

WT99P461-S1

Development Board Guide

Version 1.0

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Revision History

Version	Date	Developed/changed content	Modifier By	Auditor
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1. Development Board Introduction

1.1. Development Board Overview

WT99P461-S1 development board is a multimedia development board based on WT01P461-S1 core board launched by Wireless-tag Technology Co., Limited. The WT01P461-S1 core board is based on Espressif Systems' ESP32-P4 and ESP32-C61 series chips, featuring a dual-core 400 MHz RISC-V processor and 32 MB of PSRAM. In addition, the ESP32-P4 supports USB 2.0, MIPI-CSI, MIPI-DSI, and other peripherals, meeting customers' development needs for high-performance, wireless connectivity, and multimedia products. All unused pins on the WT01P461-S1 core board are routed to pin header, allowing developers to easily connect various peripheral devices via jumpers according to their specific needs.

1.2. Development Board Pictures

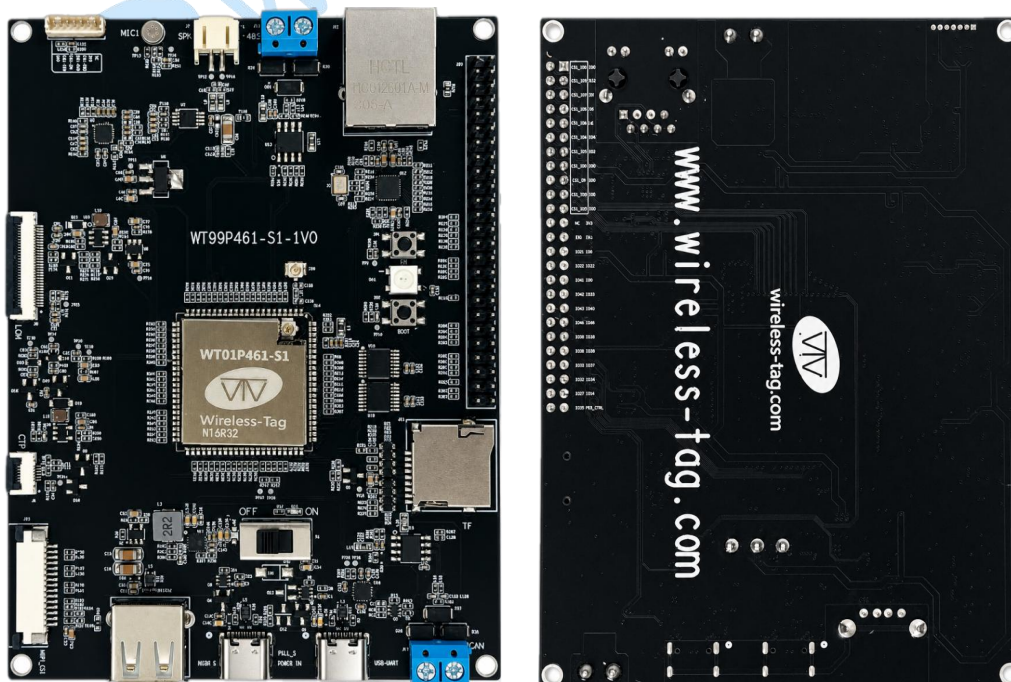


Figure 1: WT99P461-S1 Development Board (front&back)

1.3. Product Characteristics

- RISC-V 32-bit dual-core processor with 400 MHz main frequency
- All pins on the WT01P461-S1 core board are exposed

- Supports a variety of peripheral interfaces, including HS USB, MIPI-CSI, MIPI-DSI, Ethernet ports, and more
- Mature Software support, based on ESP-IDF IoT development framework

1.4. Component Introduction

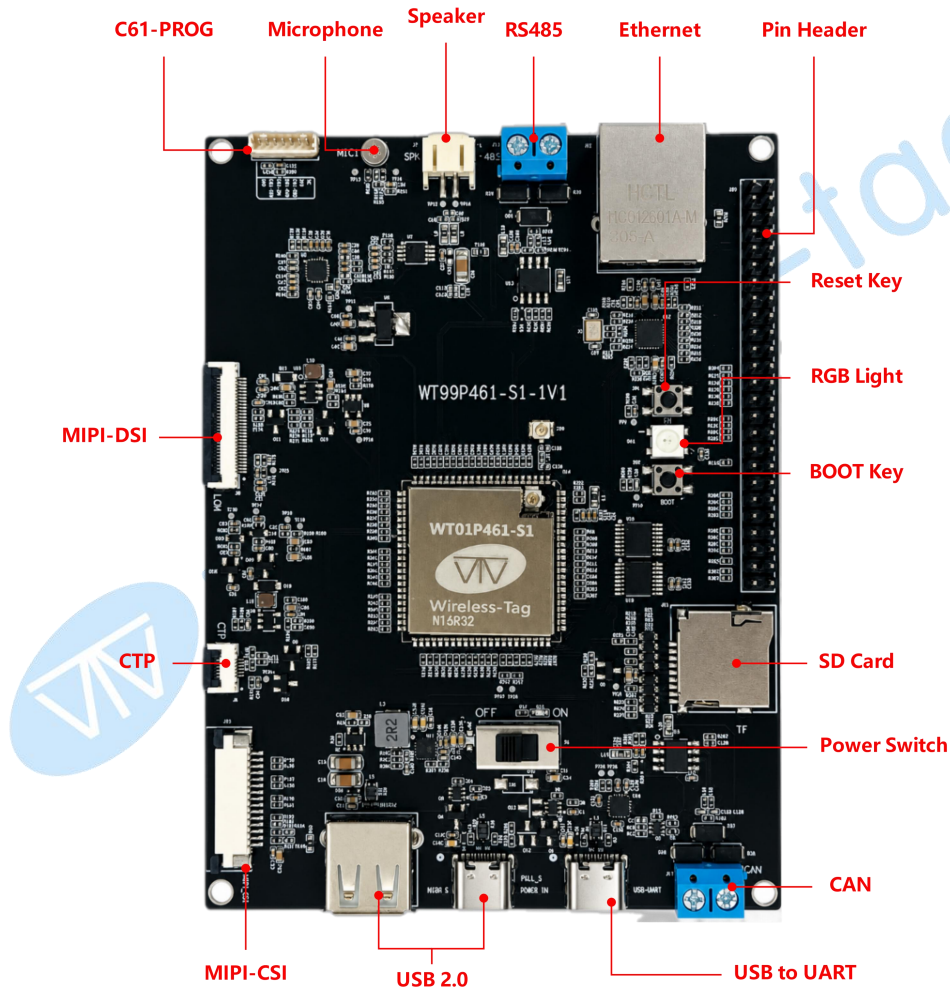


Figure 2: WT99P461-S1 Development Board Component Description

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

Component	Position	Description
C61-PROG	J16	Programming interface for programming the ESP32-C61 chip on the WT01P461-S1 core board. For more details, see Header Block .

Microphone	MIC1	Onboard microphone connected to the interface of Audio Codec Chip.
Speaker	J7	This port is used to connect a speaker. The maximum output power can drive a 4 Ω , 3 W speaker.
RS485	J13	RS-485 interface connected to the interface of RS-485 Chip.
Ethernet	J12	An Ethernet Port supporting 10/100 Mbps adaptive.
Pin Header	J20	Part of available GPIO pins are broken out to the header block J20 for easy interfacing. For more details, see Header Block .
Reset Key	SW1	Resets the board.
RGB Light	D41	RGB LED connected to the WT01P461-S1 core board via GPIO54.
BOOT Key	SW2	The boot mode control button. Press the EN Button while holding down the Boot Button to reset WT01P461-S1 and enter firmware download mode. Firmware can then be downloaded to SPI flash via the USB-to-UART Port.
SD Card	J11	The development board supports a MicroSD card in 4-bit mode and can store or play audio files from the MicroSD card.
Power Switch	S1	Power On/Off Switch. Toggling toward the ON sign powers the board on (5 V), toggling away from the ON sign powers the board off.
CAN	J17	CAN interface, connected to the CAN PHY chip.

USB to UART	J1	The USB Type-C port can be used to power the board,flash firmware to the chip,and communicate with the WT01P461-S1 via the USB-to-UART Bridge Chip.
USB 2.0	J3	The USB 2.0 Type-C port connects to the USB 2.0 OTG Full-Speed port on the ESP32-P4 chip of the WT01P461-S1 core board. It supports the USB 2.0 standard and can connect to other USB host devices as a USB device. In this case, the port can also be used to power the development board.
USB 2.0	J4	The USB 2.0 Type-A port connects to the USB 2.0 OTG High-Speed port on the ESP32-P4 chip of the WT01P461-S1 core board and supports the USB 2.0 standard. When communicating via this port, the ESP32-P4 acts as a USB host to connect with other USB devices and can supply power to external devices.
MIPI-CSI	J15	MIPI CSI FPC connector is used for connecting external camera module to enable image transmission.For details, please refer to specification in Related Documents. FPC specifications:1.0 mm pitch,15 pins.
CTP	J8	LCM TP connector is used for connecting displays touch functions.For details,please refer to Specification in Related Documents.FPC specifications:0.5 mm pitch,6 pins.
MIPI-DSI	J9	MIPI DSI FPC connector is used for connecting displays. For details, please refer to Specification in Related Documents.FPC specifications:0.5 mm pitch,30 pins.

1.5. Interface Packaging

Interface Description	Package
J16	1.25mm 1x7P
Speaker	2.0mm 2p
J20	2.54mm 2x25P
MIPI-CSI	FPC 15P spacing 1.0mm
CTP	FPC 6P spacing 0.5mm
MIPI-DSI	FPC 30P spacing 0.5mm

2. Hardware Reference

2.1. Block Diagram

The main components, connection methods, and pin assignment diagram for the WT01P461-S1 core board are shown in the figure below.

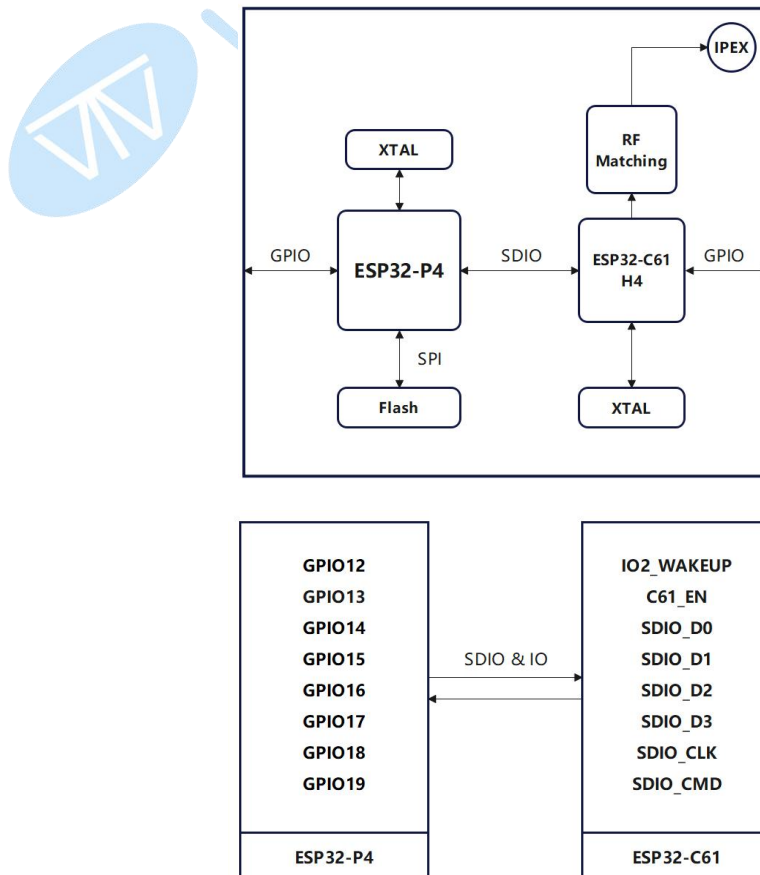


Figure 3: WT01P461-S1 Block Diagram and Pin Assignment Diagram

The main components and connection methods of the WT99P461-S1 development board are shown in the figure below.

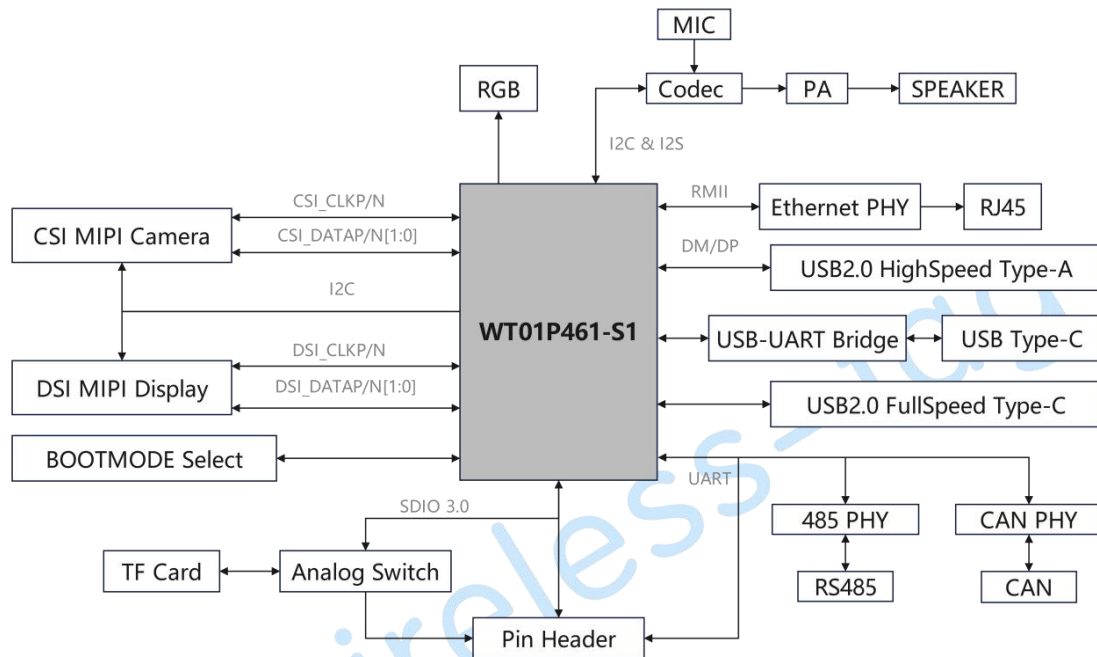


Figure 4: WT99P461-S1 Hardware Block Diagram

2.2. Header Block

The tables below provide the Name and Function of the pin or pin header(J16,J13,J20,J17),The names are shown in Figure [WT99P461-S1](#) -front.

Detailed Functional Description of J16

No.	Name	Function
1	GND	GND
2	C61_GPIO9	GPIO9, ZCD1 (internal 10K pull-up)
3	C61_EN	Enable ESP32-C61 (internal 10K pull-up)
4	C61_U0RXD	GPIO10, U0RXD
5	C61_U0TXD	GPIO11, U0TXD
6	3V3	3.3V Power
7	NC	/

Detailed Functional Description of J13

No.	Name	Function
1	485_B	Receiver Inverted Input and Driver Inverted Output
2	485_A	Receiver In-phase Input and Driver In-phase Output

Detailed Functional Description of J20

No.	Name	Function
1	VCC_3V3	3.3V POWER
2	C61_GPIO9	GPIO9, ZCD1
3	VCC_3V3	3.3V POWER
4	C61_GPIO8	GPIO8, FSPICS0, ZCD0
5	VCC_5V	5V POWER
6	C61_GPIO7	GPIO7, FSPID
7	VCC_5V	5V POWER
8	C61_GPIO6	GPIO6, LP_GPIO6, MTDO, FSPICLK
9	NC	/
10	C61_GPIO5	GPIO5, LP_GPIO5, MTCK, ADC1_CH3
11	GND	GND
12	C61_GPIO4	GPIO4, LP_GPIO4, MTDI, ADC1_CH2, FSPIWP
13	GND	GND
14	C61_GPIO1	GPIO1, LP_GPIO1, XTAL_32K_N, ADC1_CHO
15	GND	GND
16	C61_GPIO0	GPIO0, LP_GPIO0, XTAL_32K_P
17	GND	GND
18	C61_EN	Enable ESP32-C61
19	GPIO1	GPIO1, LP_GPIO1, XTAL_32K_P
20	C61_U0TXD	GPIO11, U0TXD
21	GPIO2	GPIO2, MTCK, LP_GPIO2, TOUCH_CHANNEL1
22	C61_U0RXD	GPIO10, U0RXD
23	GPIO3	GPIO3, MTDI, LP_GPIO3, TOUCH_CHANNEL2

24	NC	/
25	GPIO4	GPIO4, MTMS, LP_GPIO4, TOUCH_CHANNEL3
26	GPIO5	GPIO5, MTDO, LP_GPIO5, TOUCH_CHANNEL4
27	GPIO6	GPIO6, SPI2_HOLD_PAD, LP_GPIO6, TOUCH_CHANNEL5
28	GPIO21	GPIO21, ADC1_CHANNEL5
29	GPIO22	GPIO22, ADC1_CHANNEL6
30	GPIO23	GPIO23, ADC1_CHANNEL7, REF_50M_CLK_PAD
31	GPIO0	GPIO0, LP_GPIO0, XTAL_32K_N
32	GPIO41	GPIO41, SD1_CDATA2_PAD, GMAC_PHY_TXD0_PAD
33	GPIO53	GPIO53, GMAC_PHY_RXD1_PAD, ADC2_CHANNEL4, ANA_COMP1
34	GPIO42	GPIO42, SD1_CDATA3_PAD, GMAC_PHY_TXD1_PAD
35	GPIO48	GPIO48, SD1_CDATA7_PAD, GMAC_PHY_RXER_PAD
36	GPIO47	GPIO47, SD1_CDATA6_PAD, GMAC_PHY_RXD1_PAD
37	GPIO40	GPIO40, SD1_CDATA1_PAD, GMAC_PHY_TXEN_PAD
38	GPIO46	GPIO46, SD1_CDATA5_PAD, GMAC_PHY_RXD0_PAD
39	GPIO39	GPIO39, SD1_CDATA0_PAD, REF_50M_CLK_PAD
40	GPIO45	GPIO45, SD1_CDATA4_PAD, GMAC_PHY_RXDV_PAD
41	GPIO38	GPIO38, UART0_RXD_PAD, SPI2_DQS_PAD
42	GPIO36	GPIO36, SPI2_IO6_PAD, GMAC_PHY_TXER_PAD
43	GPIO37	GPIO37, UART0_TXD_PAD, SPI2_IO7_PAD

44	GPIO33	GPIO33, SPI2_WP_PAD, GMAC_PHY_TXEN_PAD
45	GPIO43	GPIO43, SD1_CCLK_PAD, GMAC_PHY_TXER_PAD
46	GPIO32	GPIO32, SPI2_HOLD_PAD, GMAC_RMII_CLK_PAD
47	GPIO44	GPIO44, SD1_CCMD_PAD, GMAC_RMII_CLK_PAD
48	GPIO27	GPIO27, USB1P1_P1
49	PWR_CTRL	Power Control Pins
50	GPIO26	GPIO26, USB1P1_N1

Detailed Functional Description of J17

No.	Name	Function
1	CAN_H	CAN Bus High-Level Line
2	CAN_L	CAN Bus Low-Level Line

3. Getting Started

3.1. Preliminary

- WT99P461-S1
- USB-C cables
- Computer running Windows, Linux, or macOS
- LCD(Optional)
- Camera(Optional)
- MicroSD Card(Optional)
- UART Flashing Tool(Optional)

3.2. Hardware Setup

Connect the WT99P461-S1 to your computer using a USB cable. The board can be powered through any of the USB Type-C ports. The USB-to-UART Port is recommended for flashing firmware and debugging.

3.3. Software Setup

To set up your development environment and flash an application example onto your board, please follow the instructions in [ESP-IDF Get Started](#). Or go to [Wireless-Tag GitHub Examples](#), development board application examples

have been stored, download compile and burn the application to the development board to start development.

3.4. Flashing Guide

The ESP32-P4 and ESP32-C61 on the WT99P461-S1 development board each have their own dedicated programming interfaces, and the two use different programming methods.

3.4.1 ESP32-P4 Flashing Guide

When connecting the USB-UART interface at J1 on the development board to a computer using a USB Type-C cable, press and hold the Boot button, then briefly press the EN button. After releasing the Boot button, the ESP32-P4 will enter flashing mode. At this point, you can use the ESP-TOOL software on your computer to flash the firmware onto the ESP32-P4 chip via the serial port.

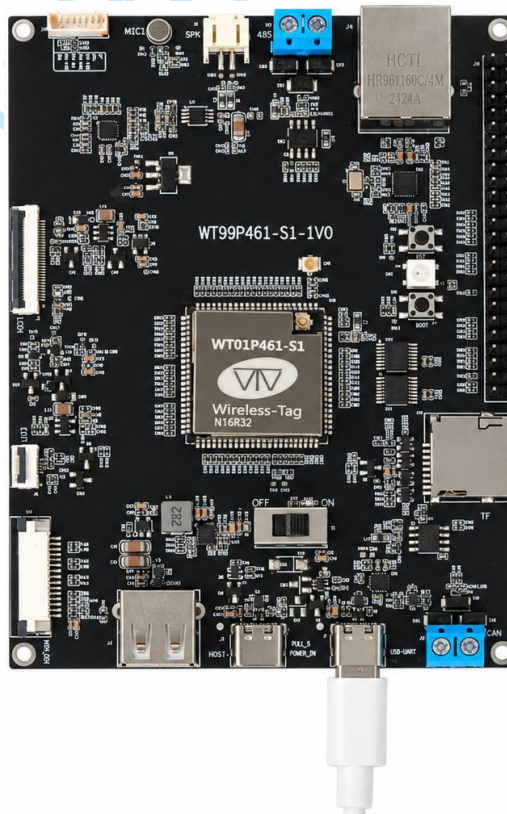


Figure 5: ESP32-P4 Flashing Wiring Diagram

3.4.2 ESP32-C61 Flashing Guide

Connect the J16 using the Programming Tool. Use a USB Type-C cable to connect the USB Type-C port on the programming tool to your computer. You

can then use the ESP-TOOL software on your computer to program the firmware onto the ESP32-C61 chip via the serial port and perform debugging.

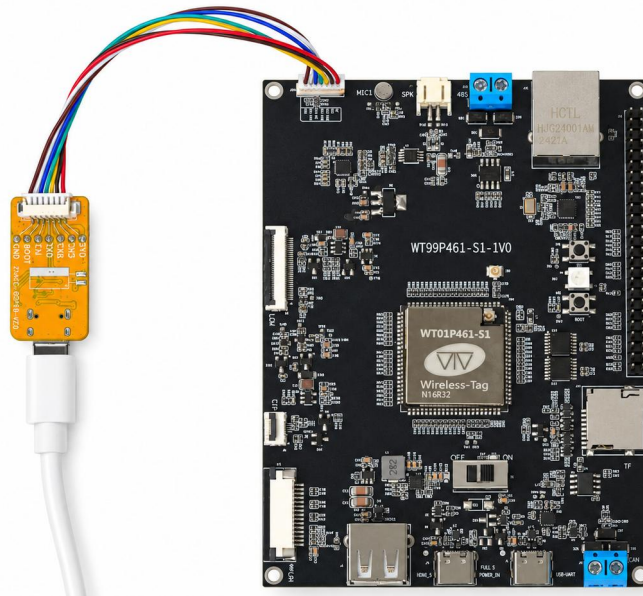


Figure 6: ESP32-C61 Flashing Wiring Diagram

Use DuPont wires to connect C61_EN, C61_TXD, C61_RXD, C61_IO9, 3V3, and GND header pins on the development board (J20) to any serial programming tool connected to a computer (as shown below), turn on the development board's power switch, and the ESP32-C61 will enter download mode. At this point, you can use the ESP-TOOL software on the host computer to program the firmware onto the ESP32-C61 chip via the serial port.

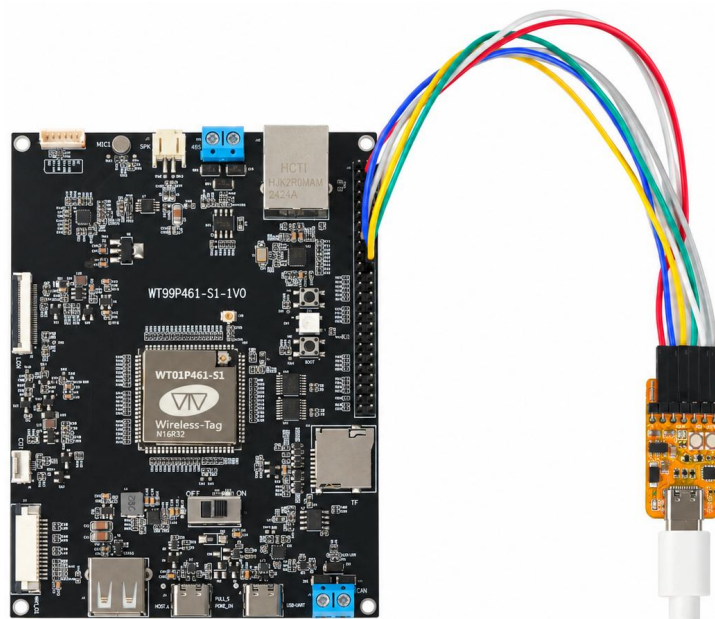


Figure 7: ESP32-C61 Flashing Wiring Diagram

4. Related Documents

For documentation related to the development board, please visit:

[Wireless-Tag Documentation Site](#)

5. Contact Us

Official website: www.wireless-tag.com

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