSD card and SPI NAND flash functions share GPIO20–GPIO25 on the ESP32-S31-WROOM-3 module. The board uses the microSD card function by default. To switch to the SPI NAND flash function, perform hardware rework: remove R7, R65, R66, R67, R68, and R69, and populate R22, R23, R1, R2, R3, R4, C6, R20, and U4. Note that ESP32-S31 supports both 1.8 V and 3.3 V NAND flash. For **1.8 V** NAND flash, you must also populate R134, C66, C80, R100, U1, C82, and C67; for **3.3 V** NAND flash, populate R135.

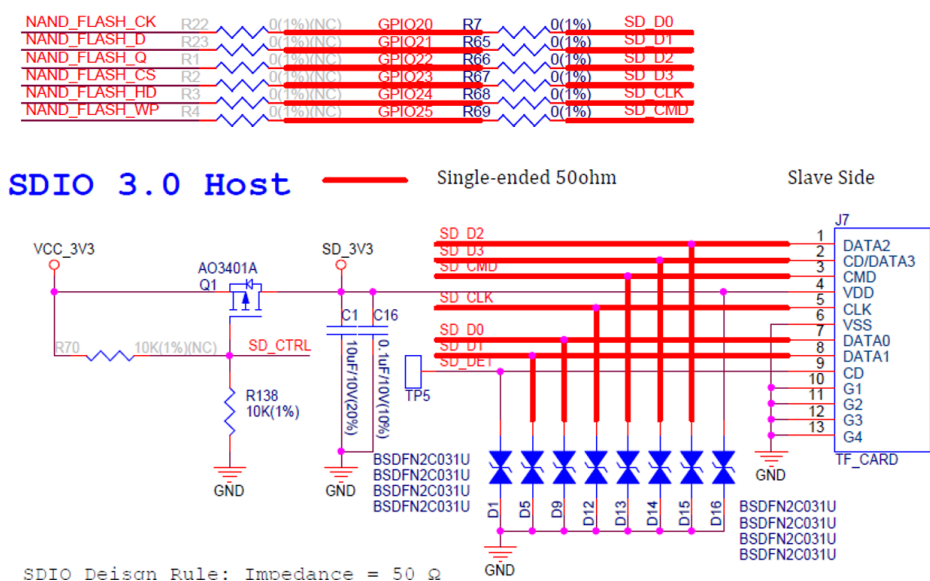
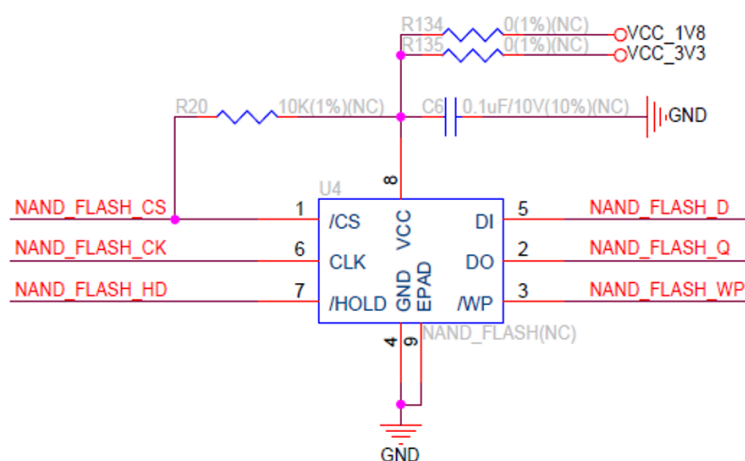


Fig. 7: ESP32-S31-Korvo-1 V1.1 - microSD card function (click to enlarge)

SPI NAND



NAND 1V8

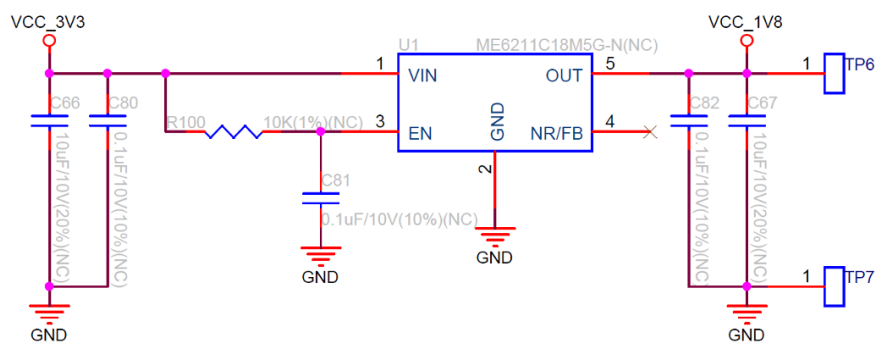


Fig. 8: ESP32-S31-Korvo-1 V1.1 - SPI NAND flash function (click to enlarge)

Pin Assignment Table

The table below lists ESP32-S31-WROOM-3 module pin assignments to onboard functions.

Table 1: ESP32-S31-WROOM-3 pin assignment

Pin	Name	SD-MMC	SPI NAND	I2S	I2C	RGB LCD	BOOT-MODE	UART0	Other	DVP camera
6	GPIO2			I2S_MCLK						
7	GPIO3			I2S_SCL						
8	GPIO0				I2C_SDA					
9	GPIO1				I2C_SCL					
10	GPIO4			I2S_LRC						
11	GPIO5			I2S_DSI						
12	GPIO6			I2S_SDC						
13	GPIO7								PA_CTR	
14	GPIO8					DB0(B3)				
15	GPIO9					DB1(B4)				
16	GPIO10					DB2(B5)				
17	GPIO11					DB3(B6)				
18	GPIO12					DB4(B7)				
19	GPIO13					DB5(G2)				
20	GPIO14					DB6(G3)				
21	GPIO15					DB7(G4)				
22	GPIO16					DB8(G5)				
23	GPIO17					DB9(G6)				
24	GPIO18					DB10(G7)				
25	GPIO19					DB11(R7)				
27	GPIO20	SDIO_D	SPI2_CLK							
28	GPIO21	SDIO_D	SPI2_D0							
29	GPIO22	SDIO_D	SPI2_Q0							
30	GPIO23	SDIO_D	SPI2_CS							
31	GPIO24	SDIO_C	SPI2_HC							
32	GPIO25	SDIO_C	SPI2_W0							
40	USB_DP								USB2.0_	
41	USB_DM								USB2.0_	
42	GPIO33					DB12(R8)				
43	GPIO34					DB13(R9)				
44	GPIO35					DB14(R10)				
45	GPIO36					DB15(R11)				
46	GPIO37								WS2812	
49	GPIO38					LCD_CS	Boot Mode 0			GM_FK
50	GPIO39						Boot Mode 1		SD_CTR	
51	GPIO40					LCD_PC	Boot Mode 2			
52	GPIO42								ADC BUT-TON	
53	GPIO43					LCD_H_				
54	GPIO44					LCD_H_				
55	GPIO45					LCD_V_				

continues on next page

Table 1 – continued from previous page

Pin ^{Page 20}	Name	SD-MMC	SPI NAND	I2S	I2C	RGB LCD	BOOT-MODE	UART0	Other	DVP camera
56	GPIO46									CAM_D0
57	GPIO47									CAM_D1
58	GPIO48									CAM_D2
59	GPIO49									CAM_D3
60	GPIO50									CAM_D4
61	GPIO51									CAM_D5
62	GPIO52									CAM_D6
63	GPIO53									CAM_D7
64	GPIO54									CAM_PCLK
65	GPIO55									CAM_XCLK
66	GPIO56									CAM_V_SYNC
67	GPIO57									CAM_H_SYNC
68	GPIO58							U0TXD		
69	GPIO59							U0RXD		
70	GPIO60					LCD_M0	Boot Mode 3			
71	GPIO61					LCD_SC	Boot Mode 4			

Hardware Setup Options

Automatic Download There are two ways to put the ESP development board into download mode:

- Manually press the Boot and RST buttons, then release RST first and Boot afterwards.
- Let software perform automatic download using the serial port DTR and RTS signals to control EN and IO0. For details, see the [ESP32-S31-Korvo-1 V1.1 schematic](#) (PDF).

2.1.3 Hardware Revision Details

- ESP32-S31-Korvo-1 V1.1:
Matte black solder mask; larger PCB footprint; LCD subboard stacks on top of the main board when assembled. GPIO mapping is unchanged from V1.0.
- ESP32-S31-Korvo-1 V1.0:
First revision with green solder mask; LCD subboard extended beyond the board edge so onboard functions remained exposed for debugging.

2.1.4 Related Documents

Please download the following documents from the [HTML version of esp-dev-kits Documentation](#).

- [ESP32-S31 Datasheet](#) (PDF)
- [ESP32-S31-WROOM-3 Datasheet](#) (PDF)
- [ESP32-S31-Korvo-1 V1.1 schematic](#) (PDF)
- [ESP32-S31-Korvo-1 V1.1 PCB layout](#) (PDF)
- [ESP32-S31-Korvo-1 V1.1 dimensions](#) (PDF)
- [ESP32-S31-Korvo-1 V1.1 dimensions source file](#) (DXF) - You can view it with [Autodesk Viewer](#) online
- [ESP32-S31-Korvo-1 V1.1 3D Printed Case Files](#) (STL & STEP) - 3D printable case files are available here

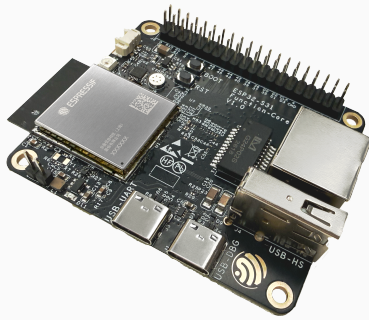
¹ Pin index on the ESP32-S31-WROOM-3 module (first column), excluding GND and power pins.

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

2.1.5 Disclaimer and Copyright Notice

See *Disclaimer and Copyright Notice*.

ESP32-S31 Development Boards



ESP32-S31-Function-CoreBoard-1



ESP32-S31-Korvo-1

Chapter 3

Related Documentation and Resources

3.1 Related Documentation

- [ESP32-S31 Datasheet](#) –Specifications of the ESP32-S31 hardware.
- [ESP32-S31 Technical Reference Manual](#) –Detailed information on how to use the ESP32-S31 memory and peripherals.
- [ESP32-S31 Hardware Design Guidelines](#) –Guidelines on how to integrate the ESP32-S31 into your hardware product.
- ESP32-S31 Product/Process Change Notifications (PCN)
<https://espressif.com/en/support/documents/pcns?keys=ESP32-S31>
- ESP32-S31 Advisories –Information on security, bugs, compatibility, component reliability.
<https://espressif.com/en/support/documents/advisories?keys=ESP32-S31>
- Certificates
<https://espressif.com/en/support/documents/certificates>
- Documentation Updates and Update Notification Subscription
<https://espressif.com/en/support/download/documents>

3.2 Developer Zone

- [ESP-IDF Programming Guide for ESP32-S31](#) –Extensive documentation for the ESP-IDF development framework.
- [ESP-IoT-Solution Programming Guide](#) - Extensive documentation for the ESP-IoT-Solution development framework.
- [ESP-FAQ](#) - A summary document of frequently asked questions released by Espressif.
- ESP-IDF and other development frameworks on GitHub.
<https://github.com/espressif>
- ESP32 BBS Forum –Engineer-to-Engineer (E2E) Community for Espressif products where you can post questions, share knowledge, explore ideas, and help solve problems with fellow engineers.
<https://esp32.com/>
- The ESP Journal –Best Practices, Articles, and Notes from Espressif folks.
<https://blog.espressif.com/>
- See the tabs SDKs and Demos, Apps, Tools, AT Firmware.
<https://espressif.com/en/support/download/sdks-demos>

3.3 Products

- ESP32-S31 Series SoCs –Browse through all ESP32-S31 SoCs.
<https://espressif.com/en/products/socs?id=ESP32-S31>
- ESP32-S31 Series Modules –Browse through all ESP32-S31-based modules.
<https://espressif.com/en/products/modules?id=ESP32-S31>
- ESP32-S31 Series DevKits –Browse through all ESP32-S31-based devkits.
<https://espressif.com/en/products/devkits?id=ESP32-S31>
- ESP Product Selector –Find an Espressif hardware product suitable for your needs by comparing or applying filters.
<https://products.espressif.com/#/product-selector>

3.4 Contact Us

- See the tabs Sales Questions, Technical Enquiries, Circuit Schematic & PCB Design Review, Get Samples (Online stores), Become Our Supplier, Comments & Suggestions.
<https://espressif.com/en/contact-us/sales-questions>

Chapter 4

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