
Multifunctional Serial to Ethernet converter

(UART ETH E001)

(UART ETH E401)

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1. Introduction

1.1. Overview

The UART ETH E SERIES is an intelligent plug-and-play RS232 to Ethernet adapter that enables any device or machine with a serial port, to become Ethernet network and Internet enabled. Go from Ethernet to serial with the UART ETH E SERIES. It features a powerful built-in device server, so you can access your serial device from anywhere in the world over internet! The UART ETH E SERIES is easily configured via Ethernet, and can also be set up through the serial port and web pages.

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1.2. Features

1. New Cortex-M3 kernel, industrial working temperature range, elaborate optimization LWIP protocol stack, stable and reliable.
2. A RS232 port, can set COM port and working mode independently, work independently, support RTS/CTS hardware flow control.
3. A RS232/RS485 compatible port, auto adaptation.
4. RS232 and RS485 can be used together, work independently, distinguish the connected serial port via port number.
5. Auto-MDI/MIDX function, discretionarily connect cross-over or direct network cable, automatic switching.
6. Support TCP Server, TCP Client, UDP, UDP Server, HTTPD Client various of work modes.
7. Support virtual serial work way, provide corresponding software.
8. Serial port highest baud rate from 110bps to 1024000bps(COM0 only max 256000bps).
9. wide voltage input, more applications.
10. Support DHCP automatically access IP, can inquire the facility within network through the UDP broadcast protocol.
11. Provide PC TCP/IP SOCKET programming example, VB, C++, Delphi, Android, IOS.
12. The built-in web page, also parameter setting via web, can customize web pages for users.
13. Can also set via UDP, provide the set up protocol and software source code.
14. Reload button, a key restore default Settings.
15. RJ45 status indicator light, RJ45 interface built-in isolation transformer, 2 KV isolation.
16. The global only MAC address bought from IEEE, the user can define MAC address (please state when you make order).

-
17. Support upgrade firmware via network.
 18. Support IP and domain name at the same time
 19. Support up to 4 link from client when act as TCP Server, send and receive data with id.
 20. Can modify MAC address you wanted.
 21. Can modify http server port for module built-in http server.
 22. Support Keepalive.

1.3. Applications

- Fire and Security Panels
- Vending Machines
- Point of Sale Terminals
- Remote equipment management
- IT management services
- Access Control
- Industrial Control
- Home Automation
- Instrumentation
- Building Control
- Power Management

1.4. Order information

Type	Part Numbers	Electric interface
Serial to Ethernet Converter	UART ETH E001	3 * TTL232
Serial to Ethernet Converter	UART ETH E401	1 * TTL232 1 * RS485

Diagram 1-1 Order information

Note:

For webpages: PORT0, PORT1 and PORT2, represent below:

UART ETH E001: PORT0 represent UART0, PORT1 represent UART1, PORT2 represent UART2;

TCP232-400/401: PORT0 represent RS232, PORT1 represent RS485, PORT2 not available;

1.5. Electrical characteristics

DC Power Supply Voltage:

Two DC Voltage can be choose (for UART ETH E001, others see Hard interface)

VCC: type: 3.3V, min: 3.15, max: 3.45 V

VDD: type: 5V, min: 4.5V, max: 5.5V

Operating supply current : Max: 180 MA

Operating Temperature: 0~75 °C (business version) -25-80°C (industry version)

Storage temperature: -40~85 °C

1.6. Block diagram

Take UART ETH E001 for example, show demo application of module UART ETH E001.

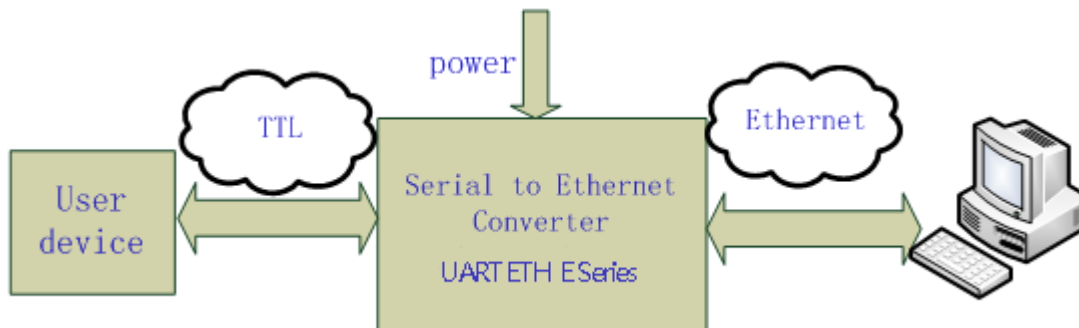


Diagram 1-2 UART ETH E001 application demo

1.7. UDP mode

When in UDP mode, after power on, module listen on specific port.

When received data from this udp port, send it to serial port; otherwise, when data is received from serial port, send it to ethernet.



Diagram 1-3 UDP mode communication test

Note:

- 1) local port and remote port can be different.
- 2) Max UDP send length(ethernet to serial) is 1472 bytes. If you want to send more than 1472 Bytes, please div it into shorter packet.

1.8. TCP Client mode

Open web pages and config module to

Telnet Mode: TCP Client

Remote port number: 23

Telnet Server Addr: 192.168.0.131

	Current	Updated
Baud Rate:	115200bits/second	115200 bits/S
Data Size:	8 bits/character	8 bits/character
Parity:	None	None
Stop Bits:	1bit(s)	1 bit(s)
Flow Control:	None	None
Local Telnet Port Number:	23	23
Remote Telnet Port Number:	N/A	23 → Target port
Telnet Mode:	TCP Server	TCP Client → Work mode
Telnet Protocol:	Raw	Raw
Telnet Server Addr:	N/A	192.168.0.131 → Target IP
Telnet Timeout:	0seconds	0 seconds (< 256, 0 for no timeout)
UART packet Time:	10ms	10 ms (< 256)
UART packet length:	200	200 chars (< 1024, 0 for no use)

Save these as next startup def

Diagram 1-4 TCP Client mode

Use TCP232,



diagram 1-5 TCP Client communication test

1.9. UDP Server mode

Like the socket UDP server in pc API. Many to one data transfer supported, the data from uart/232/485 part will be transformed to the last UDP packet's address.

Here show 2 UDP client communicate with server, server send data to the last client communicates with it.

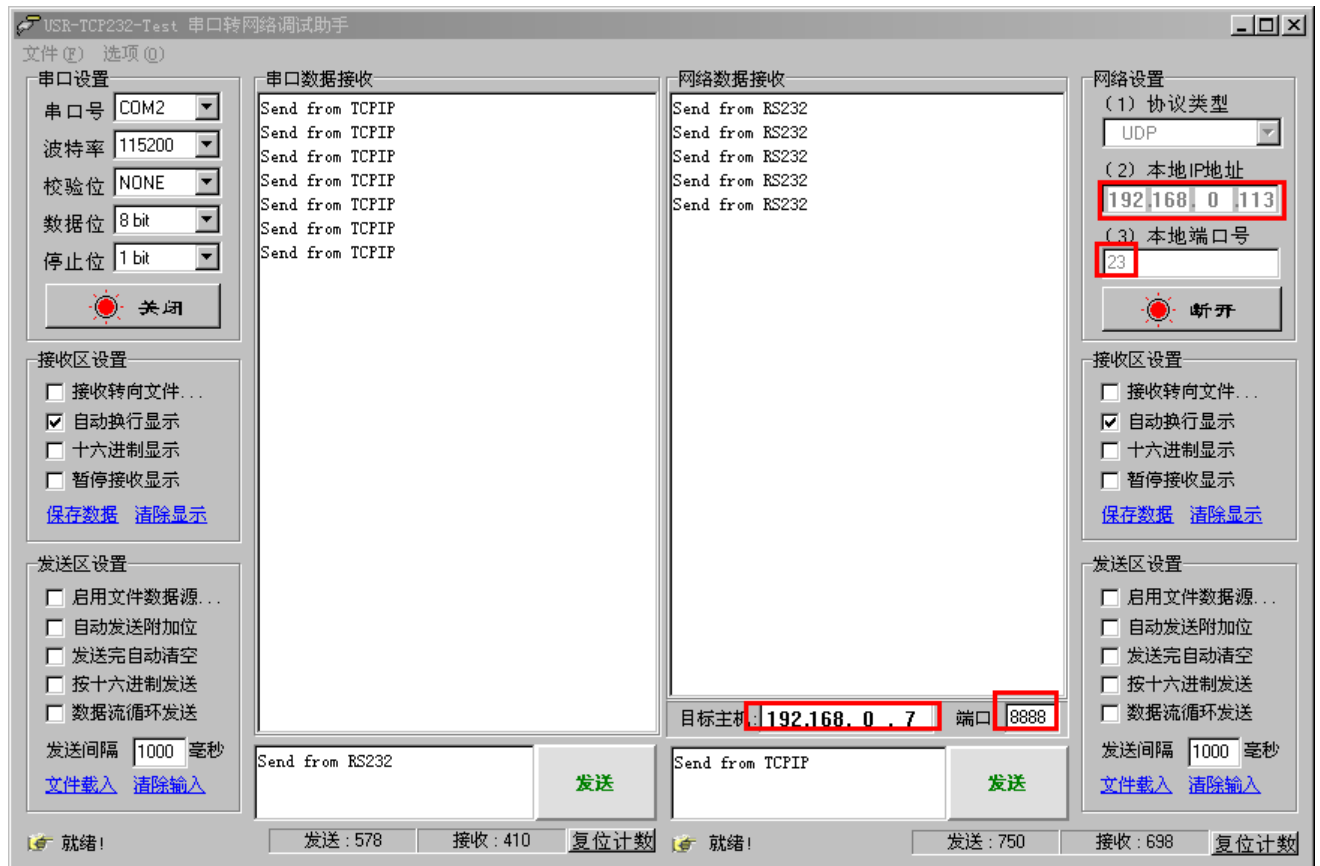


Diagram 6 Client 1 <-> server

1.10. TCP Server mode

TCP Server mode have 2 parameters: max link number and link type

1. max link number: 1 ~ 4;
2. Link type: typical, completely transparent, send data to all client;
 - extend1, communicate with id, otherwise abandon;
 - extend2, communicate with id, otherwise send to all client.

For link type extended 1 and extended 2:

When receive data from ethernet, module will send data to serial port with head 'I' 'N', followed by data. 'I' represent incoming data, 'N' represent client index.

When user MCU want send data to module serial port, start with head 'O' 'N' data... 'O' represent send out, 'N' represent which client.

When new TCP connection incoming, module will send 'C' 'N' 'M' to serial port, indicating that there is current link 'N' accessed, total link number 'M'.

When link number have exceed maximum, new link requirement will lead to message 'F' 'F'.

When disconnect, module will send 'D' 'N' 'M', represent current link N is delete, left link M.

Note:

serial data need to be sent in one package to module.

Flow Control:	None	None
Telnet Port Number:	23	23
Telnet Port Number:	N/A	23
Telnet Mode:	TCP Server	TCP Server
TCP Server detail:	1, Typical	1 max, typical type
Telnet Protocol:	Raw	Raw
Telnet Server Addr:	N/A	192.168.0
Telnet Timeout:	0seconds	0 seconds (< 256, 0 for no
UART packet Time:	10ms	10 ms (< 256)
UART packet length:	200	200 chars (< 1024, 0 for no u

Save these as next st

Diagram 1-7 web page configuration

1.11. Httpd Client mode

This function is easier used for web page developer. We establish one web server page, add this:

```
[<?php echo $_GET['data']; ?>]
```

Means we can GET data from HTTP client's request. Open this URL:

http://67.159.46.10/test/test_get_data.asp?data=12345, the web page is downbelow, we can see that the web server have got the data(12345),



Diagram 1-8 Request [67.159.46.10/test/test_get_data.asp?](http://67.159.46.10/test/test_get_data.asp?data=12345) and upload data

Then we take another way, set UART ETH E001 module Work mode HTTPD Client, Target address 67.159.46.10, Target port 80,

The screenshot displays a configuration interface for the UART ETH E001 module. On the left, a table lists device information:

设备IP	设备名称	MAC地址	版本
192.168.1.117	UART ETH E401	D8 B0 4C 00 11 1A	2013

Below the table are several control buttons: 搜索设备, 打开网页, 读取设置, 读取临时配置, 设备复位, 储存设置, and 载入默认. The '基础设置' (Basic Settings) section shows 'UPNP端口' set to 6432 and '设备名称' set to UART ETH E401.

On the right, the 'HTTPD Client' configuration is shown with the following settings:

- 串口波特率: 115200
- 校验/数据/停止: NONE, 8, 1
- 串口流控制: None
- 本地端口: 23
- 远程端口: 80
- 工作方式: HTTPD Client
- 透明传输: None
- 目标IP/域名: 67.159.46.10
- 串口打包时间: 10 毫秒 (<256, 0为不)

Diagram 1-9 config HTTPD Client

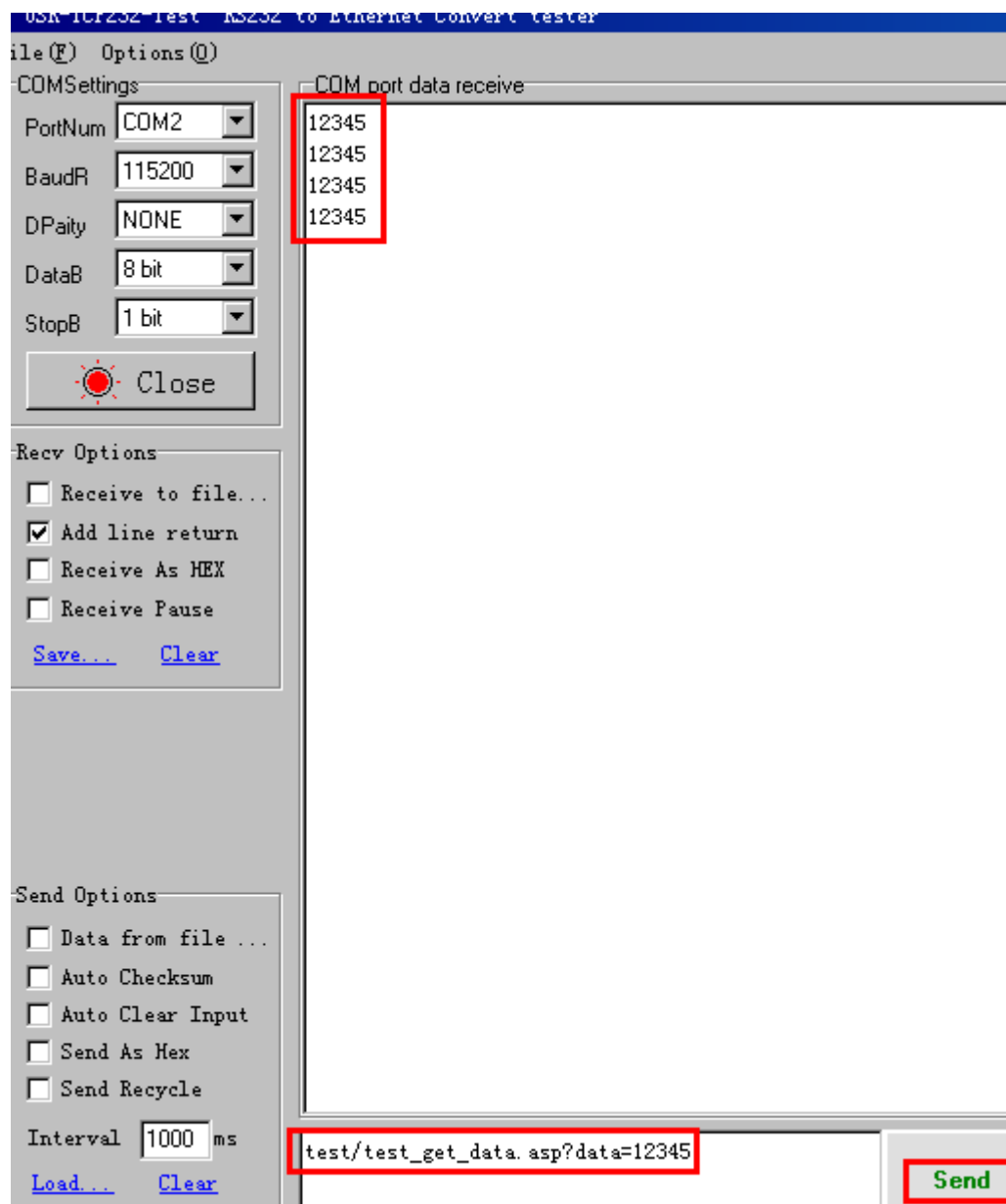


Diagram 1-10 module act as HTTPD Client

Note.

HTTPD Client based on TCP Client.

1.12. TCP Auto mode

When power on, module work as TCP Server, listen on local port, but if there is data received from serial port before any connection, module will try to connect remote IP and port as TCP Client.

1.13. WEB to Serial mode

Communication mode between serial port and web pages.

	Current	Updated
Baud Rate:	115200bits/second	115200 bits/S
Data Size:	8 bits/character	8 bits/character
Parity:	None	None
Stop Bits:	1bit(s)	1 bit(s)
Flow Control:	None	None
Local Telnet Port Number:	23	23
Remote Telnet Port Number:	N/A	23
Telnet Mode:	Web to Serial	Web to Serial
Telnet Protocol:	Raw	Web to Serial
Telnet Server Addr:	N/A	UDP Mode
Telnet Timeout:	0seconds	TCP Client
UART packet Time:	10ms	UDP Server
UART packet length:	200	TCP Server
		Httpd Client
		Web to Serial (< 256, 0 for no timeout)
		10 ms (< 256)
		200 chars (< 1024, 0 for no use)

Save these as next startup default setti

Diagram 1-11 config module to WEB to Serial mode

Select Telnet mode Web to Serial,

Send data to Serial from WEB

Choose UART Port:

UART0 UART1 UART2

Operation in HEX mode
 Auto Read every 1 Seconds

Note: Max send 32 bytes one time.

Receive window:

test/UART-ETH-E-Series.ashx

Diagram 1-12 WEB to Serial communication demo

Note:

- 1、received window show data only when click on “read” button or select “Auto read”button.
- 2、whether WEB to Serial mode or not, send web data to serial always work.

2. Hardware interface:

2.1. UART ETH E001

2.1.1. Hardware

2.1.2. Power

Power supply socket, The input voltage range 3.3V or 5V, current 150 MA. We default supply high quality 5 V / 1 A power adapter.

2.1.3. LED status

Except for Link and Data of RJ45, there is one work LED interface

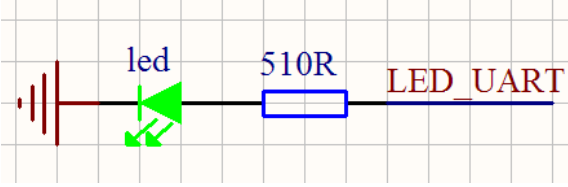
ID	name	Description
1	Work	Just interface, have no LED on module, If you needed, take this pin with LED and 510 ohm resistor to GND. See Pin8 for further explanation. 
2	Link(green)	On RJ45, when ethernet link established, on.
3	Data(yellow)	On RJ45, when ethernet data communicate, twinkle.

Diagram 2-1 LED definition

2.1.4. Serial(TTL) interface

The serial port is TTL level (2 * TTL serial port, can be directly connected to MCU).

number	name	Description
--------	------	-------------

1	TXD0	Uart0 transmit data pin
2	RXD0	Uart0 receive data pin
3	CTS0	Uart0 RS232 clear to send
4	RTS0	Uart0 require to send
5	RXD1	Uart1 receive data pin
6	TXD1	Uart1 transmit data pin
7	CTS1	Uart1 clear to send
8	RTS1	Uart1 require to send
9	RXD2	Uart2 receive data pin
10	TXD2	Uart2 transmit data pin
11	CTS2	Uart2 clear to send
12	RTS2	Uart2 require to send

Diagram 2-2 connector interface(include uart0 and uart1 and uart2)

2.2. USR-TCP232-401

2.2.1. Hardware

- 1) Mechanical dimension: (L×W×H): 90×84×25(mm) including RJ45 and connector;
- 2) PCB dimension(L×W): 80.3×50.3(mm);
- 3) +5 ~ +18V power input;
- 4) DC power plug, 5.08 connector power input
- 5) 2 * serial(1 * RS232, 1 * RS485)
- 6) 1 * RS232 support hardware flow control
- 7) 1 * RS485

2.2.2. Power

This system has three power supply interface, a power hub, a 5.08 terminal.

Power supply socket, outer diameter 5.5 mm inner 2.1 mm standard size, inside plus, outside minus. The input voltage range 5 ~ 18 V, current 150 MA. We default supply high quality 5 V / 1 A power adapter.

2.2.3. LED status

Equipment have 4 indicator lights in total, sequence from left to right.

ID	Name	Description
----	------	-------------

1	Power(red)	Bright after power on
2	Work(green)	Flash at work
3	Link(green)	In RJ45 port, bright after network connection
4	Data(yellow)	In RJ45 port, flash if there are datas on network

Diagram 2-3 LED definition

2.2.4. RS232 interface

The serial port is male (needl), RS232 level (can be directly connected to computer serial), part of RS232 pin sequences consistent to computer COM port. When connected with the computer, we need to use cross cable (2-3 cross, 7-8 cross, 5-5 direct, 7-8 can don't connect, but musn't direcly connect to computer. Otherwise, it might lead to irregularly work).

The DB9 interface contains the RS232, RS485 and RS422 interfaces.

Number	RS232	Description
1	-	-
2	RXD	RS232 device receive data pin
3	TXD	RS232 device transmit data pin
4	-	-
5	GND	Signal ground
6	-	-
7	RTS	RS232 require to send
8	CTS	RS232 clear to send
9	-	-

Diagram 2-4 DB9 interface

2.2.5. RS485 interface

RS485 two wirings terminal, A (DATA +), B (DATA), when connected with RS485, A (+) to A (+), B (-) to B (-).

Updated

Baud Rate: 115200 bits/S

Data Size: 8 bits/character

Parity: None

Stop Bits: 1 bit(s)

Flow Control: RS485

Local Telnet Port Number: None

Remote Telnet Port Number: Hardware

Work Mode: TCP Server None Modbus TCP

Diagram 5 choose RS485 for 401 if you want to use RS485

2.3. Reload

This button is used to restore factory settings. Press the button and power on, then free this Reload button, device will be factory settings.

Default settings main parameters as follows

Address type: static IP
Static IP Address: 192.168.0.7
User name: admin
password: admin
Module name: UART ETH E001

Using web pages can also restore default settings.

Restore Factory Defaults

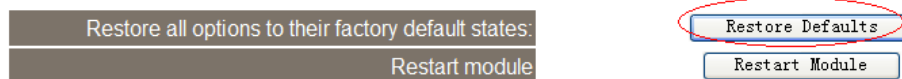


Diagram 2-6 restore defaults through web pages

3. Paramters configuration

3.1. Web page

Usually, this series of TCP232 module is configured through web pages.

3.2. network command(setup software)

1. through software UART ETH E SERIES Setup V1.0.5.0;
2. Network command(need to ask for protocol before purchasing).

Downbelow is the Setup for UART ETH E SERIES,

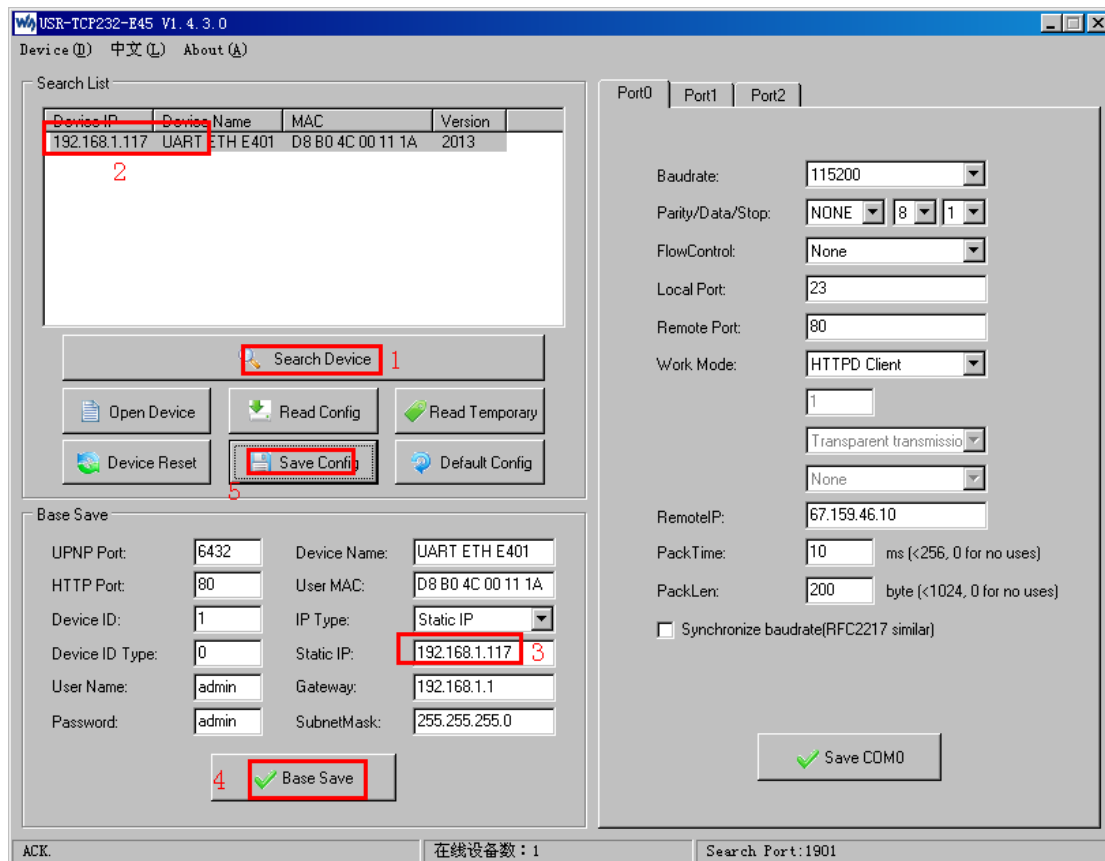


Diagram 3-1 Setup software

- (1)click 'Search Device';
- (2)Select device in search list;
- (3)Modified paramters such as static ip;
- (4)Click 'Base Save', paramters will be saved;
- (5)Click 'Save Config', the paramters will take effect;
- (6)Search again, module will appear in new paramters.

Note.

After modified paramters, need first 'Base Save' or 'Save COMX', then 'Save Config'.
If not, the paramters will only be saved, but not take effect.

4. Specific functions

4.1. Hardware flow control

RS232 interface support hardware flowcontrol (RTS/CTS)

Pin name	Description	IO type	Operater
RTS	Request to Send	O	module
CTS	Clear to Send	I	Outside device(PC)

Diagram 4-1 Pin description

When RTS = 0, enable the other side to send, at this time, TTL is 0 volt, RS232 is -3V ~ -15V;

When CTS = 0, represent module is enabled to send, at this time, TTL is 0 volt, and RS232 is -3V ~ -15V;

When the logic is reverse, represent that disable the other side to send or was disabled the module to send.

When connect with PC's RS232 interface, we can use the serial cable(cross).

4.2. User MAC address

User MAC address default is 6 bytes of 0xff, that is: FF-FF-FF-FF-FF-FF,

If defaults, use the factory MAC address such as: ac- cf-23-20-fe-3d;

If not, user MAC address will take effect.

When modify this address, insert '-' between bytes, or insert nothing. Click 'Update Settings' to save parameters, reset to take effect.

General Configuration Settings

Module Name:	<input type="text" value="UART ETH E401"/>
UPnP port number:	<input type="text" value="8432"/>
HTTP server port number:	<input type="text" value="80"/>
Module Id(use for indentify modue):	<input type="text" value="1"/> (1~65535)
Module Id mode:	<input type="text" value="0"/> (0:no use,1:send id when connect,2:send id when send data,3:both)
MAC Address(User):	<input type="text" value="d8-b0-4c-00-11-1a"/>

Diagram 4-2 user MAC address

In Current config and status, can see the currently MAC address in use. Diagram below is using the factory MAC.

Status and Configuration

Name:	UART ETH E401
Firmware Revision:	2013
IP Address:	192.168.1.117
MAC Address:	d8-b0-4c-00-11-1a

Diagram 4-3 currently MAC in use

4.3. Telnet Timeout

Telnet timeout default not use, value 0, see diagram below.

Flow Control:	None	None
Telnet Port Number:	23	23
Telnet Port Number:	80	80
Telnet Mode:	Httpd Client	Httpd Client
Telnet Protocol:	Raw	Raw
Telnet Server Addr:	180.186.12.170	www.usr.cn
Telnet Timeout:	0seconds	0 seconds (< 256, 0 for no timeout)
UART packet Time:	10ms	10 ms (< 256)
UART packet length:	200	200 chars (< 1024, 0 for no use)

Save these as next startup de

Diagram 4-4 Telnet Timeout

Telnet timeout represent no data timeout, 0 not use, max 255 (seconds).

After connection is established, no data last for timneout seconds, module will disconnect and reconnect.

When TCP Server mode, the module will disconnect with client, release resources, and waiting for new connection, clear time count;

When TCP CLient mode, the module will disconnect with server and reconnect.

Telnet timeout represent no signal reconnect timeout (seconds)。

4.4. Send RST command through network

Accord to structure to send reset command, this command only for firmware 2002 and upper UDP broadcaste, sned data to 255.255.255.255, port 1901:

function	head	len(from cmd tobefore verify)	cmd	User /password	verify(sum)
reset	FF	0D	02	[username] [password]	xx

Diagram 4-5 reset command structure

For example:

FF 0D 02 61 64 6D 69 6E 00 61 64 6D 69 6E 00 20

Device will response(4 Byte):

FF 01 02 4B (command success) 4B = 'K';

FF 01 02 45 (user name and password false) 45 = 'E'.

Attention: the proto above is an proto for old product, if you want the detailed proto, pls contact us.

4.5. Firmupdate

Use search and config software **USR-TCP232-E45 V1.4.3.0** to update firmware, only once for one time, can not cross network segment.

1. Search and select one module

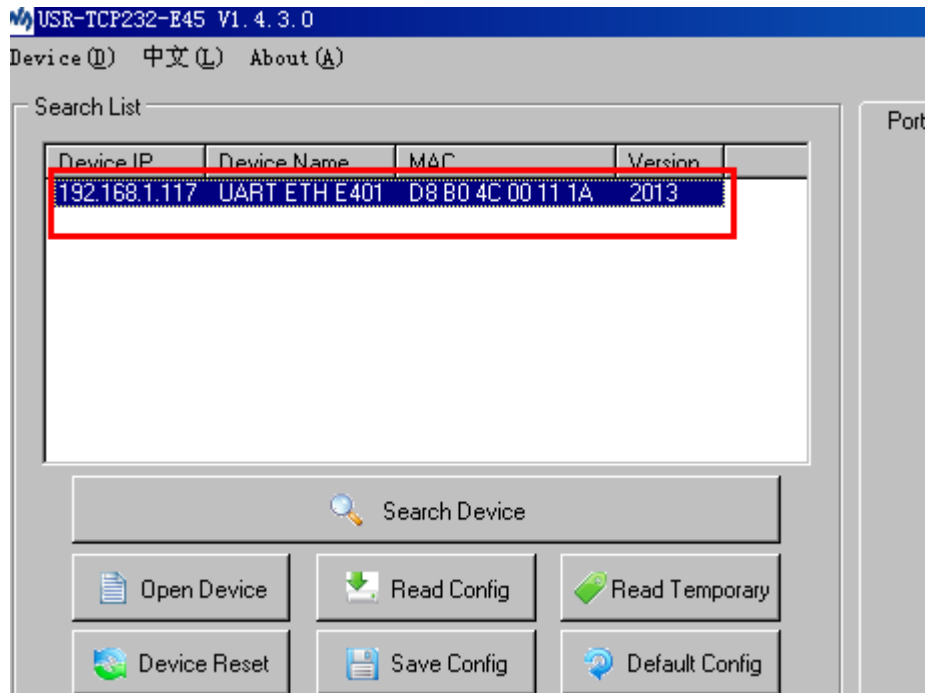


Diagram 4-6 search and select

2. 'Device' -> firmware update

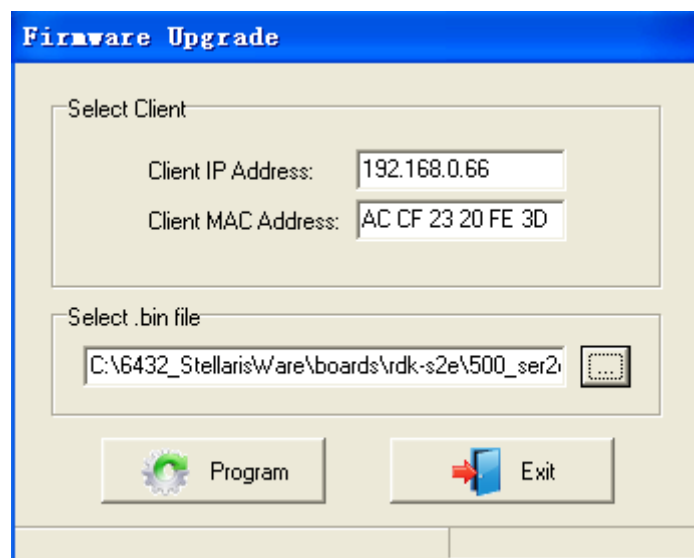



Diagram 4-7 firmware update

Click  to start update progress.

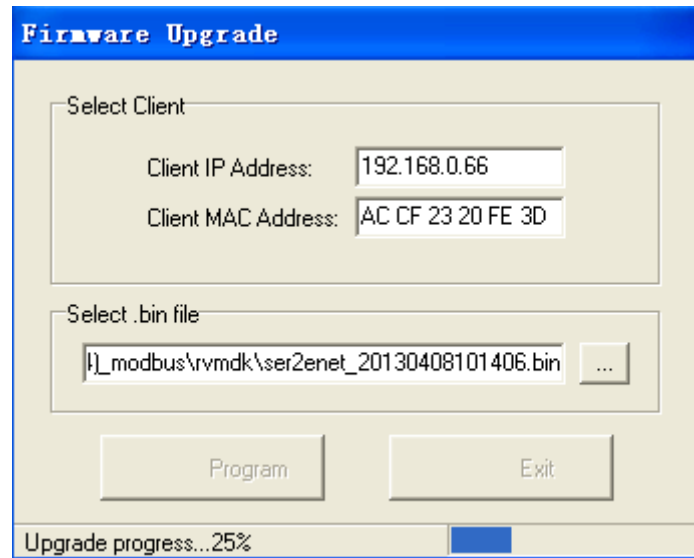


Diagram 4-8 in update progress

3. Update success, click exit.

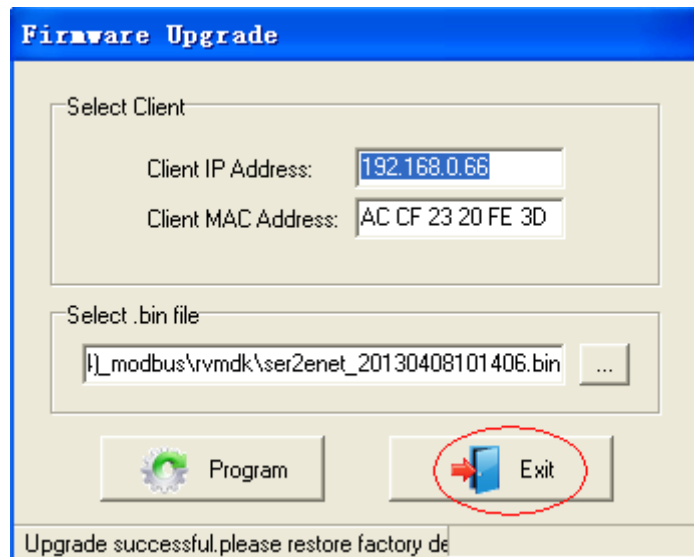


Diagram 4-9 success

Note. After update, if can not search module, restore to factory will fix this problem.

5. Module USES

5.1. Hardware connection

For the convenience of use, we designed evaluation board for module UART ETH E001, with the RS232 to TTL conversion circuit, convenient for user communicate with computer.

Here we take UART ETH E001 for example, The default configuration:

IP address: 192.168.0.7

Subnet mask: 255.255.255.0

The default gateway: 192.168.0.1

IP Address Selection

Address Type:	Static IP	▼					
Static IP Address:	192	.	168	.	0	.	7
Subnet Mask:	255	.	255	.	255	.	0
Default Gateway:	192	.	168	.	0	.	1
<input type="button" value="Update Settings"/>							

Diagram 5-1 IP Address Selection

To test briefly, you can connect the module with computer via network cable, or you can also connect the module and computer to switch or router at the same time. No need to distinguish cross and direct connect cable, the module have automatic switch function. And, change computer IP to 192.168.0. *, such as 192.168.0.161 we test.

Connect the module serial to computer through TTL to RS232 turn wiring. if you use TTL to USB turn wiring, please pay attention to the quality of the turn wiring, most low price USB turn TTL module on market is low quality at present.

Power up, 5 V connect to VDD or 3.3 V connect to VCC, keep the voltage stable, 150 MA current at least.

Diagram 5-2 Application

5.2. Login

Login above IP address <http://192.168.0.7> through the browser, you will enter setup web pages.

User name and password are “admin”, this can be modified when login into the system.

Webpage as follows, 2. TTL(uart0) Settings and 3. TTL(uart1) Settings 4. TTL(uart2) Settings 6. Miscellaneous Settings is used to set some parameters such as module IP and module name.

Note:

For webpages: PORT0, PORT1 and PORT2, represent below:

UART ETH E001: PORT0 represent UART0, PORT1 represent UART1, PORT2 represent UART2;

UART ETH E401: PORT0 represent RS232, PORT1 represent RS485, PORT2 not available;

5.3. Default working mode test

To test briefly in default working mode, on the foundation of the hardware connection, use the matched software TCP232 to make transmitting and receiving test. The left side is serial port, use software default settings, the right side is the network part, set to TCP Client and server to be IP 192.168.0.7, port 23.

By default, the two COM port to be set as TCP Server mode, port is 23/26.

This illustration shows the 10 ms two-way simultaneous automatically transmit screenshots. As the allocated memory of the display control is limited, in order to test large amount of data transceiver, here will suspend the receive display, only statistical data. Below is the effect after testing for a few hours, and transmitting millions of bytes. Stable and reliable, without a byte loss.

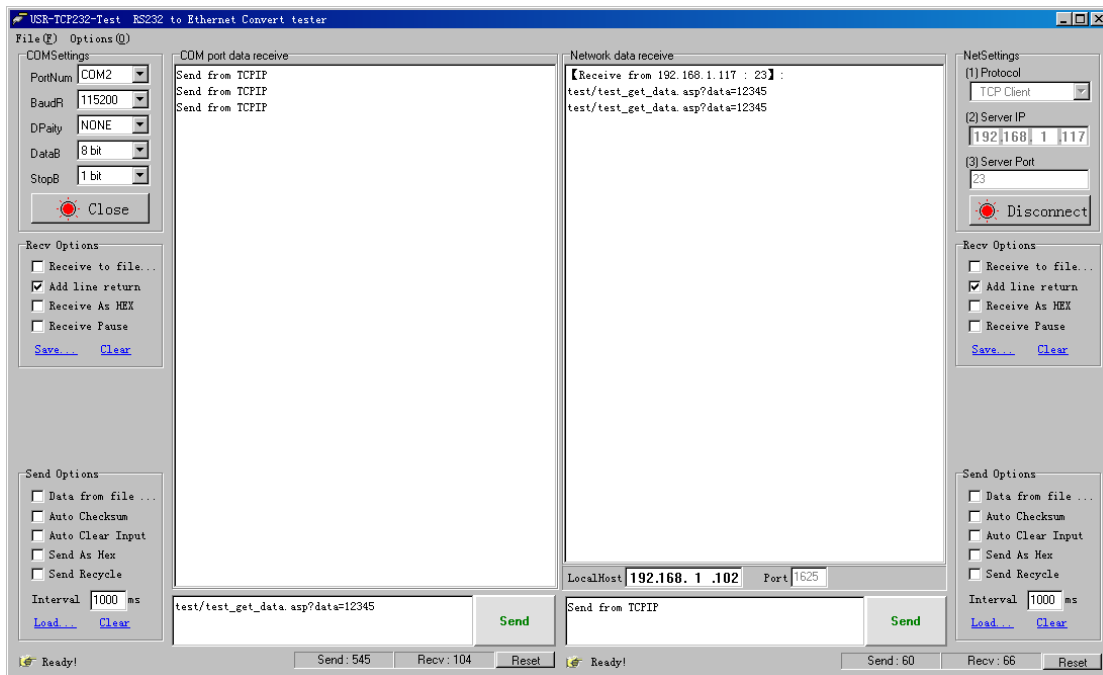


Diagram 5-3 default working mode communication

Specially instruction:

For the robustness of your application system, we suggest you using the time out function (default 0, closed). Such as setting the Telnet Time out, to prevent the complicated internet circumstances influencing communication stability, and solving the off line link, communication feign death, TCP connection to be occupied problems.

In the TCP Server mode, if still have no new data transceiver when it is time out setting time, the module will be active to switch off the client links, release resources, wait for new links, transmitting or receiving data will clear the time.

In the TCP Client mode, if still have no new data transceiver when it is time out setting time, the module will be active to switch off the server links and try to relink.

5.4. Common questions

5.4.1. Work across network segment

If your TCP232 device's IP is 192.168.0.7, and remote PC's IP is 192.168.1.7, we need to config.

Subnet mask of TCP232 device, PC, and router to 255.255.0.0, if not ,the TCP232 module will not communicate normally.

5.4.2. Ping is OK but can not open web pages

Some possible causes

1. Module is set a static ip and conflicts with another ethernet device.
2. Cross network and false subnet mask .
3. HTTP server port is modified(default 80).

Solutions:

1. Set another static or use DHCP.
2. Set correct subnet mask.
3. Set this port to 80 or open web page with correct port.

5.4.3. After firm update, can not open web page

Reload this module back to factory settings.

5.4.4. When connection established, server received serval chars

Possible causes.

- 1) Telnet Protocol use Telnet(usually should be RAW).
- 2) Module id type is not 0.



Diagram 5-4 Telnet Protocol

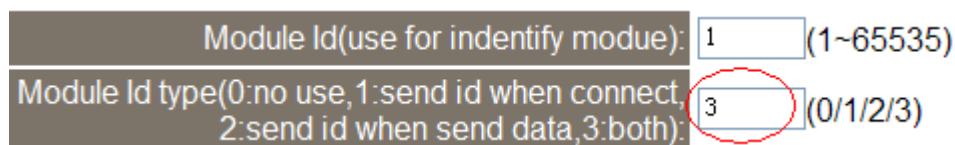


Diagram 5-5 Module id type

Solutions.

- 1) Telnet Protocol choose RAW.
- 2) Module id type set 0.

5.4.5. Every serval seconds, module reconnect

Telnet Timeout was set to none 0 value.

Solutions

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- 1) Give Telnet Timeout 0 or send data before timeout.