SMART DISPLAY MODULE SPECIFICATION

PCBA-ESP32-P4-Ultra-A	
Model:	PCBA-ESP32-P4-Ultra-A
Version:	V1.1
Date:	2025-09-08

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Customer Confirmation

Approved by	Notes

REVISION HISTORY

Revision	Date	Contents of Revision Change	Remark
V1.0	20250621	Preliminary release	
V1.1	20260908	Error in modifying the display interface, add adaptation	

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TABLE of CONTENTS

1 INTRODUCTION **4**
1.1 Product Features 4
2. HARDWARE DESCRIPTION **6**
2.1 Module Introduction 6
2.2 GPIO Introduction 8
2.3 Hardware Version 9
3. DEVELOPMENT BOARD ACCESSORIES： **9**
4. FUNCTIONAL BLOCK DIAGRAM **10**
5. INSTRUCTIONS FOR USE **10**
6. RELATED DOCUMENTS **11**
7. SCHEMATIC DIAGRAM **12**

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1 Introduction

ESP32-P4-Ultra is a high-performance development board with a dual-core RISC-V based on the ESP32-P4 chip designed by VIEWE. The ESP32-P4 is equipped with a dual-core 400MHz RISC-V processor and supports up to 32MB of SRAM. In addition, the ESP32-P4 supports common peripherals such as SPI, I2S, I2C, LED PWM, MCPWM, RMT, ADC, UART, and TWAI™. It also supports USB OTG 2.0 HS, MIPI-CSI/DSI, H.264 encoder, Ethernet, and SDIO Host 3.0 for high-speed connection; fully meeting the higher requirements put forward by embedded applications in aspects such as human-machine interface support, edge computing capabilities, and IO connection characteristics. It can also meet the development needs of customers for low-cost, high-performance, and low-power multimedia products.

This development board is equipped with an ESP32-C6-MINI-1 2.4 GHz Wi-Fi 6 & Bluetooth 5 (LE) module for Wi-Fi and Bluetooth communication of the development board; we have also adapted a number of VIEWE capacitive touch screens, such as a 4-inch square screen with a resolution of 480 x 480/720 x 720, a 2.8-inch round screen with a resolution of 480 x 480, and a 10.1-inch screen with a resolution of 800 x 1280, and a 7-inch screen with a resolution of 600 x 1024. It enriches the user's interaction experience. This development board is suitable for the prototype construction of products such as video doorbells, network cameras, smart home central control screens, LCD electronic price tags, and two-wheeler instrument panels. Most of the pins of the modules on the board have been led out to the header pins, and developers can easily connect a variety of peripheral devices through jumpers according to actual needs.

1.1 Product Features

- Processor
  - ✧ Equipped with a RISC-V 32-bit dual-core processor (HP system), with DSP and instruction set extensions, floating-point arithmetic unit (FPU), and a main frequency of up to 400 MHz
  - ✧ Equipped with a RISC-V 32-bit single-core processor (LP system), with a main frequency of up to 40 MHz
  - ✧ Equipped with an ESP32-C6 WIFI/BT coprocessor, expanding functions such as WIFI 6/Bluetooth 5 through SDIO

- Memory
  - ✧ 128 KB of high-performance (HP) system read-only memory (ROM).
  - ✧ 16 KB of low-power (LP) system read-only memory (ROM).
  - ✧ 768 KB of high-performance (HP) L2 memory (L2MEM).
  - ✧ 32 KB of low-power (LP) SRAM.
  - ✧ 8 KB of system tightly coupled memory (TCM).
  - ✧ 32 MB PSRAM is stacked and sealed inside the package, and 16MB Nor Flash is connected through the QSPI interface

- Peripheral Interfaces

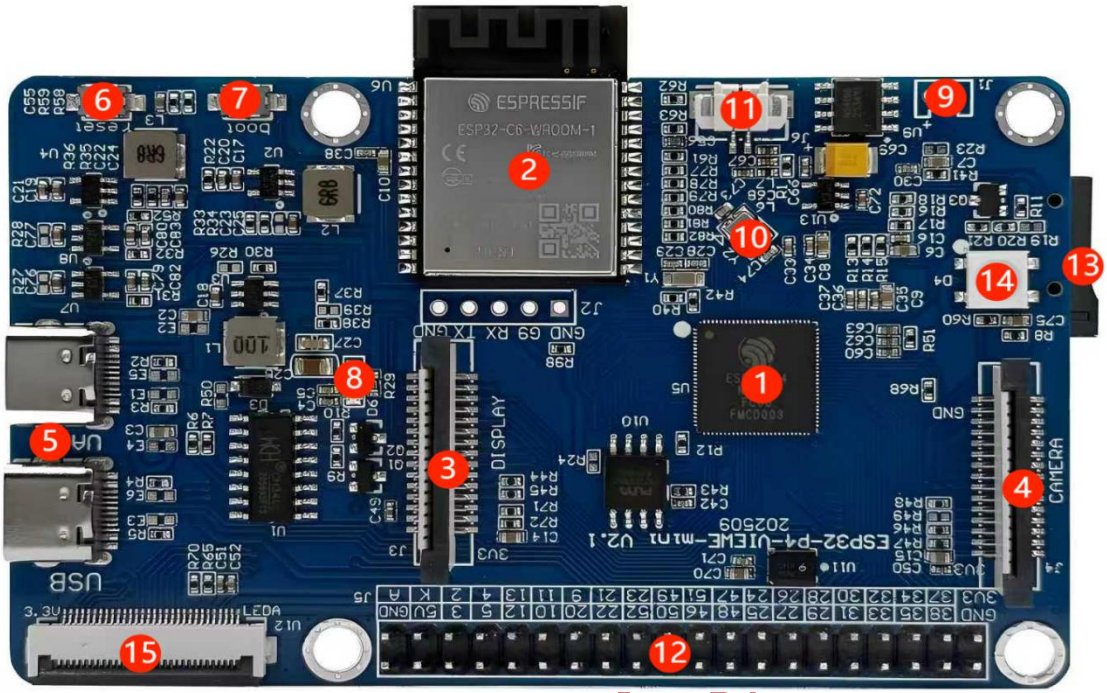
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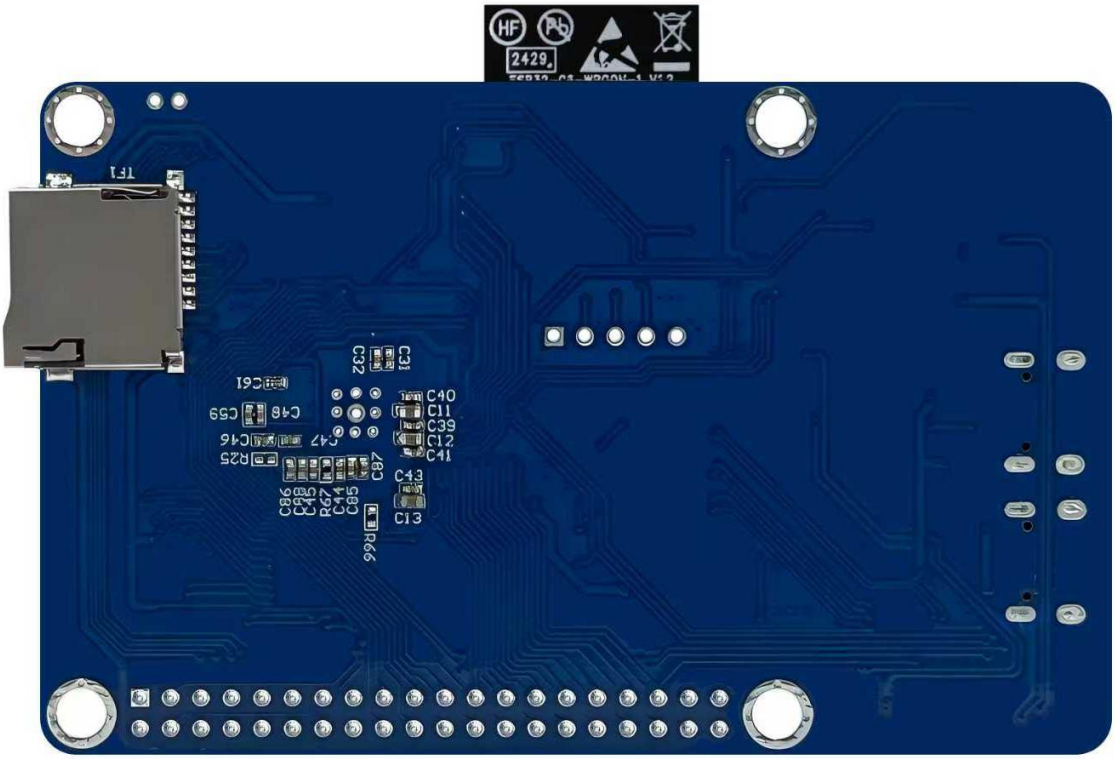
- ✧ Two 2*20 Pin Headers are on-board to 34 programmable GPIO, supporting a rich variety of peripheral devices
- ✧ On-board SDIO3.0 SD card slot and Type-C UART programming port, facilitating use in different scenarios
- ✧ On-board MIPI-CSI high-definition camera interface, supporting full HD 1080P video capture and encoding, integrating an image signal processor (ISP) and H264 video encoder, supporting H.264 & JPEG video encoding (1080P @30fps), facilitating applications in fields such as computer vision and machine vision
- ✧ On-board 2 MIPI-DSI high-definition display interfaces, integrating a pixel processing accelerator (PPA) and 2D graphics acceleration controller (2D DMA), supporting JPEG image decoding (1080P @30fps), providing strong support for high-definition displays and smooth HMI experiences, facilitating applications in scenarios such as smart home control panels, industrial control panels, and vending machines

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2. Hardware Description

2.1 Module Introduction





1、ESP32-P4
ESP32-P4 stacked with 32MB PSRAM

2、ESP32-C6
SDIO interface protocol, expanding ESP32-P4-Ultra Wi-Fi 6 and Bluetooth 5

3、Display interface
MIPI 2-lane, compatible with multiple MIPI screens from VIEWE:
4-DSI-TOUCH(720x720)
7-DSI-TOUCH(1024x600)
10.1-DSI-TOUCH(800x1280)

4、Camera interface
MIPI 2-lane

5、Type-C interface
Can be used for power supply, program burning, and debugging

6、RESET button

7、BOOT button
Press when powering on or resetting to enter download mode

8、USER-LED
Power indicator light

9、RTC socket
Connect a rechargeable RTC battery (only rechargeable RTC batteries are supported)

10、SMD microphone

11、Speaker interface
MX1.25 2P connector, supporting 8Ω 2W speaker

12、GPIO interface

13、TF card slot
SDIO 3.0 interface protocol

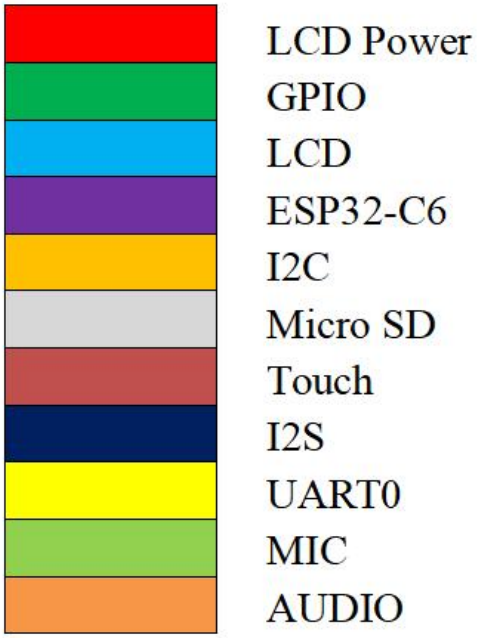
14、RGB-LED

15、30PIN Display interface(MIPI 2-lane**)**
For use with VIEWE screens, e.g.:
4.0-720x720 (With touch square screen)
4.0- 720x720(Non- touch circular screen)
6.8-400x1280(No Touch Long screen)
10.1-440x1920(With Touch Long screen)

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2.2 GPIO Introduction

Pin NO.	FUNCTION	Pin NO.	FUNCTION
GPIO2	LCD-TE	GPIO29	GPIO29
GPIO3	LCD-RESET	GPIO30	GPIO30
GPIO4	EN-LCM1V8	GPIO31	I2S-CTRL
GPIO5	EN-LCM3V3	GPIO32	I2S-LRCLK
GPIO6	C6-WP	GPIO33	I2S-BCLK
GPIO7	I2C-SDA	GPIO34	I2S-SDATA
GPIO8	I2C-SCL	GPIO35	GPIO35
GPIO9	GPIO9	GPIO36	GPIO36
GPIO10	GPIO10	GPIO37	UART0-RX
GPIO11	GPIO11	GPIO38	UART0-TX
GPIO12	GPIO12	GPIO39	SD1-D0
GPIO13	GPIO13	GPIO40	SD1-D1
GPIO14	SD3-D0	GPIO41	SD1-D2
GPIO15	SD3-D1	GPIO42	SD1-D3
GPIO16	SD3-D2	GPIO43	SD1-CLK
GPIO17	SD3-D3	GPIO44	SD1-CMD
GPIO18	SD3-CLK	GPIO45	SD1-PWRn
GPIO19	SD3-CMD	GPIO46	GPIO46
GPIO20	LCD-VSP	GPIO47	GPIO47
GPIO21	LCD-BL-EN	GPIO48	GPIO48
GPIO22	GPIO22	GPIO49	GPIO49
GPIO23	GPIO23	GPIO50	GPIO50
GPIO24	CTP-RST	GPIO51	GPIO51
GPIO25	CTP-INT	GPIO52	GPIO52
GPIO26	MIC-CLK	GPIO53	PA-CTRL
GPIO27	MIC-DATA	GPIO54	C6-CHIP-PU
GPIO28			



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2.3 Hardware Version

（1）ESP32-P4-VIEWE-Mini 1.0　No longer for sale

（2）ESP32-P4-VIEWE-Mini 2.0　Changes: Added a microphone and a speaker to the previous version, and replaced the WIFI module C6 with a chip.

3. Development Board Accessories：

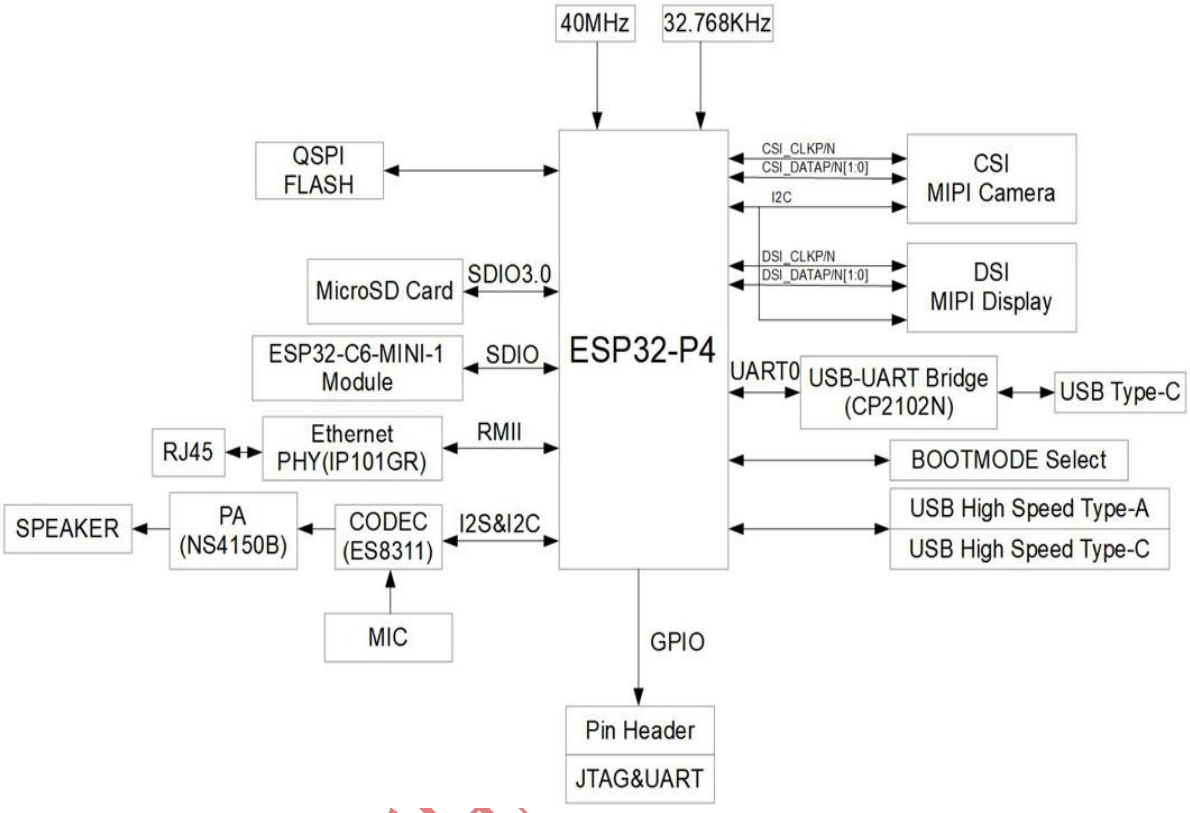
The following optional accessories are included in the packaging of the ESP32-P4-VIEWE-mini:

- Display and its accessories (optional)
  - ✧ 7-inch MIPI DSI capacitive touch screen with a resolution of 1024 x 600 pixels
  - ✧ 4-inch MIPI DSI capacitive touch screen with a resolution of 720 x 720 pixels
  - ✧ LCD screen adapter board
  - ✧ Screen cable
- Camera and its accessories (optional)
  - ✧ 2-megapixel MIPI CSI interface camera
  - ✧ Camera adapter board
  - ✧ Camera cable

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4. Functional Block Diagram

The main components and connection methods of the ESP32-P4-Ultra are shown in the following figure:



Note: This board is the most basic version, and there are no external Ethernet, USB 2.0, etc.And we have also replaced the audio part, which consists of inmp441 and ns4168. We will lead out the pin and can directly insert the expansion board later, and also reserve more creative possibilities for everyone

5. Instructions for Use

This tutorial aims to guide users to set up the software environment for ESP32-P4 hardware development, and demonstrates how to use the ESP-IDF configuration menu, compile, and download firmware to the ESP32-P4 development board through simple examples.

- Preparation
  - Hardware
    - ESP32-P4-VIEWE-mini Development Board
    - USB data cable (Type-A to Type-C, prepared as needed)
    - Computer (Windows, Linux or macOS)
  - Software (It is recommended to install ESP-IDF using an integrated development environment. If you are familiar with ESP-IDF, you can start directly from the ESP-IDF terminal. You can choose any of the following development methods.)

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- ✧ VSCode + ESP-IDF plugin (recommended)
- ✧ Eclipse + ESP-IDF plugin (Espressif-IDE)
- ✧ Arduino IDE

- Getting-start
  - Please go to ESP-IDF Quick Start to see how to quickly set up the development environment and burn the application to your development board.
  - The application examples for the development board are stored in Examples. You can configure the project options by entering idf.py menuconfig in the example directory.

6. Related Documents

GitHub：https://github.com/VIEWESMART/ESP32-P4-Ultra
Gitee: https://gitee.com/VIEWESMART/ESP32-P4-Ultra

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7. schematic diagram

