Wireless Modem

User Manual
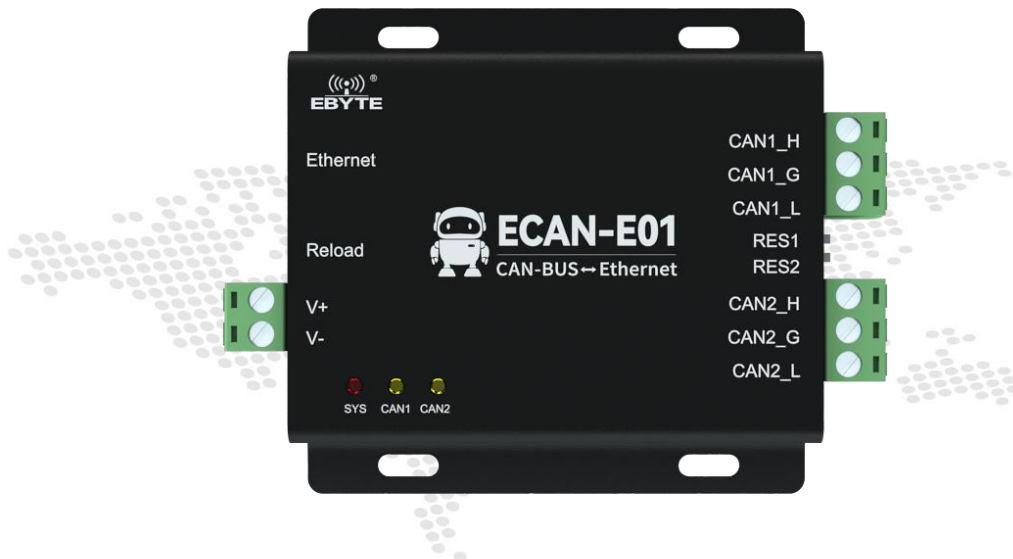
ECAN-E01S

Catalog

1. **Product Description**

1.1. **Product introduction**

ECAN-E01S is a high-performance industrial-grade Ethernet and CAN-bus data conversion device developed by Ebyte. It integrates 2 CAN-bus interfaces, 1 EtherNet interface, supports TCP/UDP protocol, and can easily Complete the intercommunication between CAN-bus network and Ethernet network.

ECAN-E01S has a built-in 120 ohm resistor, which can be enabled by dialing a code; it supports working in the temperature range of -40°C to 85°C. It has one 10M Ethernet interface; the maximum baud rate of 2 CAN ports communication is 1Mbps, with TCP Server, TCP Client, UDP and other working modes, and software configuration parameters can be configured through the host computer. .

1.2. **Features**

- Integrate 2 CAN-bus interfaces and use plug-in terminal wiring mode;
- Support CAN2.0A and CAN2.0B frame format, in line with ISO/DIS 11898 specification;
- The baud rate of CAN-bus communication can be freely programmable between 5Kbps~1Mbps;
- Dual-channel CAN transceiver, support dual-channel server, maximum support 14-channel connection
- Maximum sending data flow: 8000 frames/second; maximum receiving data flow: 14000 frames/second
- The time stamp accuracy of the received message at the CAN end can reach 1us;
- Support registration package, heartbeat package, short connection function
- Support DHCP, DNS;
- Support disconnection restart/timeout restart;
- Support clear cache function;
- Support host computer configuration;
- Contains 120 ohm resistance;
- Built-in watchdog;
- Ethernet port upgrade function;
- Operating temperature range: -40℃~+85℃.

2. Quick start

You need to prepare ECAN-E01S*1 power adapter*1 network cable 1

After the device is powered on, connect the computer to the device through a network cable, set the computer IP address to the same network segment as the device IP, and the default IP address of the device is 192.168.4.101; for example, the computer IP address is 192.168.4.193.

Open the computer's network debugging assistant, set it to TCP Client, set the remote host IP to 192.168.4.101, and set the remote host port number to 8881.
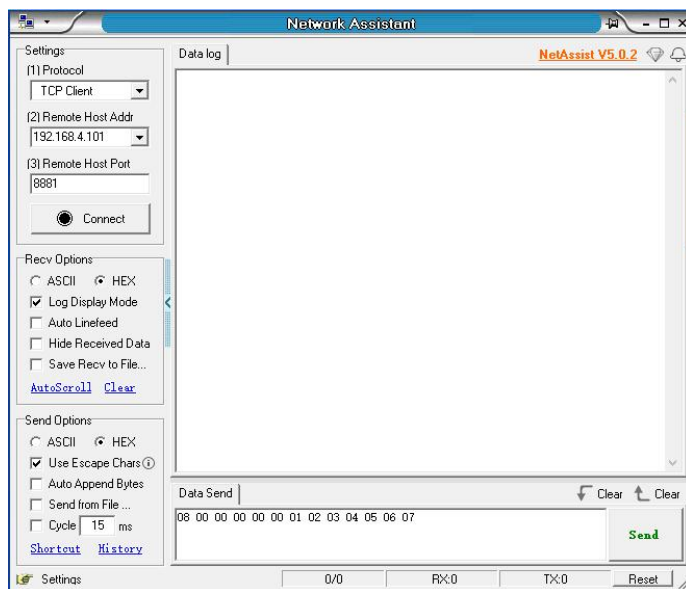
Connect the CAN1 of the ECAN-E01S to the CAN analyzer. When the ECAN-E01S is connected to the CAN bus, you only need to connect CAN_H to CAN_H and CAN_L to CAN_L.

Device-to-peripheral communication is possible using the Network Assistant.

3. Technical index

3.1. General Specifications

Serial Number	Index	Specification
1	Voltage	8V~28VDC, more than 28V may burn, recommend 12V or 24V power supply
2	Network port specifications	Standard RJ45, support 10Mbps
3	Network protocol	IP、 TCP/UDP、
4	Simple transparent transmission	TCP Server、TCP Client、UDP Server、UDP Client
5	TCP Server connection	Supports up to 14 TCP connections
6	How to get IP	Static IP, DHCP
7	DNS	Support
8	User configuration	Host computer configuration
10	Operating temperature	-40 ~ +85℃, industrial grade
11	Working humidity	10% ~ 90%, relative humidity, non-condensing
12	Size	See dimension chart
13	Average weight	120g
14	Storage temperature	-40～+85℃, industrial grade

3.2. **Mechanical dimension drawing and pin definition**
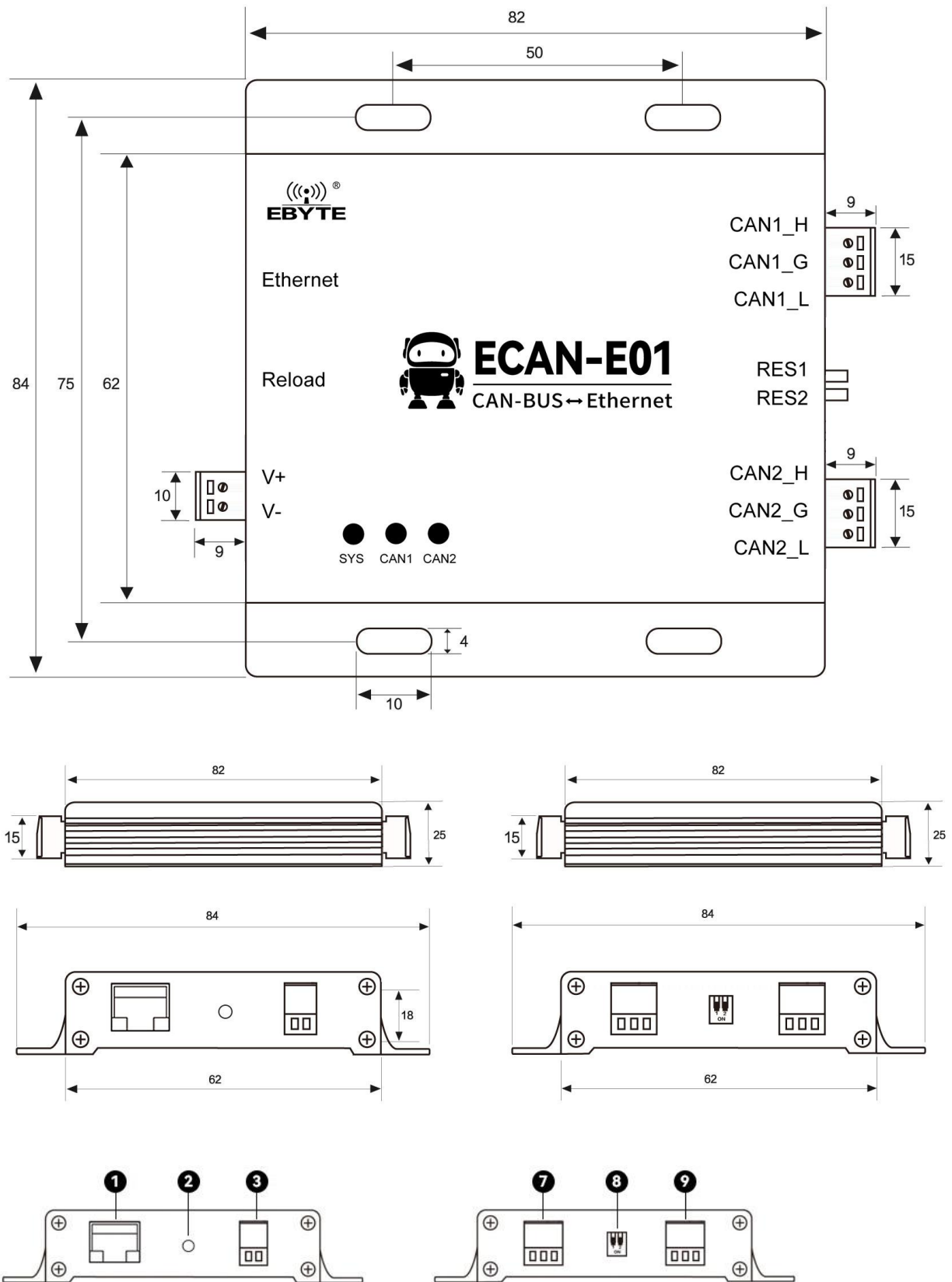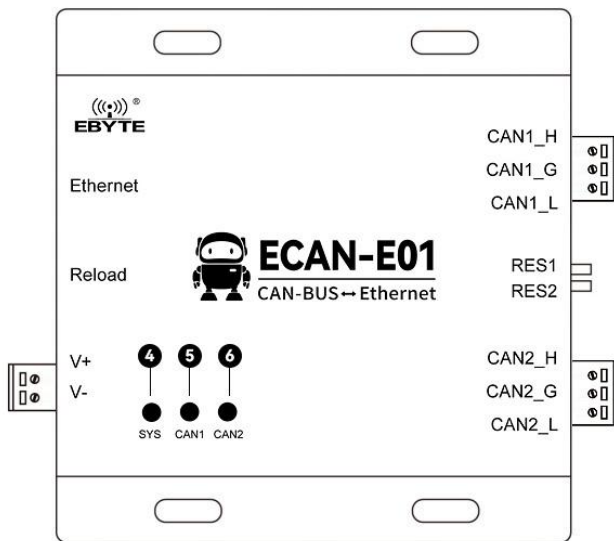
Serial Number	Identification name	Function Description
1	ETHERNET	Ethernet interface, standard RJ45 interface, connected with equipment or PC
2	Reload	Reload button, long press for more than 5s to restore factory
3	V+	Power supply positive interface, 5.08 phoenix head, (default 8-28V), recommended 12V/24V
	V-	Power supply negative interface 5.08 Phoenix head
4	SYS	Power indicator (red), access to the network (yellow flashing)
5	CAN1/ERR	CAN1 data light (green), data error light (red)
6	CAN2/ERR	CAN2 data light (green), data error light (red)
7	CAN2_H	CAN2 channel bus high, 5.08 phoenix head
	CAN2_G	CAN2 channel bus ground, 5.08 phoenix head
	CAN2_L	CAN2 channel bus low, 5.08 phoenix head
8	Dial RES1	CAN1 channel 120 ohm resistance DIP switch
	Dial RES2	CAN2 channel 120 ohm resistance DIP switch
9	CAN1H	CAN1 channel bus high, 5.08 phoenix head
	CAN1G	CAN1 channel bus ground, 5.08 phoenix head
	CAN1L	CAN1 channel bus low, 5.08 phoenix head

4. **Product function introduction**

4.1. **Basic function**

→**Ethernet part**

4.1.1. SOCKET

ECAN-E01S can establish two sockets, namely Socket A1 and Socket B1. Among them, both channels support all types of TCP Client, TCP Server, UDP Client, and UDP Server.

Two Sockets run at the same time. It can be connected to different networks at the same time for data transmission.

TCP Client

(1) TCP Client provides client connections for TCP network services. Actively initiate a connection request to the server and establish a connection for realizing the interaction between CAN data and server data. According to the relevant provisions of the TCP protocol, the TCP Client is the difference between connection and disconnection, so as to ensure the reliable exchange of data. It is usually used for data interaction between devices and servers, and is the most commonly used network communication method.

(2) When ECAN-E01S tries to connect to the server in TCP Client mode and the local port is 0, it will initiate a connection with a random port every time.

(3) ECAN-E01S supports short connection function.

(4) Under the same local area network, if ECAN-E01S is set to static IP, please keep the IP of ECAN-E01S and the gateway in the same network segment, and set the gateway IP correctly, otherwise it will not be able to communicate normally.

TCP Server

(1) TCP Server is the TCP server. In TCP Server mode, ECAN-E01S listens to the local port, accepts and establishes a connection for data communication when a connection request is sent. client device.

(2) It is usually used for communication with TCP clients in the local area network. It is suitable for scenarios where there is no server in the local area network and there are multiple computers or mobile phones requesting data from the server. Like TCP Client, there is a difference between connection and disconnection to ensure reliable exchange of data.

(3) When ECAN-E01S is used as TCP Server, up to two-way Socket supports 14-way Client, and the local port number is a fixed value and cannot be set to 0.

UDP Client

(1) UDP Client is a connectionless transmission protocol that provides transaction-oriented simple and unreliable information transmission services. There is no connection establishment and disconnection, and data can be sent to the other party only by specifying IP and port. It is usually used in data transmission scenarios where there is no requirement for the packet loss rate, the data packets are small and the transmission frequency is fast, and the data is to be transmitted to the specified IP.

(2) In UDP Client mode, ECAN-E01S will only communicate with the target port of the target IP. If the data does not come from this channel, the data will not be received by ECAN-E01S.

(3) In UDP Client mode, if the target address is set to 255.255.255.255, it can achieve the effect of UDP broadcast on the entire network segment, and can also receive broadcast data. The ECAN-E01S module supports broadcast within the network segment, such as xxx.xxx .xxx.255 broadcast method.

UDP Server

(1) UDP Server means that the source IP address is not verified on the basis of ordinary UDP. After each UDP data packet is received, the destination IP is changed to the data source IP and port number. When sending data, it is sent to the most recent communication. That IP and port number.

(2) This mode is usually used in data transmission scenarios where multiple network devices need to communicate with the module and do not want to use TCP due to the high speed and frequency.

Note: UDP Server cannot actively send data, only after receiving data, can it send data to the IP and port that have recently interacted with data.

→**CAN Part**

4.1.2. Relay enable

The device has the function of two-way CAN mutual transmission, that is, the relay function. When the device is in relay mode, the data received by CAN1 on its network will be sent to the network where CAN2 is located, and the data received by CAN2 on its network will be sent to the network where CAN1 is located.
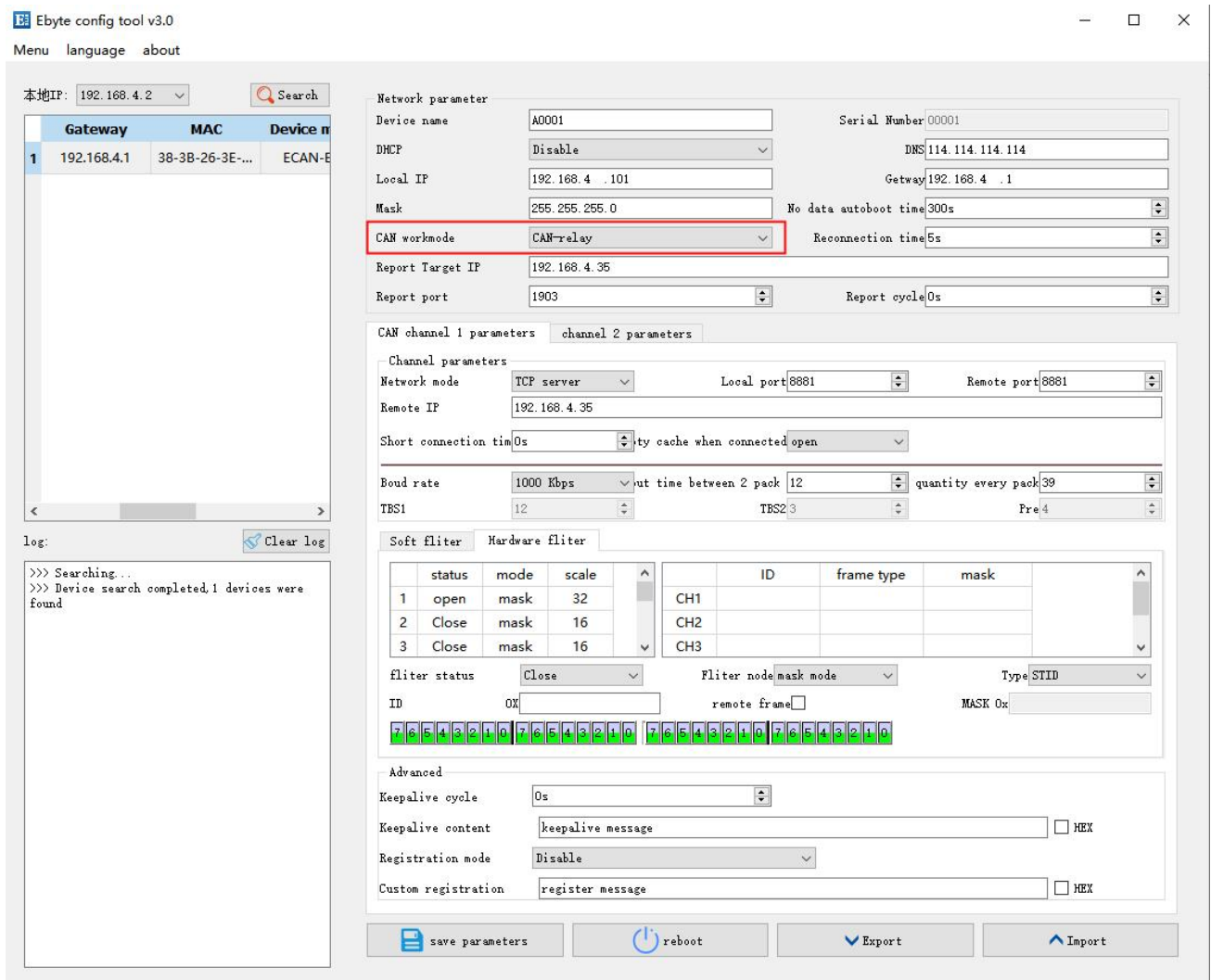
Note: When the baud rates of the two CAN networks are different, it should be noted that the high baud rate needs

to control the network utilization (if it is too high, data will be lost).

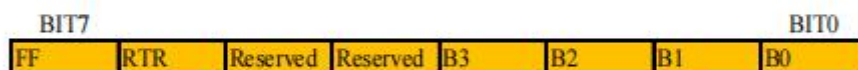## 4.1.3. CAN protocol conversion format

Multiple data of CAN-Bus is in one Ethernet data.

Definition of Ethernet & CAN-Bus data flow:

One frame data contains 13 bytes.

Frame information include length & type, 1 byte in length.

BIT7							BIT0
FF	RTR	Reserved	Reserved	B3	B2	B1	B0

FF: Standard frame & Extended frame identification bit, 1=Extended frame, 0=Standard frame.

RTR: Remote frame & data frame identification bit, 1=Remote frame, 0=data frame.

B3~B0: data length, the length of CAN frame.

Frame ID: 4 byte in length, standard frame has 11 bits, Extended frame has 29 bits.

High byte			Low byte
12h	34h	56h	78h

Extended frame ID:
0X12345678

High byte			Low byte
00h	00h	01h	23h

Extended frame ID:
0X123

Frame data: 8 byte in length, the valid length decide by frame information B3~B0

DATA1							DATA8
11h	22h	33h	44h	55h	66h	77h	88h

As above is the valid data of 8 bytes.

DATA1							DATA8
11h	22h	33h	44h	55h	66h	77h	88h
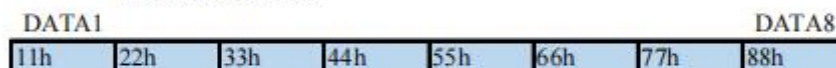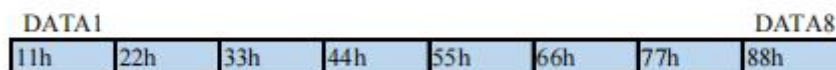
As above is the valid data of 5 bytes.

For example:

A extend frame data: 8 byte in length, frame ID 0×12345678, valid data of 8 bytes(11h,22h,33h,44h,55h,66h,77h,88h).

| 88h | 12h | 34h | 56h | 78h | 11h | 22h | 33h | 44h | 55h | 66h | 77h | 88h |

Note: Every frame must be 13 bytes, must complement 0 if don't have enough 13 bytes in both case: frame ID is less than 4 bytes or frame data is less than 8 bytes.

4.1.4. CAN function

Category	Name	Defaults	Description
	CAN baud rate	1000K	There are 10 options from 5K to 1000K. Users can also fill in any baud rate value by themselves.
	CAN working mode	Normal	Normal: The CAN port can respond to the received CAN frame normally; Listen only: The CAN port works in the monitor mode and does not respond;
	Subcontracting time interval (ms)	1	The values that can be filled in are: 12 to 255. When the CAN port does not receive a new data frame within the time defined by the "packet time interval" (unit is ms), and the number of sub-packet frames is not reached, the previous All data frames received and not yet sent are encapsulated into an Ethernet packet and sent to the network port.
	empty CANBuffer	Optional empty	This option is only valid in TCP working mode. It determines whether to clear the data in the CAN port Buffer after the connection is established. If not, the data in the Buffer will be sent after the connection is established. If clear when TCP connection is selected, the saved CAN buffer will be cleared when the TCP connection is established.

Category	Name	Defaults	Description
	Standard frame cap	7FF（HEX）	The upper limit and lower limit of the received standard frame ID set by the user together determine the standard frame ID range to be received.
	Standard frame lower limit	000（HEX）	
	Extended frame cap	1FFFFFFF	The upper limit value and lower limit value of the received extended frame ID set by the user together

Extended frame lower limit	000000000	
CAN transmit buffer number (600 frames)	Not configurable	Because the speed of Ethernet is much higher than the transmission speed of CAN, if the amount of data received by Ethernet is too large, CAN needs to buffer transmission, which can ensure that no frames are lost, but such a large buffer may lead to poor real-time performance, that is, Ethernet The data currently sent by the network needs to wait for a certain time to be sent out from the CAN interface. In this case, the client needs to control the transmission speed of the Ethernet to match the transmission speed of the CAN port.

4.2. **Special feature**

4.2.1. Heartbeat Packet

In network transparent transmission mode, users can choose to let ECAN-E01S send heartbeat packets. Heartbeat packets can be sent to the network server. The main purpose of sending to the network is to maintain a connection with the server, and it only takes effect in TCP Client and UDP Client modes. ECAN-E01S module supports custom heartbeat packet content up to 128 bytes. Support custom heartbeat package.



4.2.2. Registration package

In the network transparent transmission mode, the user can choose to let the DTU send the registration packet to the server. The registration package is used to allow the server to identify the data source device, or as a password to obtain authorization for server functions. The registration packet can be sent when the DTU establishes a connection with the server, or the registration packet data can be spliced into the front end of each data packet as a

data packet. The data of the registration package can be MAC address or user-defined registration data, wherein the setting content of the user-defined registration package can be up to 128 bytes. Support custom registration package;

Establishing a connection and sending a registration package is mainly used to connect to a server that needs to be registered.

Data carrying registration package: Send data to access the registration package at the front end of the data, which is mainly used for protocol transmission.

The registration packet mechanism is only applicable to TCP Client and UDP Client, and is invalid under TCP Server and UDP Server.
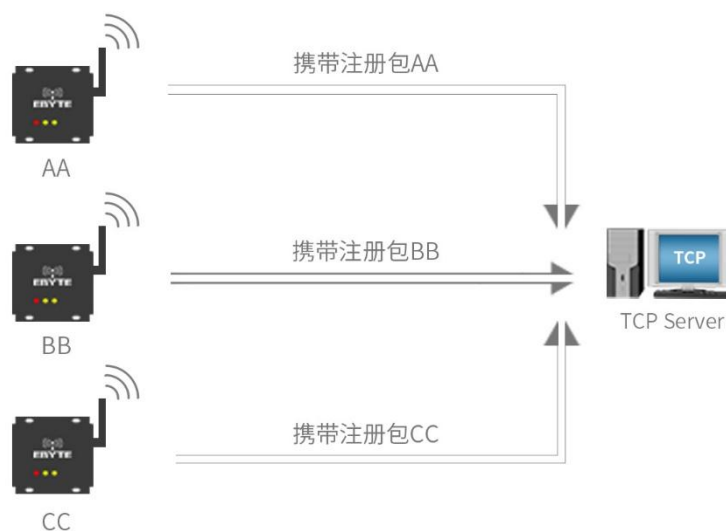
4.2.3. Short connection

The use of TCP short connections is mainly to save server resources, and is generally used in multi-point-to-point scenarios. Using short connections ensures that all existing connections are useful connections, and no additional control means are required for screening.

The TCP short connection function is used in the TCP Client mode. After the short connection function is enabled, the information is sent. If there is no data received from the serial port or network port within the set time, the connection will be automatically disconnected. The short connection function is turned off by default, and the disconnection time can be set after the function is turned on. The setting range is 2~255S.

4.2.4. Timeout restart

The timeout restart (no data restart) function is mainly used to ensure the long-term stable operation of the ECAN-E01S. When the network port cannot receive data for a long time, or the network has not received data for a long time, the ECAN-E01S will restart after the set time is exceeded. , so as to avoid the abnormal situation affecting the communication. The timeout restart time can be set by the host computer. The normal working time of this function is set to 60~65535S, and the default value is 300S. 0 is off, when the setting is out of range, it will return to the default value.

4.2.5. Clear cache

When the TCP connection is not established, the data received by the DTU will be placed in the buffer area. The maximum receiving buffer of ECAN-E01S is 3900 bytes. When the TCP connection is established, the network cache data can be cleared according to customer requirements.

Support DHCP and domain name resolution

DHCP

The device can automatically obtain IP through the router, and automatically configure the subnet mask and DNS server, and does not support modifying the subnet mask and DNS server.

DNS

Automatically follow the router to configure the DNS server to meet the needs of custom domain name resolution.

Reconnect after disconnection

Disconnection and reconnection: The device periodically requests connection after disconnection to ensure that the connection can be reconnected in the event of an accidental disconnection (note that the device is not restarted);
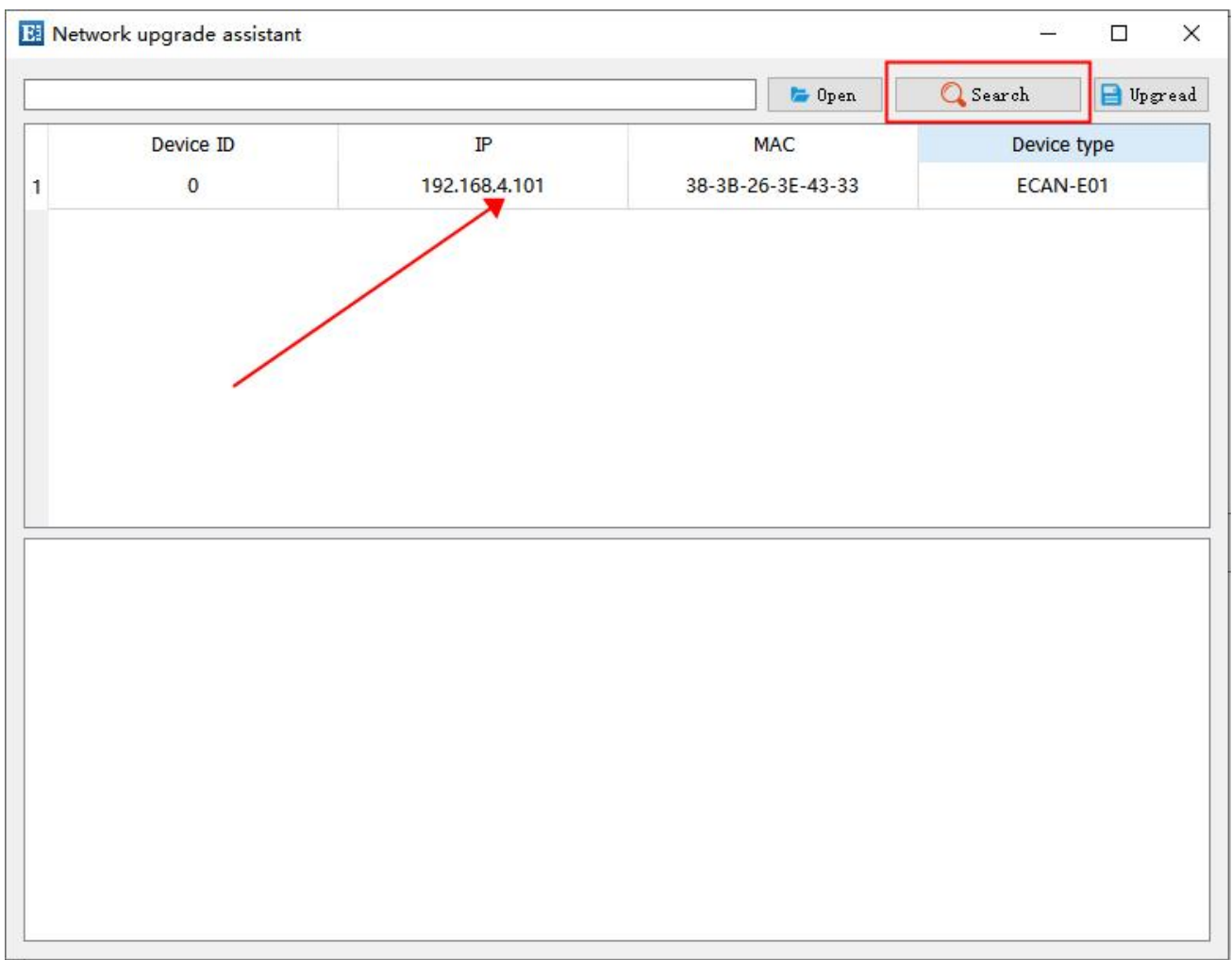
Ethernet port upgrade

Firmware can be upgraded and maintained through the serial port upgrade tool provided by our company.
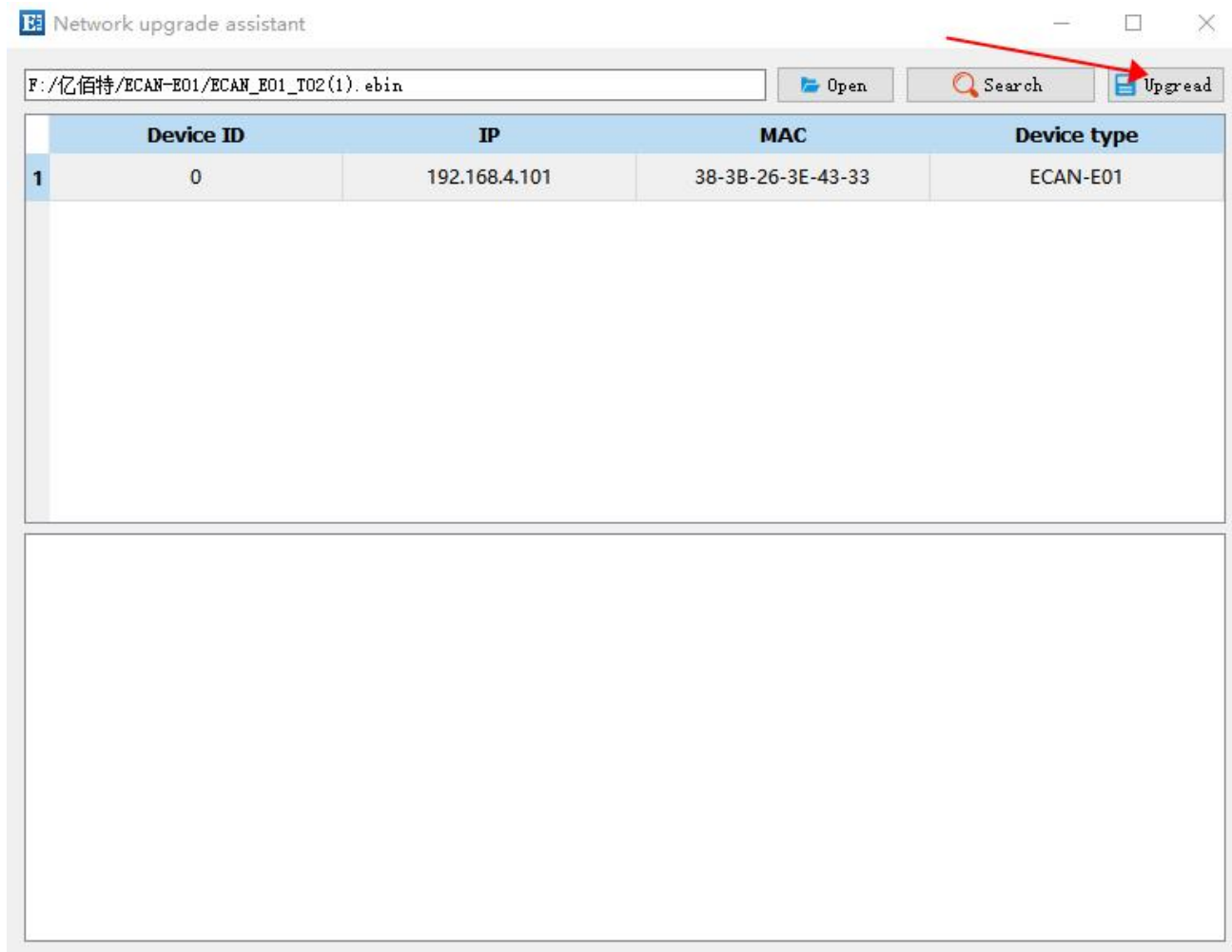
Step 1: Open the software, open the configuration host computer, and click the menu bar
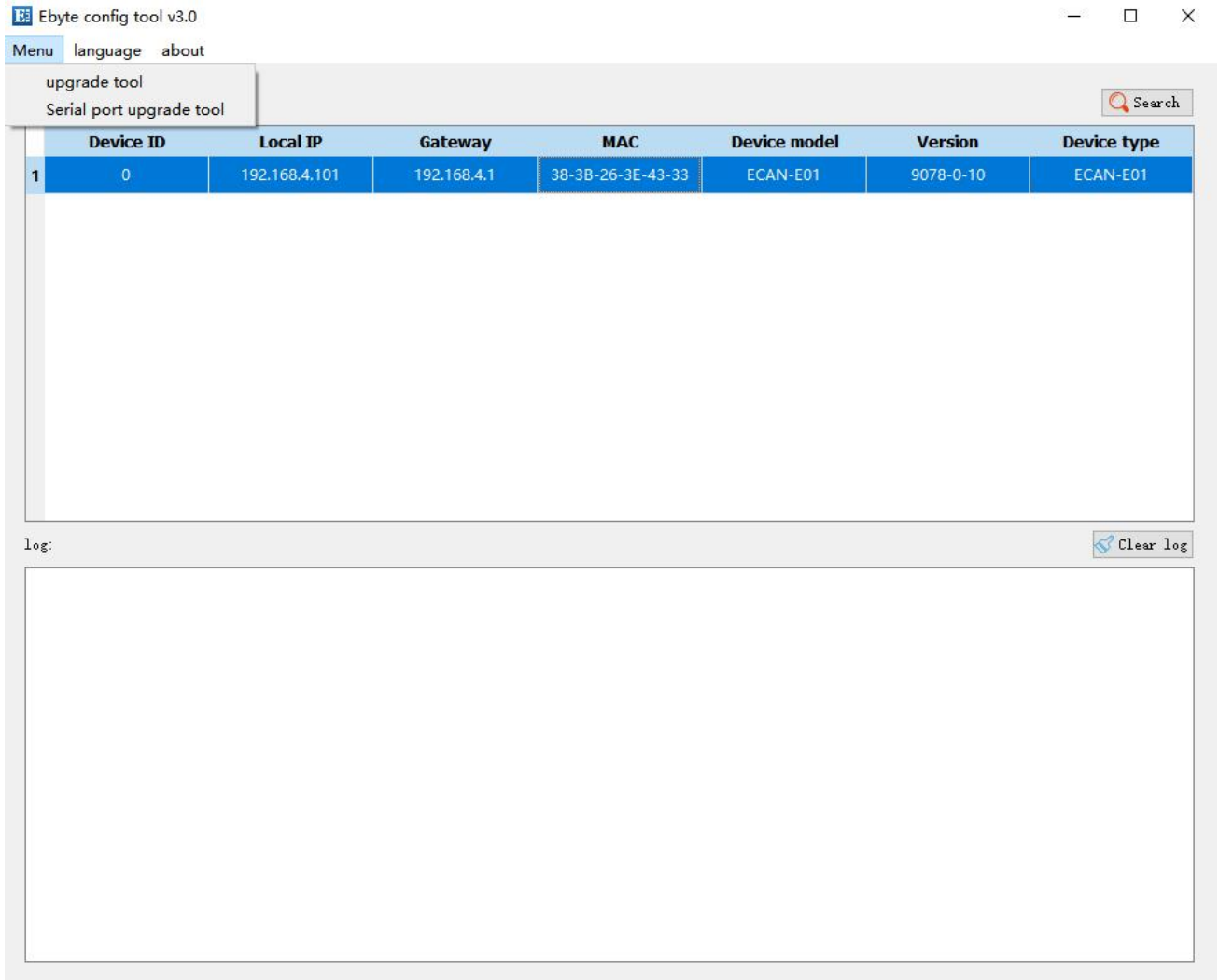
Step 2: Select Device Upgrade Assistant and click Search Device

Step 3: After selecting the firmware, click Upgrade to upgrade

4.3. **Reset**

The device has the button to restore the factory settings. To restore the hardware to the factory settings, you need to press and hold the reload button for more than 5s.

5. **Related products**

Product model	product type	Product features
ECAN-E01	CAN to Ethernet	With electrical isolation
ECAN-401	CAN to485/232/422	With electrical isolation
ECAN-S01	CAN to 485/232/422	No electrical isolation
CAN-U01	CAN analyzer	With electrical isolation

6. **Important Notice**

Ebyte reserves the right of final interpretation and modification of all contents in this manual.

Due to the continuous improvement of the hardware and software of the product, this manual may be changed without prior notice, and the latest version of the manual shall prevail.

7. **Revise History**

Version	Revise Date	Revision Notes	Maintainer
1.0	2022-07-06	First edition	LM
1.1	2022-09-13	Content revision	XXN

About us

Technical support: support@cdebyte.com

Documents and RF Setting download link: https://www.cdebyte.com

Thank you for using Ebyte products! Please contact us with any questions or suggestions: info@cdebyte.com

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Phone: +86 028-61399028

Web: https://www.cdebyte.com

Address: B5 Mould Park, 199# Xiqu Ave, High-tech District, Sichuan, China