

# **WT32-ETH01**

Datasheet

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### **Amendment record**

| Version | Changed by | Time       | Reason                    | Details                      |
|---------|------------|------------|---------------------------|------------------------------|
| V1.0    | Mark       | 2019.10.21 | Original                  | Create documentation         |
| V1.1    | linfuliang | 2019.10.23 | Perfect document<br>ation | Add product features section |

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## 1. Overview

WT32-ETH01 is an embedded serial port to Ethernet module based on ESP32 series designed by Wireless-Tag. The module integrates an optimized TCP/IP protocol stack, making it easy for users to complete the networking of embedded devices, greatly reducing development time costs. In addition, the module is compatible with semi-welding pad and connector through-hole design, and the board width is a general width, so the module can be directly welded on the board, can also be welded to the connector, and can also be used on the bread board, which is convenient for users to use in different scenes.

ESP32 series IC is an integrated 2.4GHz Wi-Fi and Bluetooth dual-mode SOC, with ultra-high RF performance, stability, versatility and reliability, as well as ultra-low power consumption.

## 2. Characteristics

Table-1 Product Specifications

| Categories | Items                       | Product specifications   |
|------------|-----------------------------|--|
| Wi-Fi      | RF certification            | FCC/CE/RoHS  |
|            | Protocols                   | 802.11 b/g/n/e/i (802.11n, up to 150 Mbps)                     |
|            |                             | A-MPDU and A-MSDU aggregation and 0.4_s guard interval support |
|            | Frequency range             | 2.4~2.5 GHz  |
| Bluetooth  | Protocols                   | Bluetooth v4.2 BR/EDR and BLE specification                    |
|            | Radio                       | NZIF receiver with -97 dBm sensitivity                         |
| Hardware   | Network port specification  | RJ45, 10/100Mbps, cross straight adaptive                      |
|            | Serial port baud rate       | 80~5000000   |
|            | On-board Flash Memory       | 32Mbit   |
|            | Operating voltage           | 5V or 3.3V power supply(choose one of them)                    |
|            | Operating current           | Average: 80mA  |
|            | Power supply current        | Min: 500 mA  |
|            | Operating temperature range | -40°C~+85°C  |
|            | Ambient temperature range   | Normal temperature   |
|            | Package                     | Half pad / connector through hole connection(optional)         |
| Software   | Wi-Fi mode                  | Station/softAP/SoftAP+station/P2P                              |

|  |                          |   |
|--|--------------------------|---|
|  | Wi-Fi Security           | WPA/WPA2/WPA2-Enterprise/WPS                |
|  | Encryption               | AES/RSA/ECC/SHA                             |
|  | Firmware upgrade         | Remote OTA upgrade over the network         |
|  | Software development     | SDK for user secondary development          |
|  | Network protocols        | IPv4, TCP/UDP                               |
|  | IP acquisition method    | Static IP, DHCP(Default)                    |
|  | Simple transmission mode | TCP Server/TCP Client/UDP Server/UDP Client |
|  | User configuration       | AT instruction set                          |

### 3. Hardware Specifications

#### 3.1 System Block Diagram

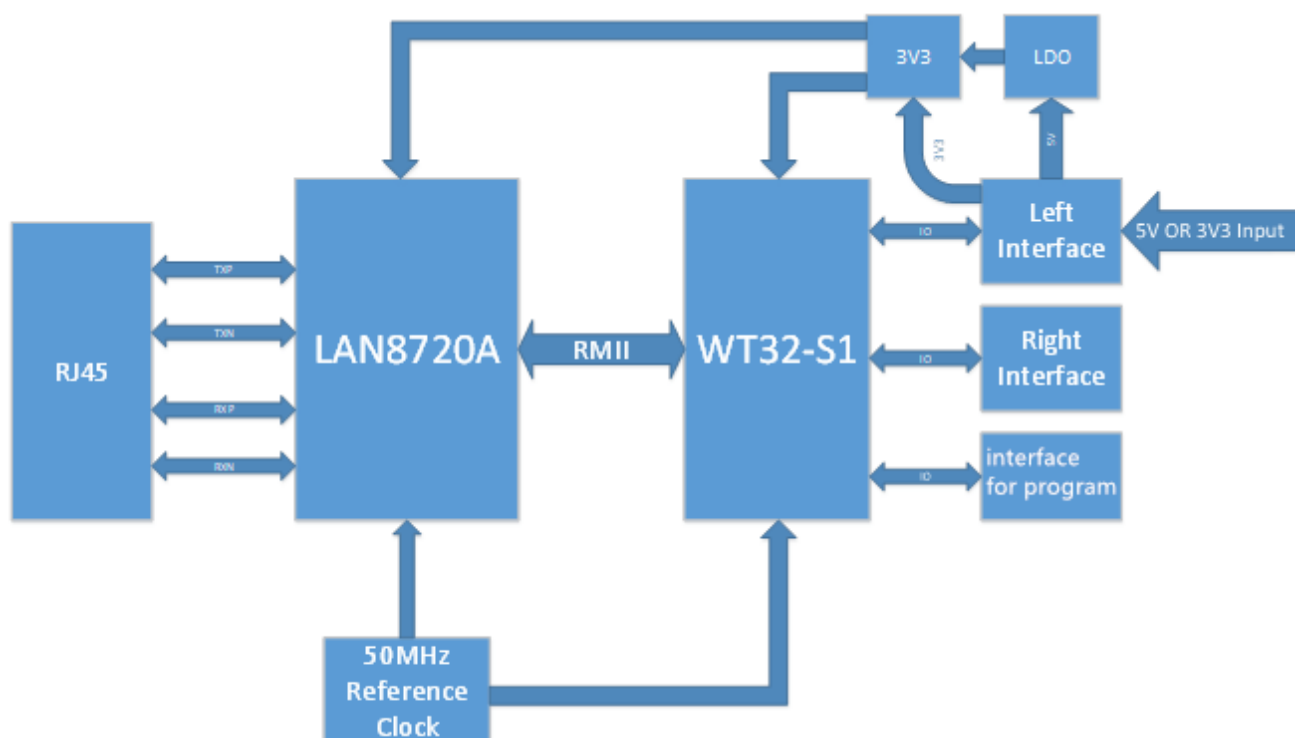


Figure-1 System Block Diagram

### 3.2 Physical Diagram

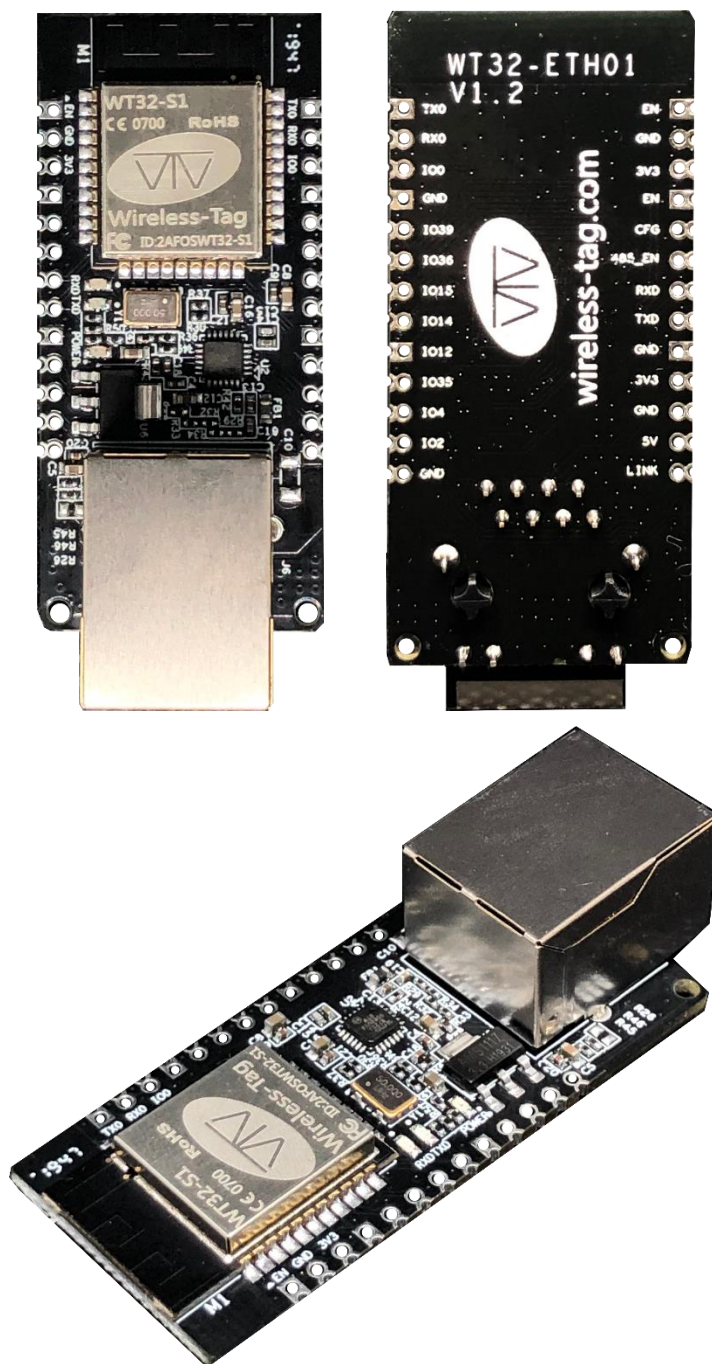


Figure -2 Physical Diagram

### 3.3 Pin Description

Table-1 Debug Burning Interface

| Pin | Name            | Description  |
|-----|-----------------|--|
| 1   | EN <sup>1</sup> | Reserved debug burning interface; Enable signal, active high |



|   |     |   |
|---|-----|---|
| 2 | GND | Reserved debug burning interface; GND       |
| 3 | 3V3 | Reserved debug burning interface; 3V3       |
| 4 | TXD | Reserved debug burning interface; IO1, TXD0 |
| 5 | RXD | Reserved debug burning interface; IO3, RXD0 |
| 6 | IO0 | Reserved debug burning interface; IO0       |

Table-2 Module IO Description

| Pin | Name              | Description                      |
|-----|-------------------|----------------------------------|
| 1   | EN <sup>1</sup>   | Enable signal, active high       |
| 2   | CFG               | IO32, CFG                        |
| 3   | 485_EN            | Enable pin of IO33, RS485        |
| 4   | RXD               | IO5, RXD2                        |
| 5   | TXD               | IO17, TXD2                       |
| 6   | GND               | GND                              |
| 7   | 3V3 <sup>2</sup>  | 3V3 power supply                 |
| 8   | GND               | GND                              |
| 9   | 5V <sup>2</sup>   | 5V power supply                  |
| 10  | LINK              | Network connection indicator pin |
| 11  | GND               | GND                              |
| 12  | IO39 <sup>3</sup> | IO39, only supports input        |
| 13  | IO36 <sup>3</sup> | IO36, only supports input        |
| 14  | IO15              | IO15                             |
| 15  | IO14              | IO14                             |
| 16  | IO12              | IO12                             |
| 17  | IO35              | IO35, only supports input        |
| 18  | IO4               | IO4                              |
| 19  | IO2               | IO2                              |
| 20  | GND               | GND                              |

Note 1: The module enables high levels by default.

Note 2: 3V3 and 5V power supply, the two can only choose one ! ! !

Note 3: IO39, IO35 and IO36, only supports input.

### 3.4 Power Characteristics

#### 3.4.1 Power Supply Voltage

The power supply voltage of the module can be 5V or 3V3, and only one of them can be chosen.

#### 3.4.2 Power Supply Mode

Users are free to choose according to their needs:

- 1) Through hole (welding row needle):
  - The power supply is connected by DuPont line.
  - The power supply is connected by bread board.
- 2) Semi-pad (directly welded on the board): the user board supply.

## 4. Description for Use

### 4.1 Power-on Description

If the DuPont line is used: find the 3V3 or 5V power input, connect the corresponding voltage, and the indicator (LED1) is on, indicating that the power-on is successful.

### 4.2 Indicator Description

- LED1: The power indicator, the power on is normal, the light is on;
- LED3: Serial port indicator, when RXD2 (IO5) has data flow, the light is on.
- LED4: Serial port indicator, when TXD2 (IO17) has data flow, the light is on.

### 4.3 Description of How to Use

Users can choose three ways of use according to their own needs:

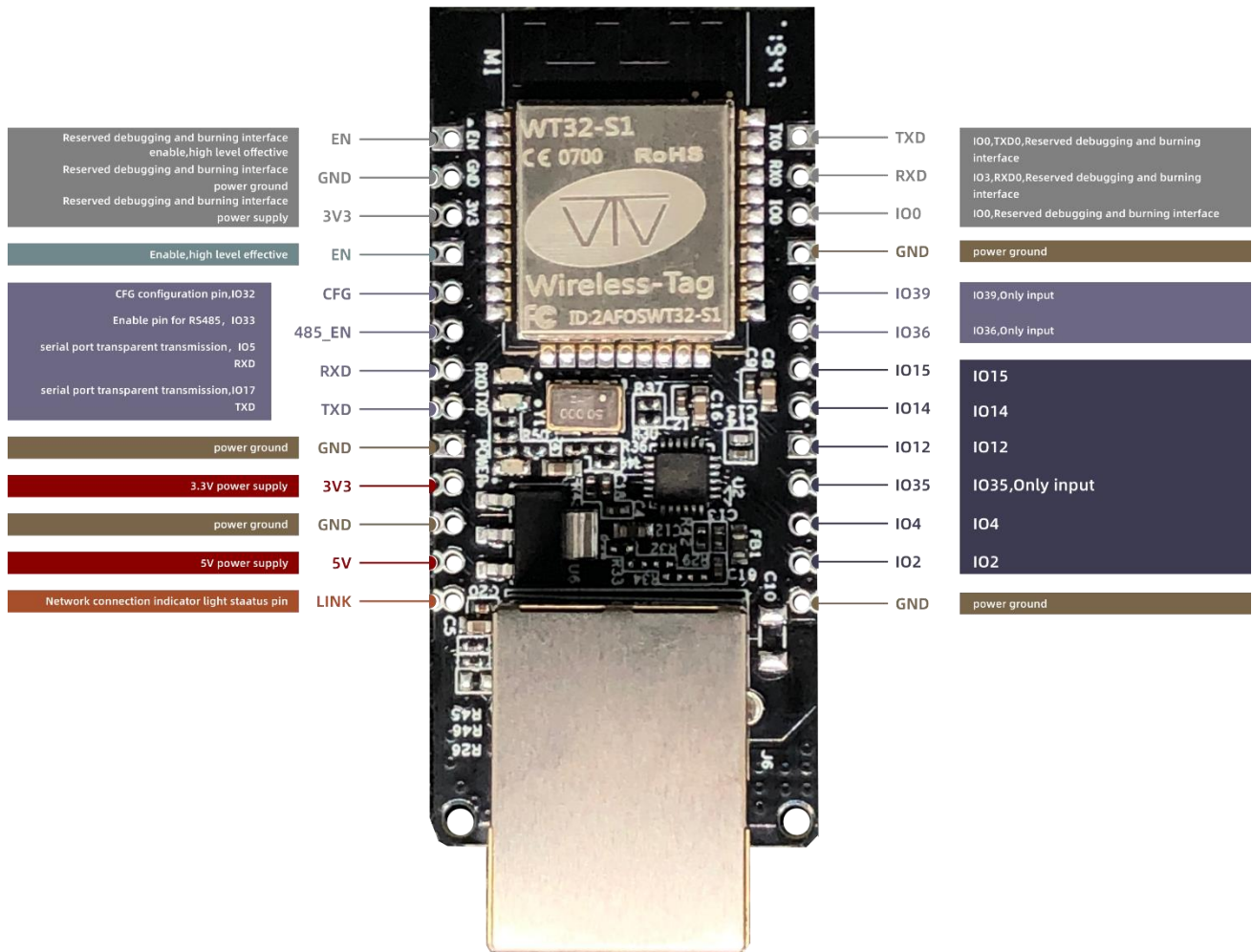
- 1) Through hole (welding pin): connected by DuPont line;
- 2) Through hole (welding pin): put on the bread board for use;
- 3) Semi-pad: users can directly weld the module on their own board.

### 4.4 Description of Network Port Operating Indicator

Table-3 Description of Network Port Operating Indicator

| Network port indicator | Function                     | Description  |
|------------------------|------------------------------|--|
| Green LED              | Connection status indication | When connected to the network correctly, the green LED is on.                                      |
| Yellow LED             | Data indication              | The module flashes yellow LED when receiving or sending data, including receiving webcast packets. |

## 5. Interface Description



## 6. Product Function

### 6.1 Default Parameter

| Items                  | Contents                             |
|------------------------|--------------------------------------|
| Serial port baud rate  | 115200                               |
| Serial port parameters | None/8/1                             |
| Transmission channel   | Serial Ethernet transmission channel |

### 6.2 Basic Function

#### 6.2.1 Set IP/ subnet mask / gateway

1. The IP address is the identity representation of the module in the local area network, which is unique in the local area network, so it cannot be repeated with other devices in the same local area network.

The IP address of the module is available in both static IP and DHCP/Dynamic IP.

#### a. Static IP

Static IP needs to be manually set by users. Write IP, subnet mask and gateway at the same time in the process of setting. Static IP is suitable for scenarios where IP and devices need to be counted and corresponded one to one. Pay attention to the correspondence of IP address, subnet mask and gateway when setting up. Using static IP requires setting up each module and ensuring that IP addresses are not duplicated with other network devices within the local area network.

#### b. DHCP/ Dynamic IP

The main function of DHCP/ dynamic IP is to dynamically obtain IP address, Gateway address, DNS server address information from the gateway host, so as to avoid the tedious steps of setting IP address. It is suitable for scenarios where there is no requirement for IP and there is no requirement for IP to correspond to modules one by one.

Note: The module cannot be set to DHCP, when directly connected to the computer. General computers do not have the ability to assign IP addresses. If the module is set to a DHCP directly connected computer, it will cause the module to wait for an IP address to be assigned all the time, which in turn will cause the module to fail to transmit properly. The module defaults to static IP:192.168.0.7.

2. The subnet mask is mainly used to determine the network number and host number of the IP address, indicate the number of subnets, and determine whether the module is in the subnet. The subnet mask must be set. Our commonly used Class C subnet mask: 255.255.255.0, the network number is the first 24 bits, the host number is the last 8 bits, the number of subnets is 255, and the module IP is in the range of 255, then we think that the module IP is in this subnet.
3. A gateway is the network number of the network where the module's current IP address is located. If a device such as a router is connected to an external network, the gateway is the router IP address. If the setting is wrong, the external network cannot be properly connected, if you do not connect to such devices as routers, you do not need to set, the default can be.

#### 6.2.2 Restore factory settings

1. AT command to restore factory settings: restore factory settings through AT+ RESTORE.
2. Hardware mode to restore factory settings: CFG pin grounding, restart the module.

#### 6.2.3 Firmware upgrade

Module upgrade firmware way is OTA remote upgrade, by upgrading firmware, you can get more application functions.

- a. Firmware upgrades can connect to the network through a wired network or wifi.
- b. Operate GPIO2 ground, restart the module and enter OTA upgrade mode.
- c. Upgrade complete, disconnect GPIO2 to the ground connection, restart the module, module into normal operation mode.

OTA firmware upgrade instructions description: Downloading firmware, serial port TXD indicator flashing quickly; Download is completed and is being upgraded, and the serial port TXD indicator is always on. The upgrade was successful, and the serial port TXD and RXD indicators were always on; Upgrade failed serial port TXD indicator flashing slowly.

#### 6.2.4 AT command function setting

The user can set the function of the module by entering the AT command through the serial port.

For more information, please refer to the ESP32 wired module AT command set.

#### 6.2.5 Data transmission function

The module has four data transmission ports: serial port, wifi, Ethernet and Bluetooth.

Through the AT command, the user can make two combinations of the four data ports for data transmission.

Set / query the transparent channel of the module through the AT+PASSCHANNEL command. The setup is complete and the module needs to be restarted for it to take effect.

### 6.3 socket Function

The socket mode of operation of the module is divided into TCP Client, TCP Server, UDP Client, and UDP Server, which can be set up by AT commands.

For AT command operation, please refer to the esp32 wired module AT command routine v1.2.

#### 6.3.1 TCP Client

1. TCP Client provides client connections to TCP network services. Initiates the connection request to the server and establishes the connection, which is used to realize the interaction between the serial port data and the server data. According to the relevant provisions of TCP protocol, TCP Client has the difference between connection and disconnection, so as to ensure the reliable exchange of data. It is usually used for the data exchange between the device and the server, and it is the most commonly used way of network communication.
2. When the module is connected to TCP Server as TCP Client, it is necessary to pay attention to parameters such as the target IP/domain name and target port number. The target IP can be a local device in the same local area network, or an IP address of a different local area network or an IP across a public network, if the server is connected to a cross-public network, the server is required to have a public IP.

#### 6.3.2 TCP Server

It is usually used to communicate with TCP clients in the local area network. It is suitable for scenarios where there is no server in the local area network and multiple computers or mobile phones request data from the server. There is the same difference between connection and disconnection as TCP Client to ensure the reliable exchange of data.

#### 6.3.3 UDP Client

UDP Client is a connectionless transport protocol that provides simple and unreliable transaction-oriented information delivery services. Without connection establishment or disconnection, data can be sent to each other only by defining IP and ports. It is usually used in data transmission scenarios where the packet loss rate is not required, the packet is small and the transmission frequency is fast, and the data is transmitted to the specified IP.

#### 6.3.4 UDP Server

UDP Server means that the source IP address is not verified on the basis of ordinary UDP. Each time UDP Server receives a UDP packet, it changes the target IP to the data source IP and port number, and when the data is sent, the IP and port number that the most recently communicated is sent.

This mode is usually used in data transmission scenarios where multiple network devices need to communicate with modules and do not want to use TCP because of their high speed and frequency.

### 6.4 Serial Port Function

#### 6.4.1 AT command settings

The user can set the function of the module by entering the AT command through the serial port.

#### 6.4.2 Transmit Serial Port Data

Through the AT command, the user makes the module enter the data transmission mode, and the module can directly transfer the serial port data to the corresponding data transmission terminal (wifi, Ethernet and Bluetooth) through the set transmission channel.

### 6.5 Bluetooth Function

#### 6.5.1 Transmit Bluetooth Data

Through the existing Bluetooth function of the module, the module can obtain Bluetooth data, and the Bluetooth data can be directly transmitted to the corresponding data transmission terminal (wifi, Ethernet and serial port) through the set transmission channel.

### 6.6 Wifi Function

#### 6.6.1 Internet Access

The module wifi connects to the Internet or local area network through the router, the user configures the socket function through the AT command, and the module can establish the TCP/UDP connection and access the designated server of the user.

### 6.7 Wired Network Access Function

A stable network connection can be obtained through the wired network, ensuring that stable network data can be obtained.

#### 6.7.1 Internet Access

The module wifi connects to the Internet or local area network through the router, the user configures the socket function through the AT command, and the module can establish the TCP/UDP connection and access the designated server of the user.

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