

WT9932P4C61 TINY User Guide

WT9932P4C61 TINY User Manual

Shenzhen Wireless-Tag Technology Co., Ltd.

2026-5-24

Contents

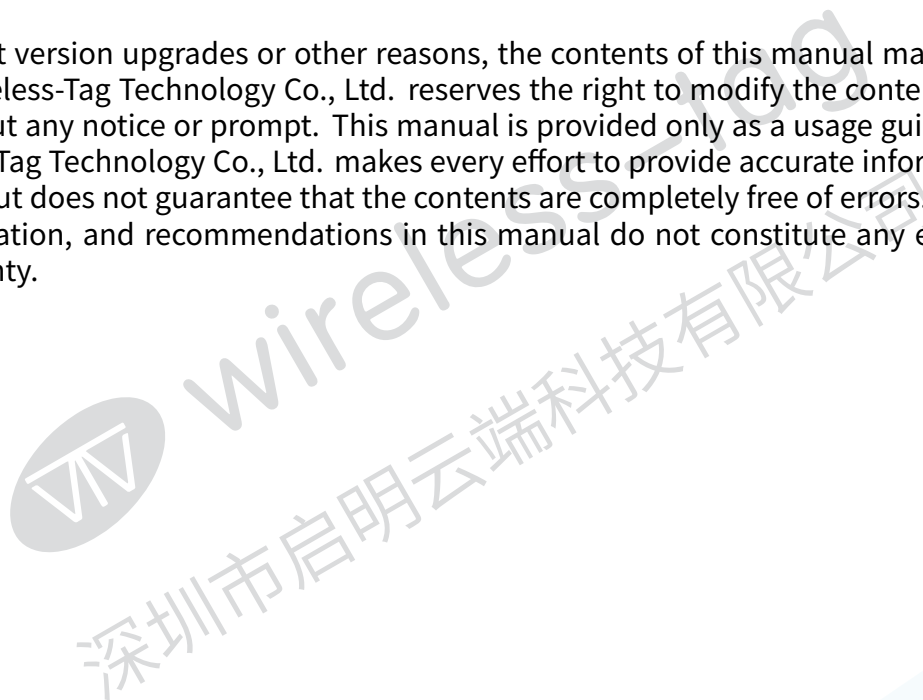
Disclaimer	1
Notice	1
1. Development Board Overview	3
1.1 Product Category	3
1.2 Development Board Introduction	3
1.3 Product Features	3
1.4 Development Board Images	4
2. Hardware Reference	5
2.1 Functional Block Diagram	5
2.2 Hardware Peripherals	6
2.3 Component Introduction	6
2.4 Interface Footprints	8
2.5 Interface Description	8
[J1] MIPI DSI FPC	8
[J2] MIPI CSI FPC	8
[J9][J10] USB Type-C Interface	9
[J11] MicroSD Card Interface	9
[J3][J4] Pin Header Interface	10
3. Schematic	12
4. Mechanical Support	13
4.1 PCBA Dimension Drawing	13
5. Usage Guide	14
5.1 Preparation	14
5.2 Hardware Configuration	14
5.3 Usage Instructions	14
6. Related Documents	15
7. Contact Us	16

Disclaimer

The information in this document, including reference URLs, is subject to change without notice. This document is provided "as is" without any warranties, including warranties of merchantability, fitness for a particular purpose, non-infringement, or any warranties arising from any proposal, specification, or sample mentioned elsewhere. This document assumes no liability, including liability for infringement of any patent rights arising from the use of the information contained herein. No license to any intellectual property rights is granted herein, whether express or implied, by estoppel or otherwise. All trade names, trademarks, and registered trademarks mentioned in this document are the property of their respective owners.

Notice

Due to product version upgrades or other reasons, the contents of this manual may change. Shenzhen Wireless-Tag Technology Co., Ltd. reserves the right to modify the contents of this manual without any notice or prompt. This manual is provided only as a usage guide. Shenzhen Wireless-Tag Technology Co., Ltd. makes every effort to provide accurate information in this manual, but does not guarantee that the contents are completely free of errors. All statements, information, and recommendations in this manual do not constitute any express or implied warranty.



Revision History

Version	Date	Author	Change Item
V1.0	2026/5/24	Kirto	Initial release



1. Development Board Overview

1.1 Product Category

1.2 Development Board Introduction

WT9932P4C61-TINY is a mini development board designed for lightweight IoT development. It is based on Espressif ESP32-P4 + ESP32-C61 chips and uses the Wireless-Tag WT01P461-S1 module. With an overall size of 33 mm x 69 mm, it balances strong performance and rich functionality in a very compact form factor.

The ESP32-P4 core runs at up to 400 MHz, while the ESP32-C61 supports Bluetooth and Wi-Fi 6 dual-mode wireless communication, making the board suitable for smart home, low-power IoT terminal, and similar applications. In terms of hardware design, all pins are brought out for quick breadboard development, and serial firmware download is integrated to simplify debugging. The board also includes an onboard RGB LED, EN and BOOT function buttons, and a power indicator LED for basic function verification and status monitoring. The power section uses a DCDC design and supports up to 2 A output current to ensure stable power supply for peripherals.

1.3 Product Features

1. Combines the strong 400 MHz performance of ESP32-P4 with the cost-effective ESP32-C61, providing high performance without compromising cost.
2. Onboard RGB indicator LED for clear real-time status indication.
3. A single USB cable can be used to develop the P4 and C61 independently.
4. EN and BOOT buttons.
5. Breadboard-friendly pin spacing.
6. MIPI CSI/DSI interfaces compatible with Raspberry Pi pin order.
7. Onboard MicroSD card support.

1.4 Development Board Images

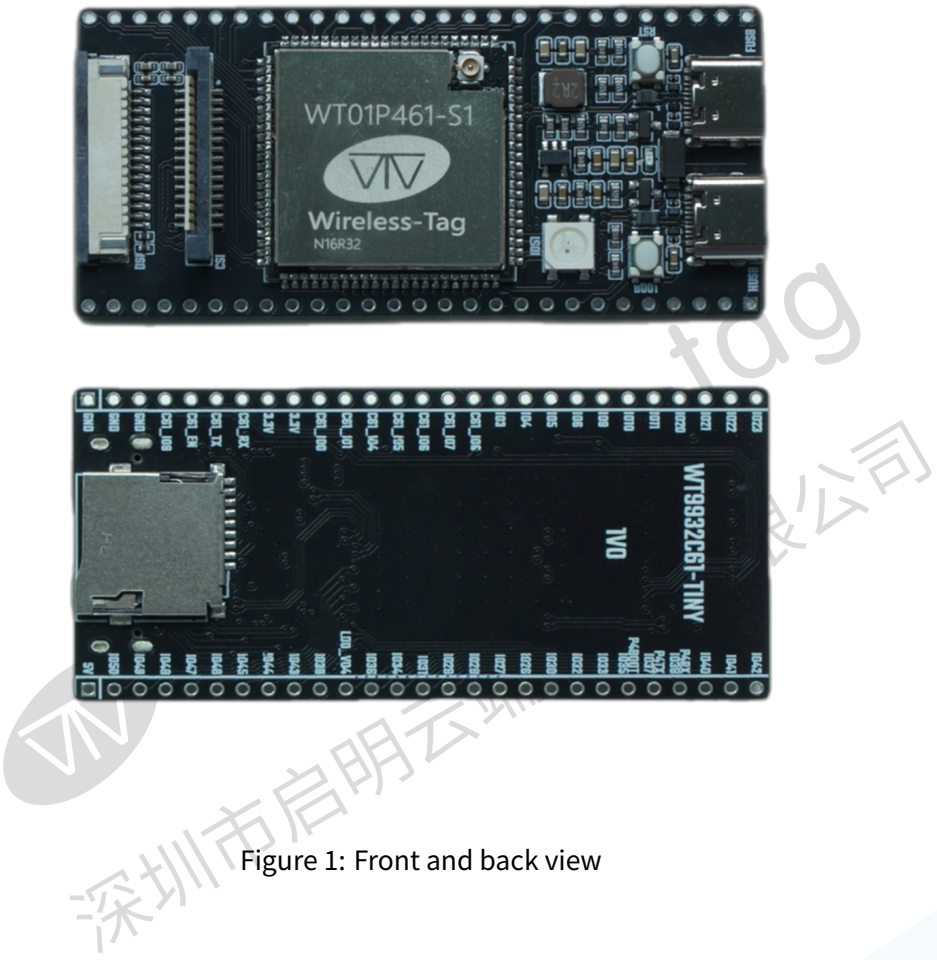


Figure 1: Front and back view

2. Hardware Reference

2.1 Functional Block Diagram

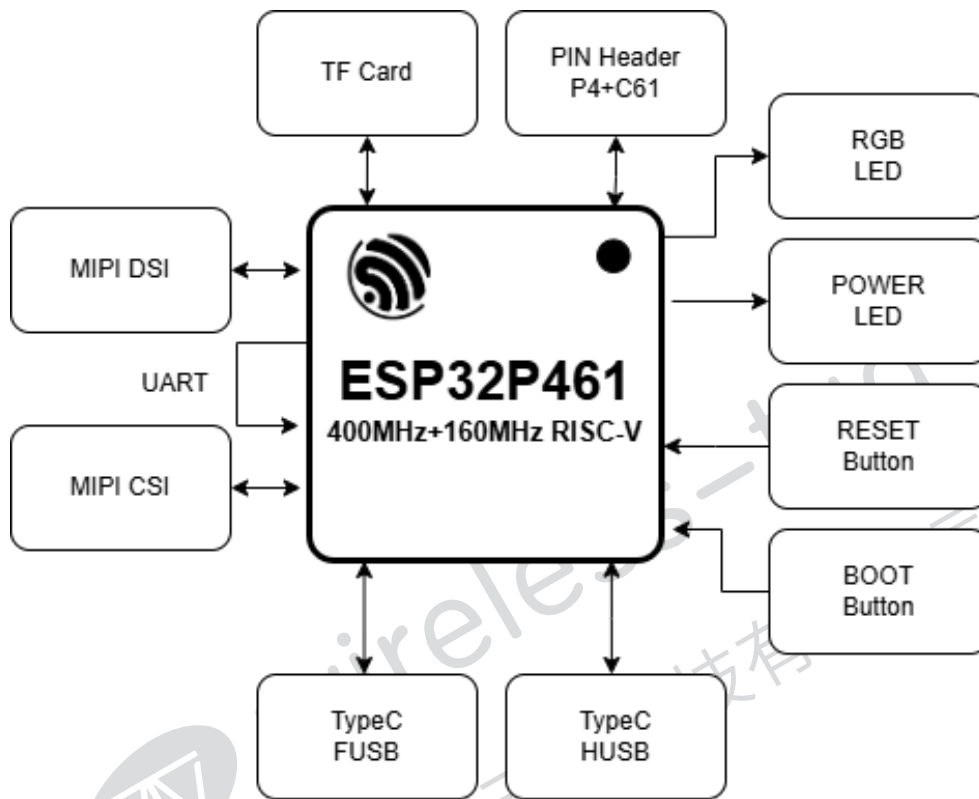


Figure 2: Functional block diagram

2.2 Hardware Peripherals

Peripheral	Description
WS2812	Single-wire RGB LED connected to IO51.
RESET Button	Used for reset.
BOOT Button	Used to manually enter download mode. Connected to IO35
FUSB	Full-speed USB, used for power supply and firmware download/upgrade.
HUSB	High-speed USB.
MIPI CSI FPC	1.0 mm pitch camera interface with Raspberry Pi pin order.
MIPI DSI FPC	1.0 mm pitch display interface with Raspberry Pi pin order.
MicroSD Card	Four-line MicroSD card interface.

2.3 Component Introduction

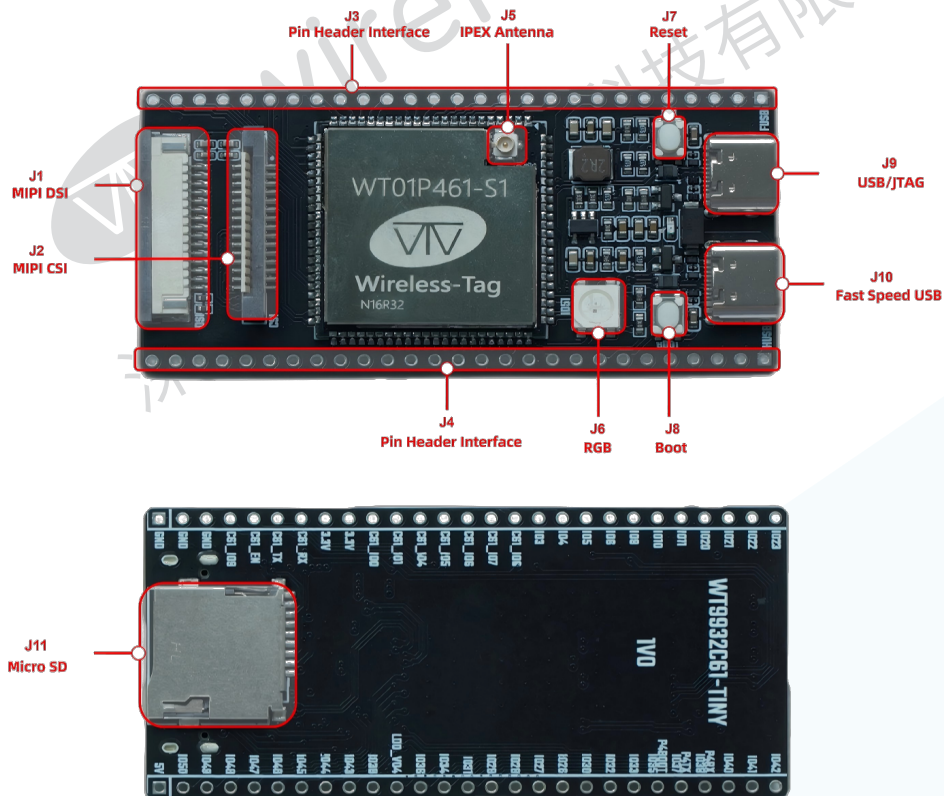


Figure 3: interfaces and components

No.	Component Name	Description
J1	MIPI DSI Connector	FPC connector for connecting an LCD expansion board. Compatible FPC specification: 1.0 mm pitch, 0.7 mm pin width, 0.3 mm thickness, 15 pins.
J2	MIPI CSI Connector	FPC connector for connecting an external camera module and transmitting image data. Compatible FPC specification: 1.0 mm pitch, 0.7 mm pin width, 0.3 mm thickness, 15 pins.
J3, J4	2.54 mm pin header interface	All available GPIO pins are routed to pin headers J3 and J4. The headers use 2.54 mm pitch, 24 pins, through-hole mounting.
J5	IPEX antenna socket	Used to connect an external FPC antenna.
J6	WS2812 RGB LED	Single-wire interface, can be used as an indicator LED.
J7, J8	Tactile switches	Connected to RESET and BOOT (IO35). After boot, IO35 can be used as a normal button.
J9	USB Serial/JTAG Port	USB Type-C interface. Supports USB 2.0 Full-speed and can download firmware to the ESP32-P4 chip. It can communicate with the chip through the USB protocol and can also be used for JTAG debugging.
J10	USB 2.0 Type-C Port	USB 2.0 Type-C interface connected to the ESP32-P4 USB 2.0 OTG High-Speed interface and compliant with the USB 2.0 standard. When USB communication is performed through this interface, ESP32-P4 acts as a USB Host and provides up to 500 mA externally.
J11	MicroSD Card Slot	This development board supports MicroSD cards in 4-bit mode.

2.4 Interface Footprints

Interface Description	Footprint	Remarks
MIPI DSI FPC	FPC_SMD_1.0K-FX-15PWBG	Pay attention to the pin order.
MIPI CSI FPC	FPC_SMD_15P-P1.00_HDGC_1.0K-GT-15PB	Pay attention to the pin order.
MicroSD Card Interface	MicroSD-SMD_MicroSD-PUSH	
Pin Header Interface x2	HDR-TH_27P-P2.54-V-M	Pitch supports perfboard/breadboard.

2.5 Interface Description

[J1] MIPI DSI FPC

The FPC connector uses an SMD package, 1.0 mm pitch, 15 pins, drawer type, bottom contact, and horizontal mounting. Pay attention to the pin order when using it.

The FPC pin order is as follows:

No.	Pin	Description	Voltage Range	Remarks
1	GND	Power ground	0V	
2	DSI_DATAN1	DSI data lane 1 differential N	0V/3.3V	
3	DSI_DATAP1	DSI data lane 1 differential P	0V/3.3V	
4	GND	Power ground	0V	
5	DSI_CLKN	DSI clock differential N	0V/3.3V	
6	DSI_CLKP	DSI clock differential P	0V/3.3V	
7	GND	Power ground	0V	
8	DSI_DATAN0	DSI data lane 0 differential N	0V/3.3V	
9	DSI_DATAP0	DSI data lane 0 differential P	0V/3.3V	
10	GND	Power ground	0V	
11	IO8	I2C SCL pin	0V/3.3V	
12	IO7	I2C SDA pin	0V/3.3V	
13	GND	Power ground	0V	
14	VCC	Power output	3.3V	Do not use as power input.
15	VCC	Power output	3.3V	Do not use as power input.

[J2] MIPI CSI FPC

The FPC connector uses an SMD package, 1.0 mm pitch, 15 pins, drawer type, single-sided contacts, and vertical mounting. Pay attention to the pin order when using it.

The FPC pin order is as follows:

No.	Pin	Description	Voltage Range	Remarks
1	GND	Power ground	0V	
2	CSI_DATAN0	CSI data lane 0 differential N	0V/3.3V	
3	CSI_DATA P0	CSI data lane 0 differential P	0V/3.3V	
4	GND	Power ground	0V	
5	CSI_DATAN1	CSI data lane 1 differential N	0V/3.3V	
6	CSI_DATA P1	CSI data lane 1 differential P	0V/3.3V	
7	GND	Power ground	0V	
8	CSI_CLKN	CSI clock differential N	0V/3.3V	
9	CSI_CLKP	CSI clock differential P	0V/3.3V	
10	GND	Power ground	0V	
11	IO1	Camera reset pin	0V/3.3V	
12	IO0	Unused pin	0V/3.3V	
13	IO8	I2C SCL pin	0V/3.3V	
14	IO7	I2C SDA pin	0V/3.3V	
15	VCC	Power output	3.3V	Do not use as power input.

[J9][J10] USB Type-C Interface

The USB 2.0 Type-C interfaces can be used for firmware download and power supply. J9 is a Full-speed USB 2.0 interface with a maximum theoretical speed of **12 Mbps**, using IO24 and IO25. J10 is a High-speed USB 2.0 interface with a maximum theoretical speed of **480 Mbps**, using dedicated IOs.

[J11] MicroSD Card Interface

Self-ejecting MicroSD card interface:

Note: The power supply here uses LDO_VO4. It can be configured to support 1.8 V power supply. All pull-ups use LDO_VO4.

No.	Pin	Description	Voltage Range	Remarks
1	IO41	DATA2 in four-line SDIO	0V/LDO_VO4	
2	IO42	DATA2 in four-line SDIO	0V/LDO_VO4	
3	IO44	DATA2 in four-line SDIO	0V/LDO_VO4	
4	LDO_VO4	SD card power supply	LDO_VO4	
5	IO43	DATA2 in four-line SDIO	0V/LDO_VO4	
6	GND	Power ground	0V	
7	IO39	DATA2 in four-line SDIO	0V/LDO_VO4	
8	IO40	DATA2 in four-line SDIO	0V/LDO_VO4	

[J3][J4] Pin Header Interface

The pin header interface uses common 2.54 mm pitch pin headers.

The following table shows the **[J3]** pin definitions:

No.	Pin	Description	Voltage Range	Remarks
1	GND	Power ground	0V	
2	GND	Power ground	0V	
3	GND	Power ground	0V	
4	C61_IO9	C61 general-purpose input/output pin 9/C61 BOOT pin	0V/3.3V	
5	C61_EN	C61 reset enable pin	0V/3.3V	
6	C61_U0TXD	C61 UART0 TX pin	0V/3.3V	
7	C61_U0RXD	C61 UART0 RX pin	0V/3.3V	
8	3.3V	3.3 V power output	3.3V	Do not input 3.3 V.
9	3.3V	3.3 V power output	3.3V	Do not input 3.3 V.
10	C61_IO0	C61 general-purpose input/output pin 0	0V/3.3V	
11	C61_IO1	C61 general-purpose input/output pin 1	0V/3.3V	
12	C61_IO4	C61 general-purpose input/output pin 4	0V/3.3V	
13	C61_IO5	C61 general-purpose input/output pin 5	0V/3.3V	
14	C61_IO6	C61 general-purpose input/output pin 6	0V/3.3V	
15	C61_IO7	C61 general-purpose input/output pin 7	0V/3.3V	
16	C61_IO8	C61 general-purpose input/output pin 8	0V/3.3V	
17	IO3	General-purpose input/output pin 3	0V/3.3V	
18	IO4	General-purpose input/output pin 4	0V/3.3V	
19	IO5	General-purpose input/output pin 5	0V/3.3V	
20	IO6	General-purpose input/output pin 6	0V/3.3V	
21	IO9	General-purpose input/output pin 9	0V/3.3V	
22	IO10	General-purpose input/output pin 10	0V/3.3V	
23	IO11	General-purpose input/output pin 11	0V/3.3V	
24	IO20	General-purpose input/output pin 20	0V/3.3V	
25	IO21	General-purpose input/output pin 21	0V/3.3V	
26	IO22	General-purpose input/output pin 22	0V/3.3V	
27	IO23	General-purpose input/output pin 23	0V/3.3V	

The following table shows the **[J4]** pin definitions:

No.	Pin	Description	Voltage Range	Remarks
1	5V	5 V power	5V	If J9 and J10 are both connected, the board internally prioritizes J9.
2	IO50	General-purpose input/output pin 50	0V/3.3V	
3	IO49	General-purpose input/output pin 49	0V/3.3V	
4	IO48	General-purpose input/output pin 48	0V/3.3V	
5	IO47	General-purpose input/output pin 47	0V/3.3V	
6	IO46	General-purpose input/output pin 46	0V/3.3V	

续下页

No.	Pin	Description	Voltage Range	Remarks
7	IO45	General-purpose input/output pin 45	0V/3.3V	
8	IO44	General-purpose input/output pin 44	0V/3.3V	
9	IO43	General-purpose input/output pin 43	0V/3.3V	
10	IO39	General-purpose input/output pin 39	0V/LDO_VO4	Can also be used as a general-purpose input/output.
11	LDO_VO4	SD card power output control pin	LDO_VO4	Controls the power for IO39 to IO48 and can be configured by software.
12	IO36	General-purpose input/output pin 36	0V/3.3V	Strapping pin.
13	IO34	General-purpose input/output pin 34	0V/3.3V	
14	IO31	General-purpose input/output pin 31	0V/3.3V	
15	IO29	General-purpose input/output pin 34	0V/3.3V	
16	IO28	General-purpose input/output pin 32	0V/3.3V	
17	IO27	General-purpose input/output pin 32	0V/3.3V	
18	IO26	General-purpose input/output pin 26	0V/3.3V	
19	IO30	General-purpose input/output pin 27	0V/3.3V	
20	IO32	General-purpose input/output pin 28	0V/3.3V	
21	IO33	General-purpose input/output pin 29	0V/3.3V	
22	IO35_BOOT	General-purpose input/output pin 35/BOOT pin	0V/3.3V	Strapping pin.
23	IO37_U0TXD	General-purpose input/output pin 37/UART0 TX pin	0V/3.3V	
24	IO38_U0RXD	General-purpose input/output pin 38/UART0 RX pin	0V/3.3V	
25	IO40	General-purpose input/output pin 40	0V/3.3V	
26	IO41	General-purpose input/output pin 41	0V/3.3V	
27	IO42	General-purpose input/output pin 42	0V/3.3V	

Note: After reset, the strapping pin levels determine whether the board enters download mode.

Boot Mode	GPIO35	GPIO36	GPIO37	GPIO38
SPI Boot	1	Any	Any	Any
Joint Download Boot	0	1	Any	Any

Note: The TX0, RX0, EN, and BOOT signals of the C61 in the module are connected on the development board to C61 pins 53, 54, 52, and 2 respectively.

4. Mechanical Support

4.1 PCBA Dimension Drawing

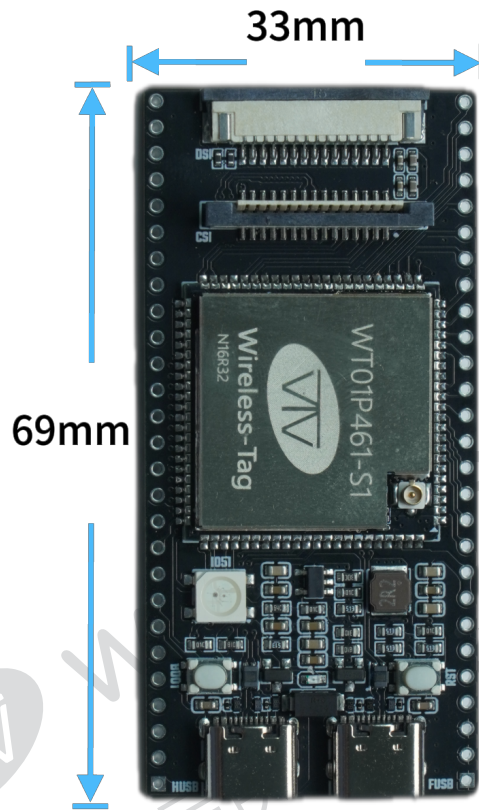


Figure 4: Main board dimension drawing

5. Usage Guide

5.1 Preparation

Before using the device, prepare the following items and environment:

1. **USB-C data cable** x 1 Used to power the development board or connect it to a computer. Use the original cable or a high-quality cable to ensure stable power supply.
2. **WT9932P4C61-TINY development board** x 1 The core hardware device of this product.

Tip: If the device is powered from a computer USB port, the USB port is recommended to provide at least 5 V at 1 A. If the power supply is insufficient, the device may fail to start properly.

5.2 Hardware Configuration

1. **Connect power**
 - Use a USB-C data cable to connect the development board to a computer or USB power adapter.
 - A **5 V/1 A or higher** adapter is recommended to ensure stable power supply.
 - After power-on, the device starts automatically. The indicator LED turns on to indicate that the device is powered.

5.3 Usage Instructions

1. **Set up the ESP-IDF environment according to the official documentation** [Official Get Started Guide](#)
2. **Clone the example** Clone the official blink example and export ESP-IDF.
3. **Build and flash the example** Use a USB-C data cable to connect to the FUSB port on the development board. Run:

```
idf.py set-target esp32p4
idf.py build
```

Build the example. Run:

```
idf.py flash
```

Flash the example. The RGB LED on the development board should blink.

Tip: If the UART appears and disappears intermittently after FUSB is connected, try holding the BOOT button, pressing and releasing the RESET button, and then releasing the BOOT button to manually enter download mode.

6. Related Documents

Document Name	Link	Description
WT9932P4-TINY Device User Guide	WT9932P4-TINY - Device User Guide	
ESP32-P4 ESP-IDF Online Documents	https://docs.espressif.com/projects/esp-idf/en/v5.4.2/esp32p4/get-started/index.html	ESP-IDF programming guide and API reference.
ESP32-P4 Technical Reference Manual	https://www.espressif.com.cn/sites/default/files/documentation/esp32-p4_technical_reference_manual_en.pdf	ESP32-P4 chip parameter reference.
ESP32-C61 Technical Reference Manual	https://documentation.espressif.com/esp32-c61_technical_reference_manual_en.pdf	
ESP32-C61 Series Datasheet	https://documentation.espressif.com/esp32-c61_datasheet_en.pdf	

7. Contact Us

- Official website: <https://www.wireless-tag.com/>
- Taobao store: <https://shop538225597.taobao.com/>
- Sales email: sales@wireless-tag.com
- Technical support email: technical@wireless-tag.com
- Phone: 18122057087



Figure 5: Wireless-Tag QR code

wireless-tag
深圳市启明云端科技有限公司