# USR-GPRS232-DTU USR MANUAL

**For Models：**

USR-GM1

USR-GPRS232-7S2

USR-GPRS232-701-2

USR-GPRS232-701-4

USR-GPRS232-710

File Version：V3.1

# Copyright Notice



# NOTE

As the product version upgrades or other reasons, this document is subject to change without notice. Due to normal use of the product depends on the network environment, SIM card status, server status, a number of factors, and can not be determined in accordance with this document, the operation must be able to perform a given function.

Unless otherwise agreed, this document only as a guide, all statements in this document, information, and recommendations do not constitute any kind, express or implied, including fitness for a particular purpose, merchantability or any patent, copyright or Other tort liability and other intellectual property rights are not secured by.

The Company may at any time on product specifications and product descriptions to make changes without notice. This product may contain design defects or errors, once discovered their income errata, which may cause the product to deviate from published specifications.

# 1. Instructions before use:

## 1.1 Basic introduction

Jinan USR IOT Technology Limited (: USR). networking products company focused on the field of networking. the main serial servers, Ethernet to serial, GPRS DTU, embedded WIFI module. The company has a strong R & D team of embedded hardware and software, mobile application development and server application development team. we can provide customers with OEM and ODM services.

GPRS product model described in this document are based on USR-GM1 core module development comes with the same features, the difference between the different models that range of aspects of power, data interfaces.

The following is the product model abbreviation:

| | |
|---|---|
| USR-GM1 | GM1 |
| USR-GPRS232-7S2 | 7S2 |
| USR-GPRS232-701-2 | 701-2 |
| USR-GPRS232-701-4 | 701-4 |
| USR-GPRS232-710 | 710 |

## 1.2 Product Testing

This document provides an example of how to set parameters of the product examples. A Case Study in 7s2. We provide a server to do the testing.

Server Information

Domain name: www.usr.cn

Port: 2317

Protocol type: TCP

the serial port parameters

Baud rate: 115200

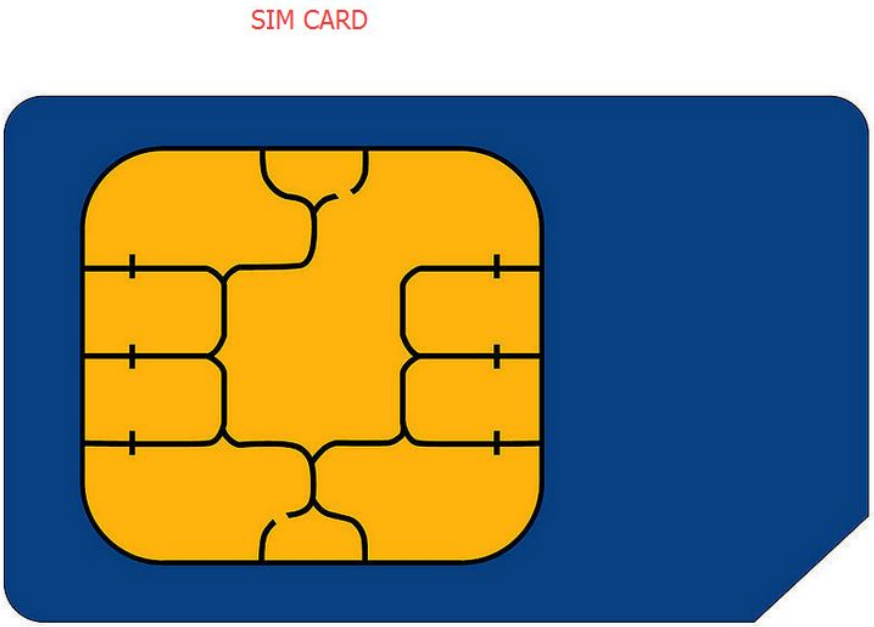
Data bits: 8

Parity: NONE

stop Adults: 1

1, test preparation:

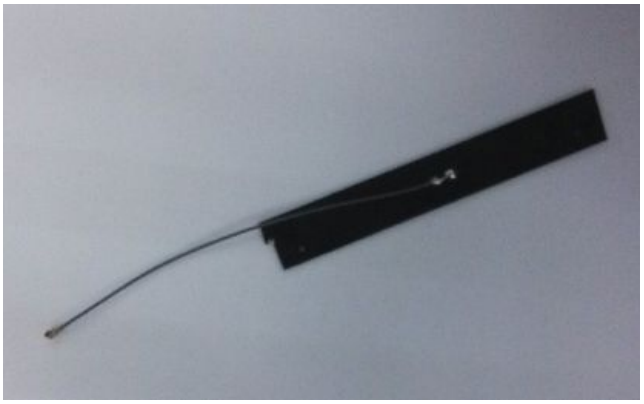
a) Open Data enabled SIM card



b) DC12V power supply (7S2 can be used DC9 ~ 18V power supply can be used, 701 and 710 can be used DC9 ~ 28V power supply);

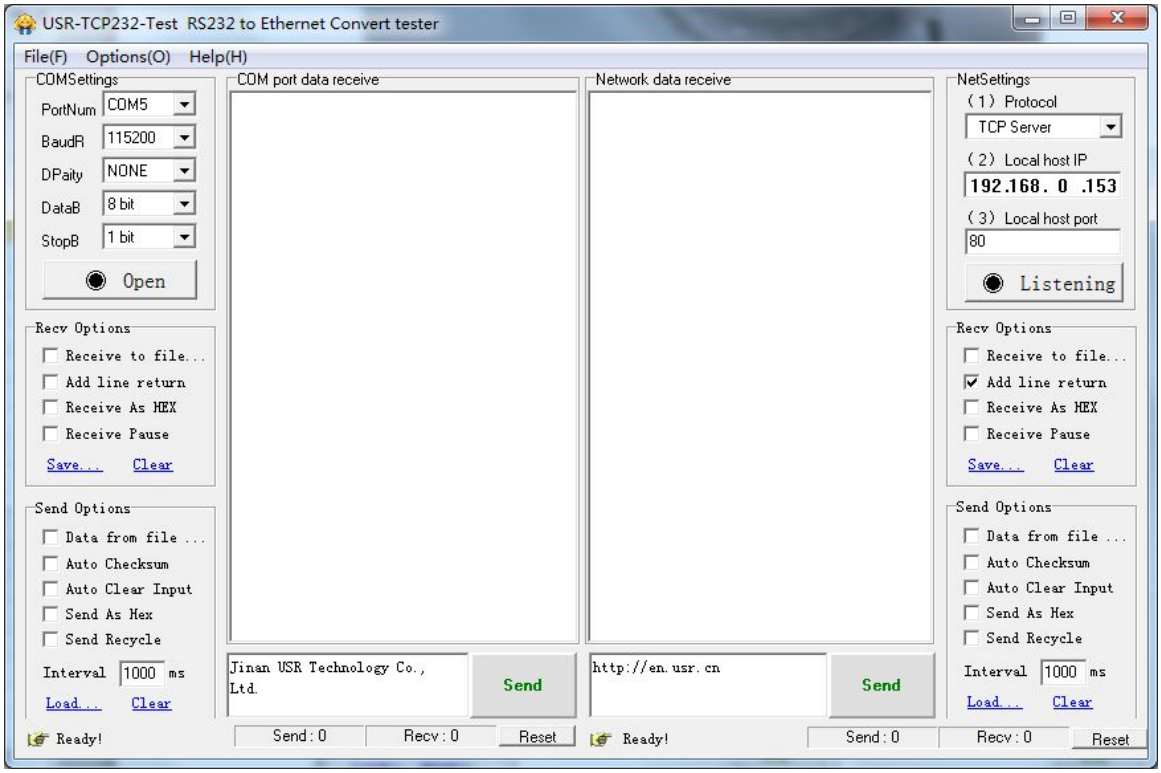

c) USR-GPRS232-7S2 module& Evaluation board;

d) GPRS antenna



e) Serial port extension cable (If the pc don't have RS232 interface，you need a USB to RS232 adapter );

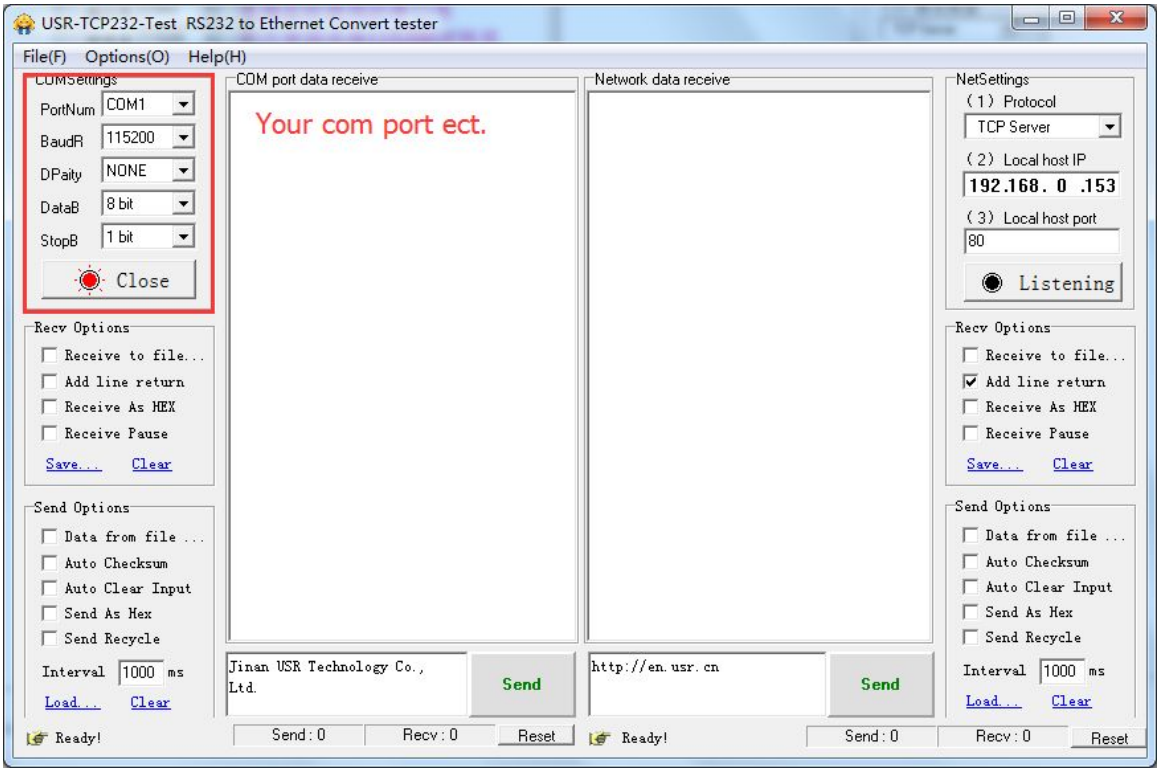
f) computer, USR-TCP232-TEST Software.



2. The 7S2 module into the evaluation board, in the correct direction. The SIM card is inserted 7S2 module in the correct direction.


3. The antenna is connected to the 7S2 module.

4. Connect the RS232 serial port (or USB to RS232 serial port),open the USR-TCP232-TEST software.



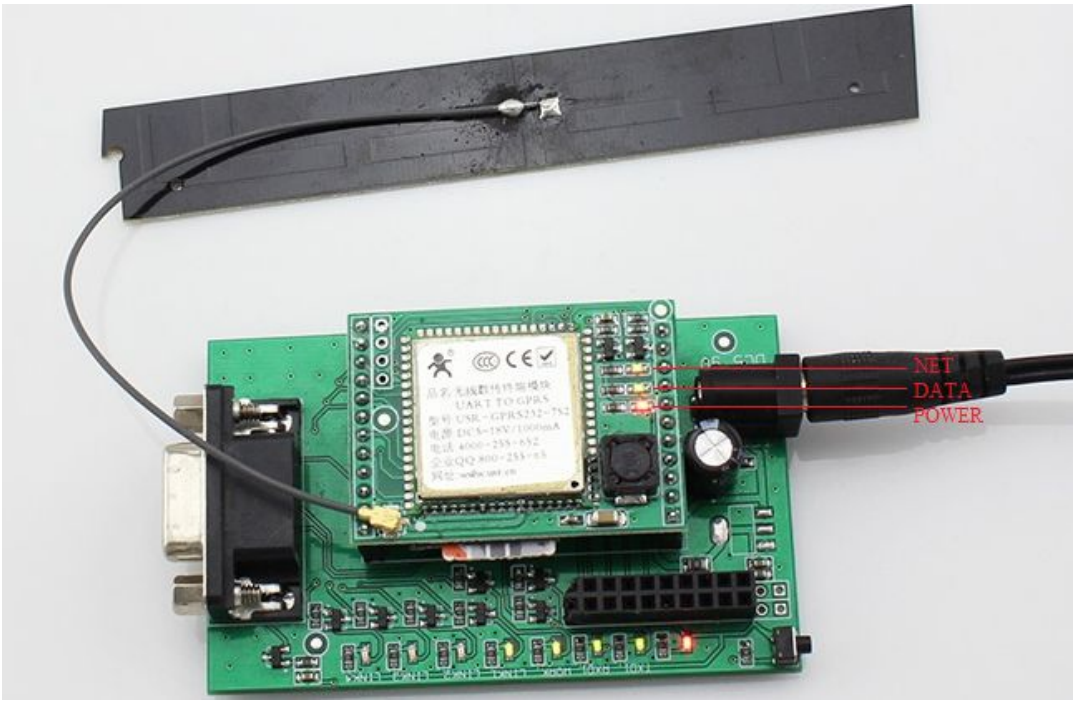
5. Supply power

6. LED Status

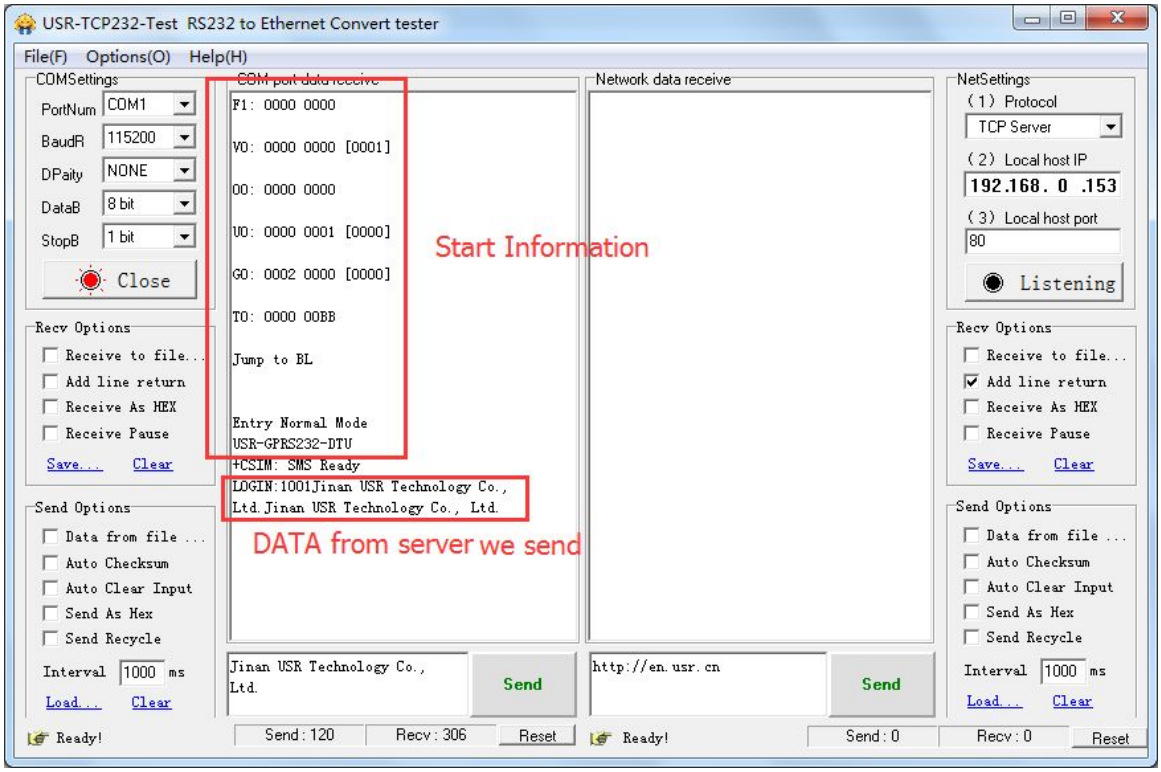
NET: work instructions, NET has been flashing after the module starts, in the absence of network activity slow flash (flash once for about 3 seconds), when there is network activity (telephone / Internet) Flash (about 0.7 seconds);

DATA: Data connection instructions, DATA lamp module connections to the server after the light, and the server is disconnected Jimie, if the data transmission, DATA flashes about;

POW: Power indicator, when the power supply to the module, POW lights;




7. serial data receive



8. the test is completed, the parameter settings

If you strictly follow the above eight steps for the product tested, customers can send and receive normal data (as shown in the screenshot Step 7).

Now product testing has been completed, users can follow their own needs to set parameters for the product and use.

If you can not get the final result as shown in Step 7, check:

A.SIM card is delinquent / Invalid data traffic.

B.SIM card is inserted, reinsert the SIM card and test.

C.serial cable is properly connected, the computer serial port driver is installed OK.

D.power supply is normal.

E.antenna is connected.

## 1.3 Document describes

**For customers for the product corresponding to the type required product information, download links listed below in order to use the information.**

Software Name: USR-TCP232-TEST
Software features: You can make network debugging serial debugging assistant and assistant to use.
Download Link: http://www.usriot.com/Download/199.html

Software Name: DTU Setting Software
Software features: GPRS products for parameter setting and modification.
Download Link: http://www.usriot.com/Download/113.html

Software name: Virtual Serial Port Software
Software features: network data into a virtual serial data port for software development based on the use.
Download Link: http://www.usriot.com/Download/31.html

File name: GPRS products used AT command set
Download Link: http://www.usr.cn/Download/188.html

File name: GPRS products extended AT command set
Download Link: http://www.usr.cn/Download/187.html

File name: USR-GPRS232-7S2 library files and hardware design manual
Download Link: http://www.usr.cn/Download/141.html

File name: USR-GM1 library files and hardware design manual
Download Link: http://www.usr.cn/Download/134.html

If you need more information and product information,
please visit : http://www.usriot.com/Product/cat-68.html
Or http://www.usriot.com/Product/cat-10.html

# Contents

# 3 Product Introduction

## 3.1 Features

1. Quad-band world wide (850/900/1800 / 1900MHz);
2. Support operators such as GSM / GPRS / EDGE network.
3. Support public network / APN private network access, supported by a dedicated network APN specify the local port number;
4. Support multiple network connections at the same time online, maximum support 4-way network connection, easy to use multiple data centers;
5. KEEP-ALIVE mechanism to support and enhance the stability;
6. Each TCP connection support under 15K data cache, the data used to enhance stability
7. support any formatting registration packet / heartbeat packet data;
8. No long-time support data transmission module automatically restart (set less than 600 seconds when the automatic restart function is disabled);
9. Support Remote SMS set module parameters (SMS setting parameters supports password authentication to prevent unauthorized users to set parameters and spam messages interference), support for remote server setup parameters (can be turned on / off this feature);
10. Support multiple operating modes.
11. GSM07.07 AT command set support, support for custom instruction set extensions (AT command mode is available);
12. Supports the use of the extended instruction set to establish, maintain and close network connections, increase application flexibility;
13. Supports synchronous baud (class RF217) function can be dynamically modify the device baud line with the company to use the virtual serial port software;

## 3.2 Product Features

- 300 to 115200 baud rate can be set, serial parameters (data bits, stop bits, parity) can be set
- Operating voltage: 7S2 Module 9 ~ 18V; 701/710 module 9 ~ 28V
- Current: average 50 ~ 200mA; maximum 1000 mA / 12V
- Working temperature: -40 ~ + 80 °C
- Storage Temperature: -40 ~ + 85 °C
- Storage humidity: 5% ~ 95% RH
- maximum transmit power: GSM900 class4 (2W), DCS1800 class1 (1W)
- LED: 3 LEDs (POW, NET, DATA), respectively, indicate power, work status, connection status
- status and control pins: 7S module supports switch, WORK, LINK, LINK1 ~ LINK4, audio input / output;
- transparent mode supports TCP / UDP transport protocol, user flexibility to use other modes
- Serial level: 7S2 module supports 3.3V TTL level (disable access 5V level), 701 module supports RS232 / RS485 interface in two versions, 710 module supports RS232 / RS485 adaptation.

# 3.3 Hardware Introduction

## 3.3.1 USR-GM1

USR-GM1 is a patch-embedded GPRS module, our DTU products are based on this, peripheral circuits and so on GM1 module details, please refer to the USR-GM1 hardware design manual.

USR-GM1 download link hardware design manual and package library: **http://www.usr.cn/Download/134.html**

| Parameters | Description |
|---|---|
| **measurement** | 24*24*2.9mm |
| **POW** | Power 3.6 ~ 4.2V; 3.8V standard values |
| **Interface** | POWER/SIM/WORK/LINK/UART/AUDIO/RF |

## 3.3.2 USR-GPRS232-7S2

USR-GPRS232-7S2 is a forward-compatible USR-GPRS232-7S (discontinued) embedded GPRS module, built-in DC-DC converter circuit can support 9 ~ 18V power supply; after the demolition onboard DCDC converter circuit inductance wheeling You can use DC5V plus buck diode (recommended model 1N4007) way directly to the VCAP pin power supply to use DC5V power supply.

Users can also use the battery, after the removed board power inductors。

USR-GPRS232-7S2 peripheral circuit requirements, hardware and other detailed information, refer to the USR-GPRS232-7S2 hardware design manual.

USR-GPRS232-7S2 download link hardware design manual and package library:

**http: //www.usr.cn/Download/141.html**

| Parameters | Description |
|---|---|
| **measurement** | 45*32*14mm |
| **POW** | VCAP Power supply:3.6~4.2V； VCC power supply:9~18V； |
| **PORT** | POWER/WORK/LINK/UART/AUDIO |
| **Antenna** | IPEX antenna connector fittings |

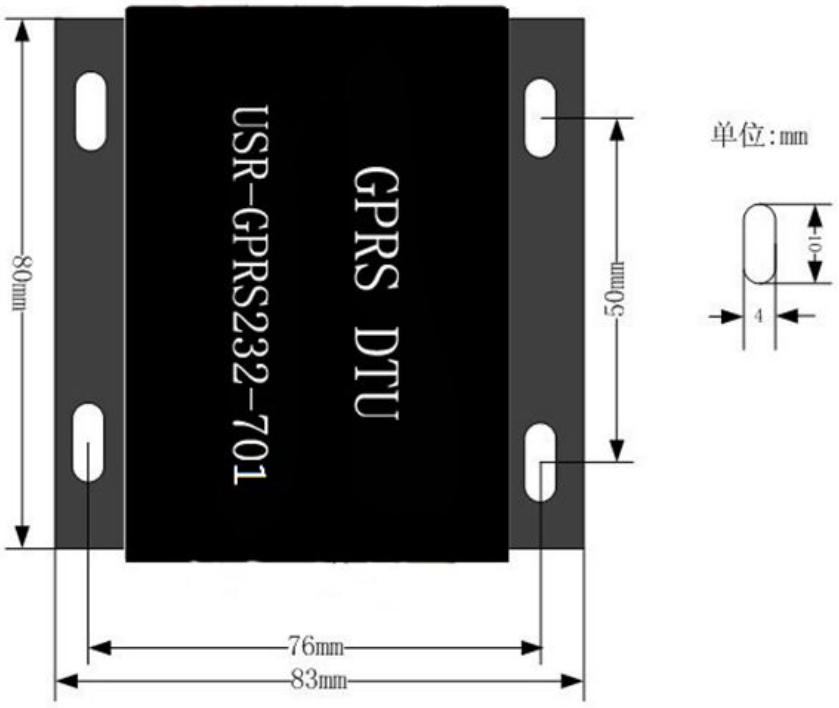
## 3.3.3 USR-GPRS232-701

701-2 which use 5.5 * 2.1 round hole fittings supply, DB9 female data interface; 701-4 using 3.81-2 pluggable terminal powered 3.81-3 pluggable terminal data interface.

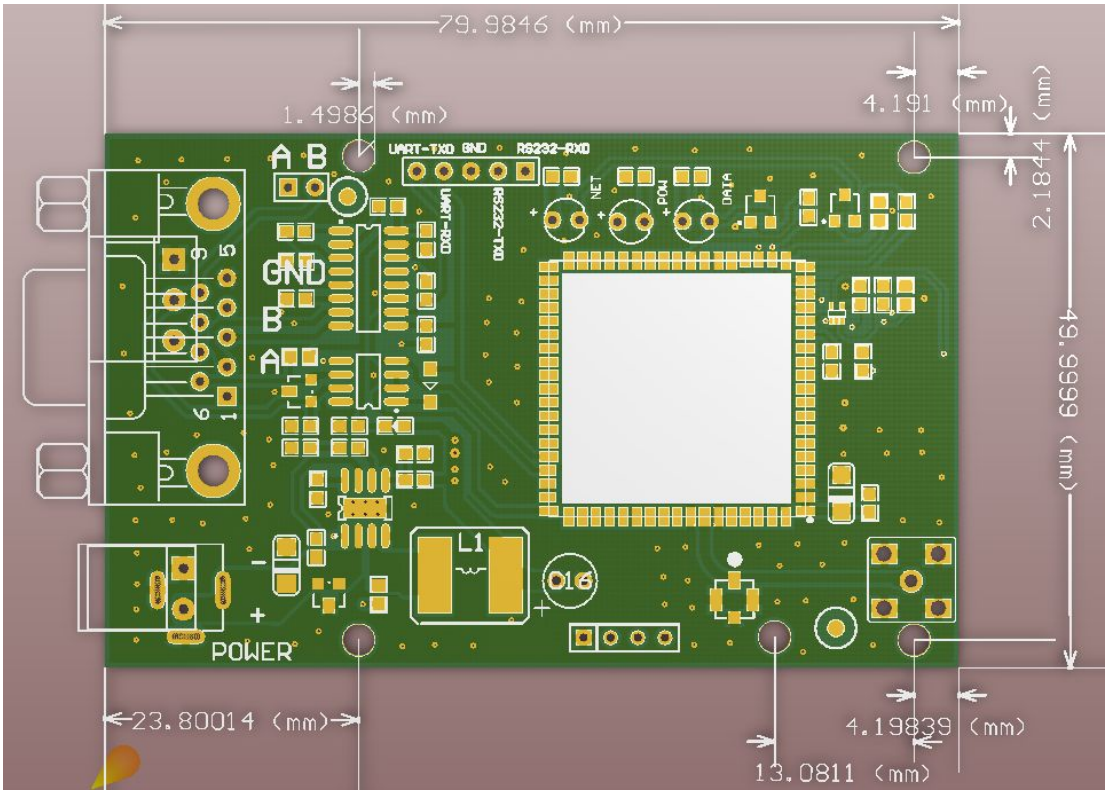
The models made of aluminum alloy shell (user orders can not use the shell as long as the internal PCB board), the screw hole location to install, suitable for installation in the chassis.

| 参数 | 详细描述 |
|---|---|
| **POW** | 9~18V； |
| **PORT** | POWER/RS232/RS485 |
| **Antenna** | SMA antenna connector inside the outer screw hole |

Product Size :




Without housing product positioning holes and dimensions:



### 3.3.4 USR-GPRS232-710

USR-TCP232-710 with RS232 interface and RS485 interfaces. Users do not need to switch modes, fully adaptive. RS232 data interface with DB9 female connector. RS485 interface for pluggable terminal 5.08-3 data interface.

The models of high quality housing Adam, with rail mounting guides for rail mounting use.

| Parameters | Description |
|---|---|
| **measurement** | 103 * 72 * 30mm |
| **POW** | 9~18V； |
| **PORT** | POWER / RS232 / RS485 |
| **Antenna** | SMA antenna connector inside the outer screw hole |

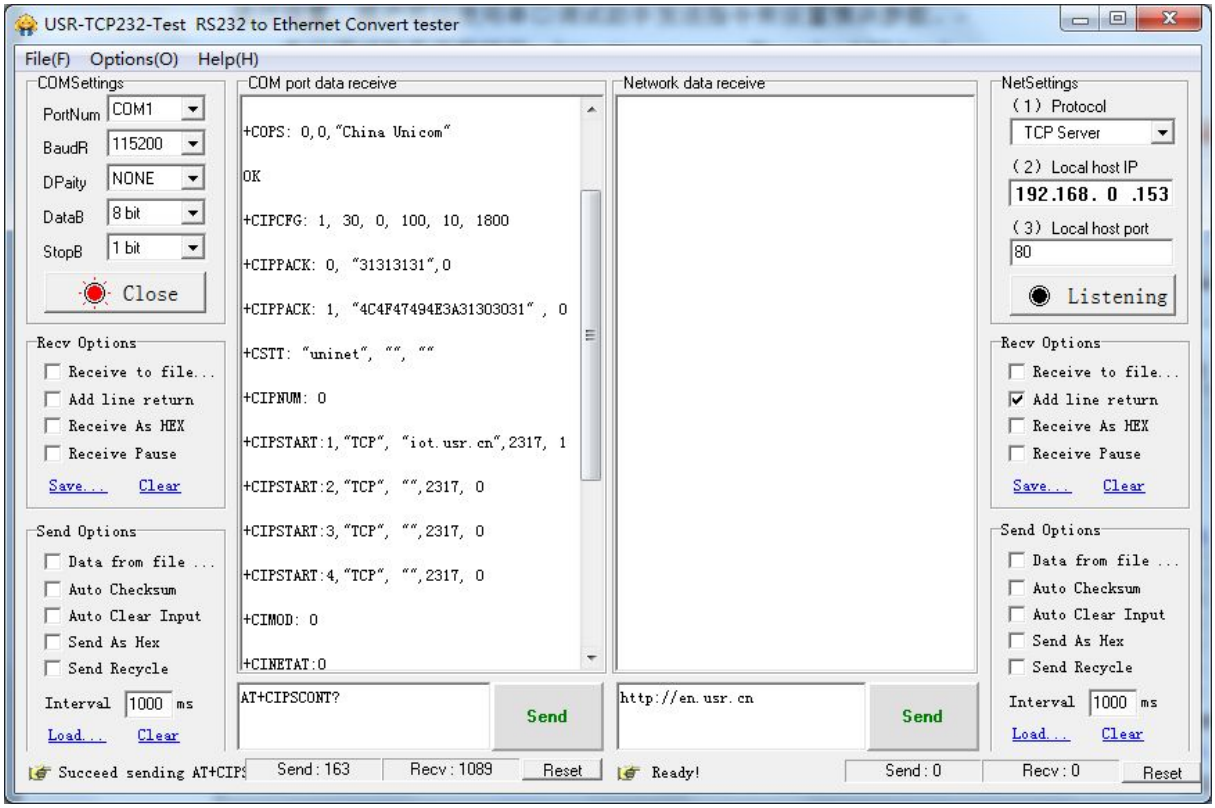
Products shown:

# 4 Set Methods

## 4.1 Use AT command set parameters

USR-GPRS product family supports standard AT command set, and it was extended AT command set, you can use the command module of the operating parameters to be set. Users can use the serial debugging assistant to send commands to set the module parameters.

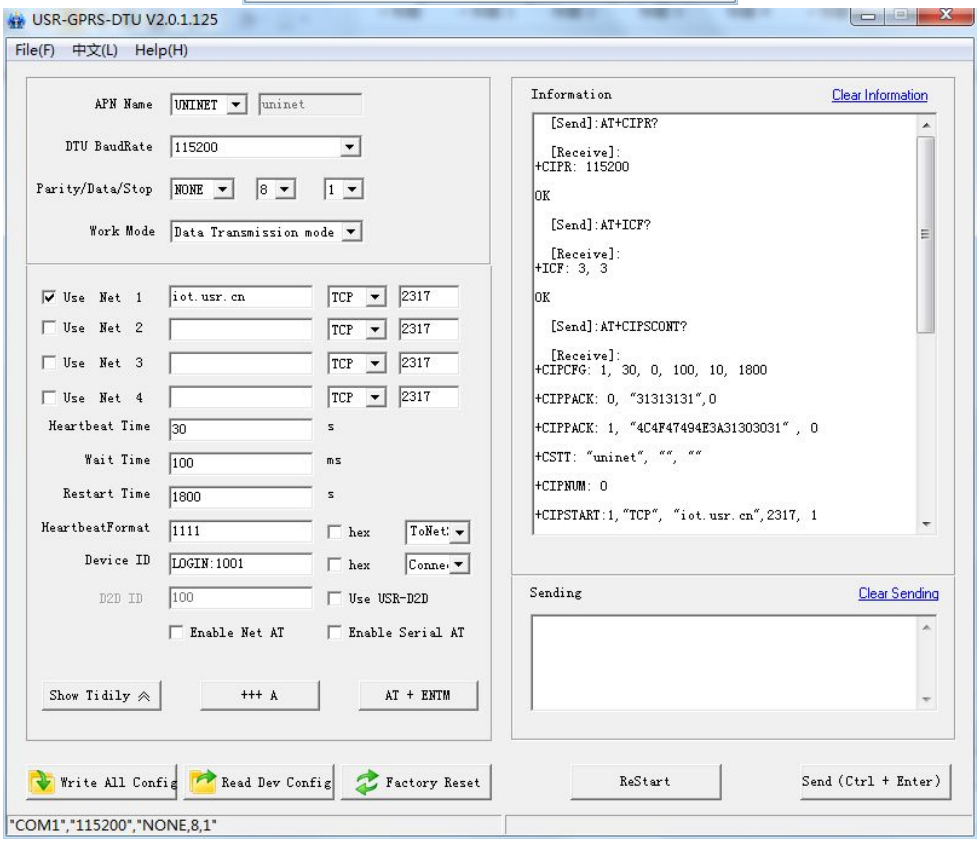
AT command set download link: **http: //www.usr.cn/Download/187.html**



# 4.2 setup software to set parameters

USR-GPRS products have a dedicated set of software module parameters are set, the user can set the software products that do DTU parameter setting, serial data debug and other operations.

Set software download link: **http: //www.usr.cn/Download/113.html**


**Setup software consists of five parts:**

APN information common parameter setting area is used to set the DTU work, serial port parameters and operating modes.

Operating mode corresponding parameter setting area is used to set the parameters corresponding to the operating mode.

Provides the setting function button area / reading parameters, and the Send button to send commands to restart the test information by sending a window.

Serial reception window to receive information sent from the DTU to the serial port of the computer data;

Serial messaging window can be edited through the serial data is sent to the DTU.

About the meaning of the module parameters that can be set, refer to " **operating modes Introduction** " Description chapter.

## 4.3 Other setting methods

DTU in the data transfer mode, supports SMS AT command set to send information / check work status / query operations such as setting parameters, send AT commands via SMS to DTU, DTU will be like in the serial execution of AT commands sent by the user to perform the same command and returns SMS report the results.

DTU After enabling serial AT command / network AT command functions, you can use SMS to send AT commands similar format to use the serial / network to send AT commands, similar to the effect of the implementation of the serial port to send commands directly.

### SMS AT commands:

SMS AT commands, the format is "PSW, CMD", PSW indicates the password, CMD, said specific instructions, PSW's factory default setting is "admin", and the CMD command refer to the "USR-GPRS232-DTU-AT command set" and the other on describes instructions.

## Serial AT commands and network AT commands:

Serial AT commands and network AT command, when the module is operating in transparent mode data, supported by two extensions.

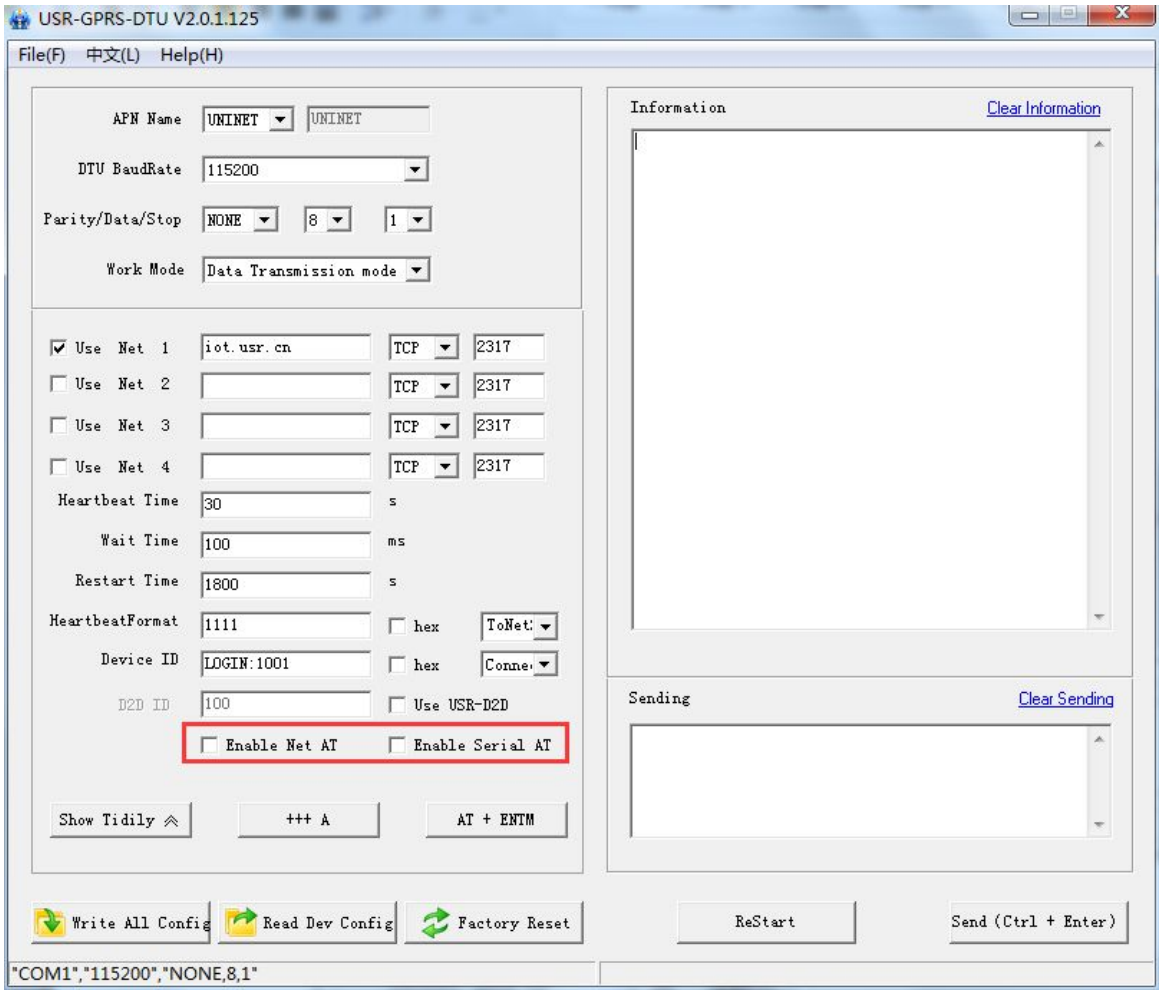
Which, after serial AT command is enabled, you can transfer data through the serial process, using a specific packet header to send AT commands to the command module to modify parameters, sending alarm messages and other operations;

AT instruction realize network functions and serial AT commands similar server can send the next packet header specific instructions to send AT commands to the module to operate other operating module to modify parameters.

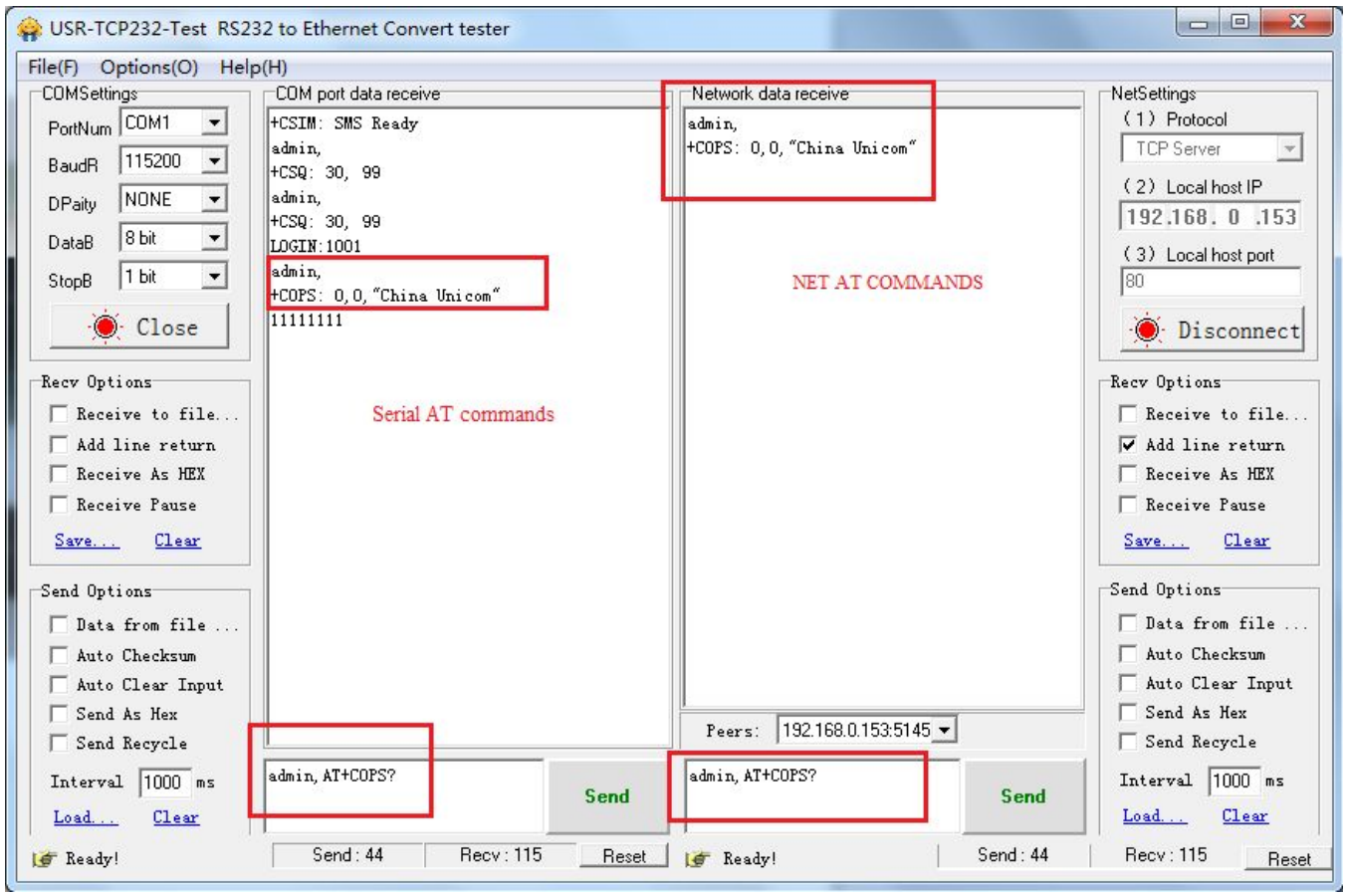
To use the serial port or network AT command AT commands, you need to enable this feature, enable the method: Method One,When the module start ，with in five seconds, through the serial port to send "AT + CINETAT = 1 <CR>", enable the network AT command functions; via serial port to send "AT + CICOMAT = 1 <CR>", enable serial AT command functions.

When the module is operating in transparent data transfer mode, which can use the "PSW, CMD" format to send AT commands to set or parameters of the DTU to read, send text messages and other operations.

The second method is set when using the setup software module for transparent transmission mode, select Settings area below the operating mode "Full Display", after the screen, select the check box corresponding functions.



Serial AT command NET AT command



# 5 operating modes Introduction

## 5.1 Data passthrough mode

The basic function of the data transparent mode is the serial data received will be forwarded to the public network server module is connected to the public network to forward data sent by the server to the serial port to exchange data between the user and the public network serial device server.

**Parameters data transparent transmission mode is in effect are:**

1 APN account

APN account used to notify the network operator when the appropriate network information to establish a network connection. The network currently in use requires the user to be set according to information provided by the operator.

2 the serial port parameters

Serial port parameters for baud rate, data bits, parity and other information set serial module working.

3 the operating mode

Set module in transparent mode data.

4 the network connection information

Connection information setting module connected to the public network server, including whether to enable the connection of the domain name / IP address, network connection type (TCP / UDP) and destination port four parameters, our products support up to four network connections simultaneously online (can not be used as a backup server), so there are four connection setup software information to fill in the area.

5 heartbeat time

Time is the heartbeat heartbeat packet data transmission interval. In the case of DTU heartbeat packet is not received serial data, and the network does not receive data to send heartbeat heartbeat packet time interval data. For maintaining network connectivity.

This parameter is the recommended 30 to 60, to 0 to disable heartbeat.

6 serial packing time

Serial packing time refers to the serial port of DTU within this time no new data is received, it will have received data package sent to the network.

This parameter is the recommended 10 to 100.

7 automatic restart time

Automatic restart time is the time, DTU is not received within a set time to network data, it does not receive the serial data, then automatically restart. This parameter is the recommended 600 to 1800, Less than 600 to disable this feature.

8 heartbeat packet format

Heartbeat packet format for 40-byte random characters, the user can set, for the maintenance of the network connection.

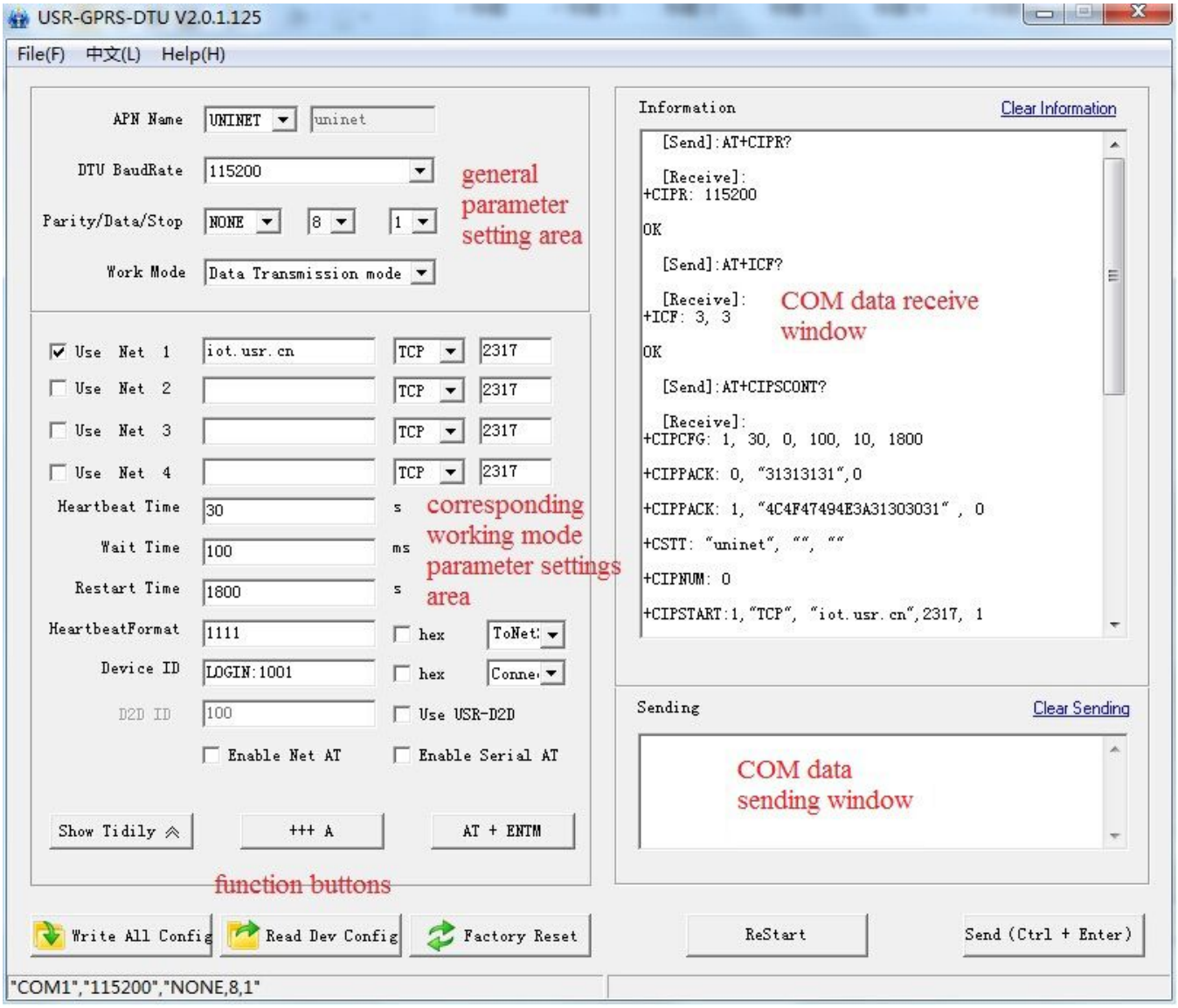
If do not need this feature can be set to empty the contents of the package heartbeat.

9 registration packet format

Sign up for 40-byte packet format any character, DTU module establishes the first packet network connection

automatically sent. Registered users can set the contents of the package, this parameter is used to identify the different public network server connections initiated DTU modules for different DTU module mark.

This function does not require such registration packet contents can be left blank.



**Special Features:**

1 A heartbeat packet to the network transmission / heartbeat packet sent to the serial port

You can choose to send a heartbeat packet direction, if you set the heartbeat packet is sent to the network, the heartbeat package for maintaining a connection; if you set the heartbeat packet is sent to the serial port, the heartbeat packet data device can be set to read instructions, instructions for acquiring fixed The user equipment device to capture user data, to reduce the burden on the data server.

2 The connection is made registration packet / data with registration packet

Registration packets can choose to send the way, if you set the connection that is made for registration package, DTU module connected to the server when establishing registration packet that is sent to the server, the user can register the server program package to identify the binding is currently connected to do; if set of data with registration packet, the serial data received by DTU will increase after registration packet header data is sent to the user server to do data recognition.

3 Enable network AT commands

After enabling network AT commands, which can be in a specific format to send commands via the server in passthrough mode to modify parameters DTU module.

4 Enable the serial AT commands

Enabling serial AT commands, in transparent mode which can be used to modify the parameters of a specific format DTU module to send commands through the serial port, send text messages and so on.

## 5.2 Serial Command Mode

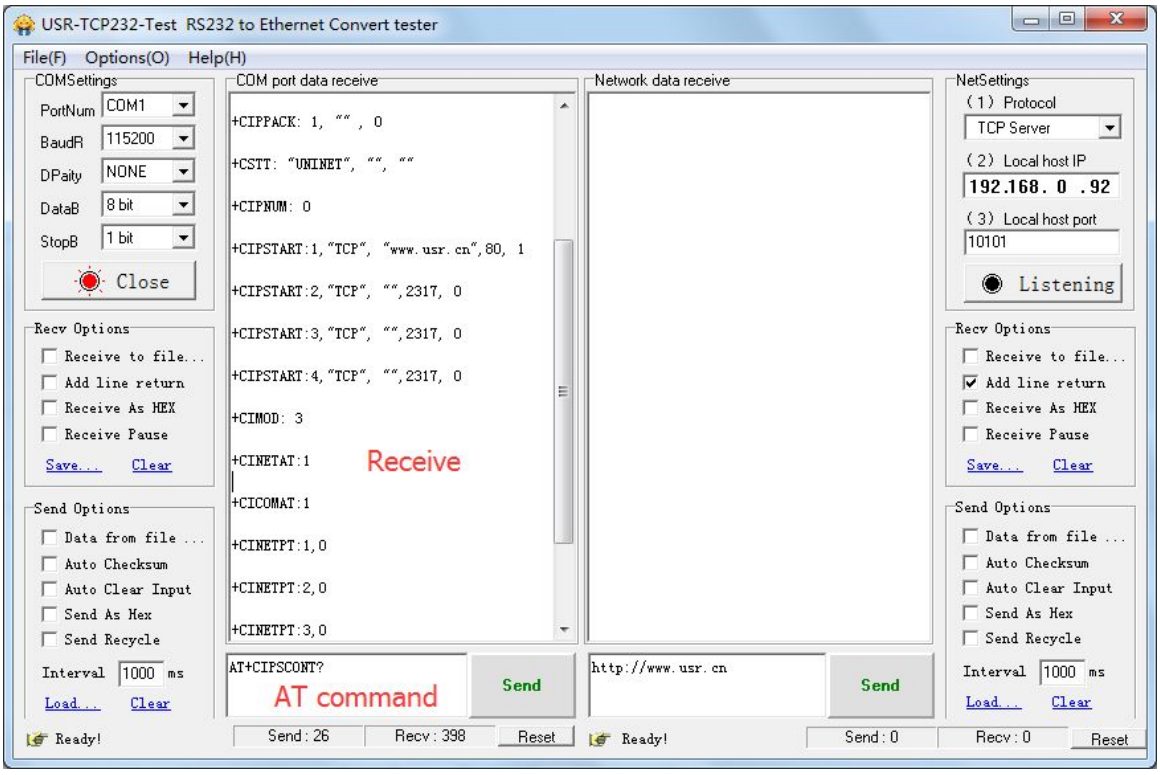
Currently serial command mode functionality being improved in our company.

## 5.3 AT command mode

DTU module in the AT command mode, AT commands can be sent via SMS, to establish a network connection, data transfer and other operations.

In this mode, the user's device to DTU module has complete control over, you can support the instruction set of modules corresponding operation.

Under the AT command mode supports AT command set, please refer to: **http: //www.usr.cn/Download/187.html**



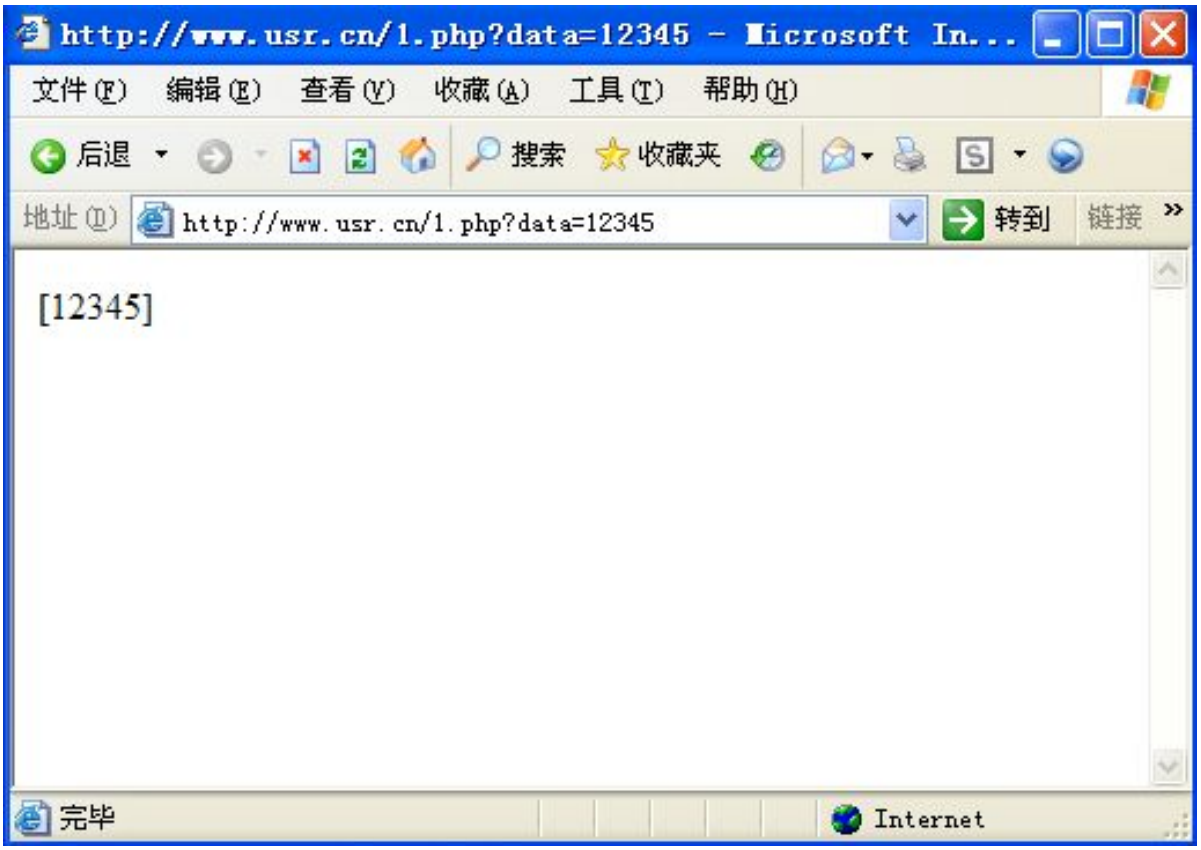
# 5.4 HTTPD CLIENT mode

In HTTPD Client mode, DTU module to TCP Client mode to connect to the WEB server initiative set by the user (you need to set the domain name / IP and port number), and the PHP script sent by the user to send HTTP GET format WEB server, this way to operate WEB server data and return the results to facilitate embedded web applications in PHP programmers.You need to set the next HTTPD CLIENT mode parameters are as follows:

**For example:**

We build a web developer, adding this sentence [<php echo $ _GET ['data'];??>], Represents the contents of data obtained from the HTTP Client requests.

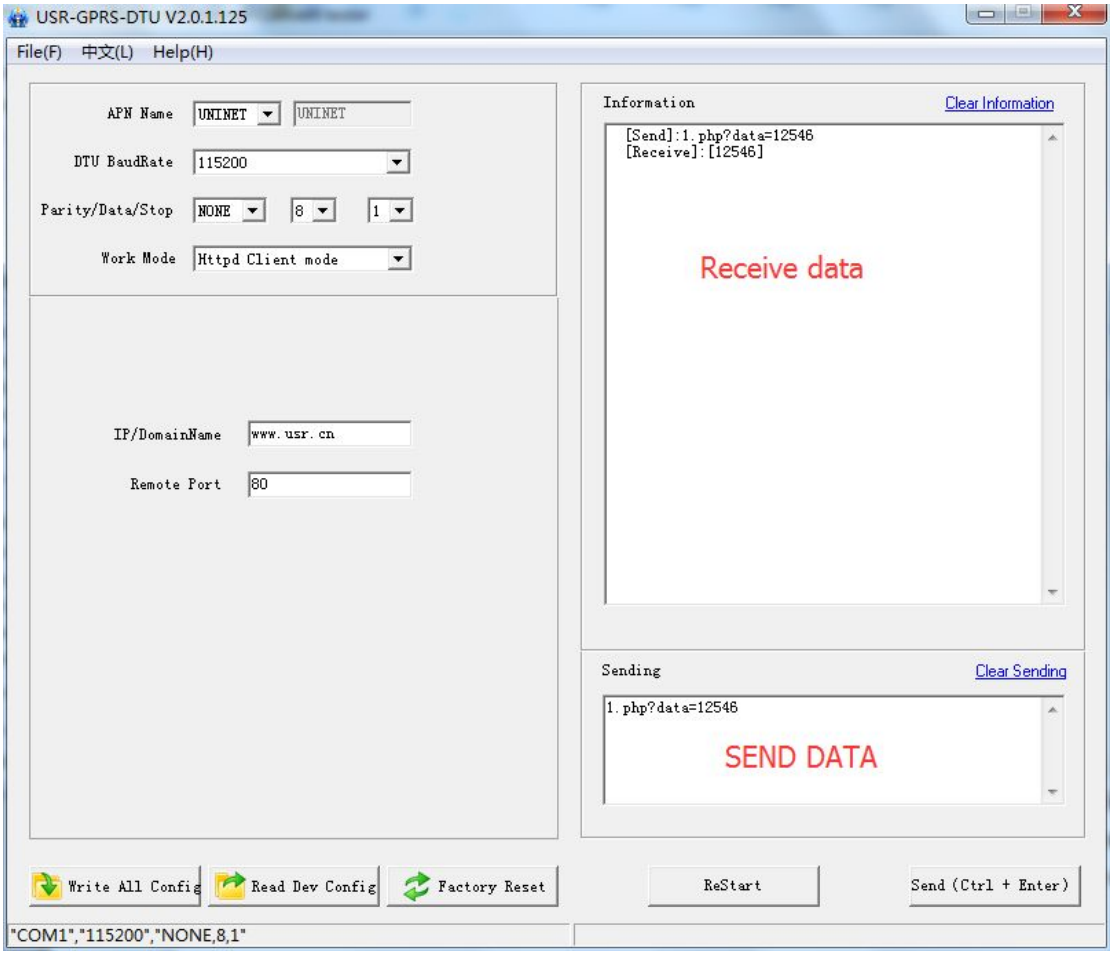
Open your browser and enter: www.usr.cn/1.php?data=12345 then press Enter to open the following pages, pages 12345 to get data request command.



Then put it another way, using the DTU module to do the job:

Set DTU module parameters: Operating mode: HTTPD Client mode, the purpose of IP / domain: www.usr.cn, protocols: TCP, destination port: 80, DTU configuration parameters and restart the DTU;

Open serial debugging software, send window to send HTTP code and data are as follows:

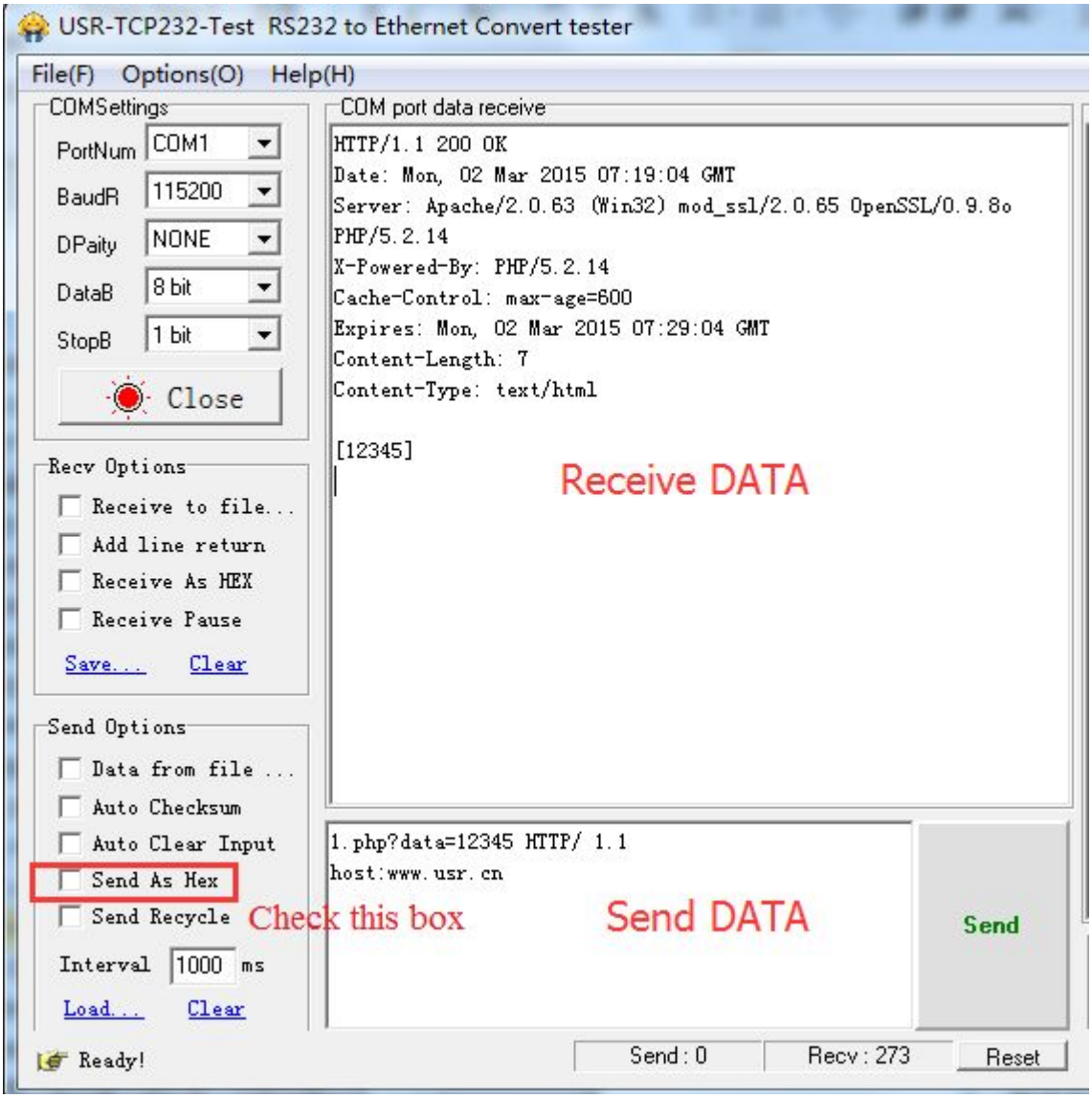



DTU module do HTTPD Client request web data

**Note:**

1, Httpd Client functionality is essentially based on TCP Client functions on doing Http GET package.

2, the current module is only on the basis of PHP user messages sent through the serial port on the added GET header, did not add HEAD header and version information, if the user build their own PHP server, you need to use the following message formats:

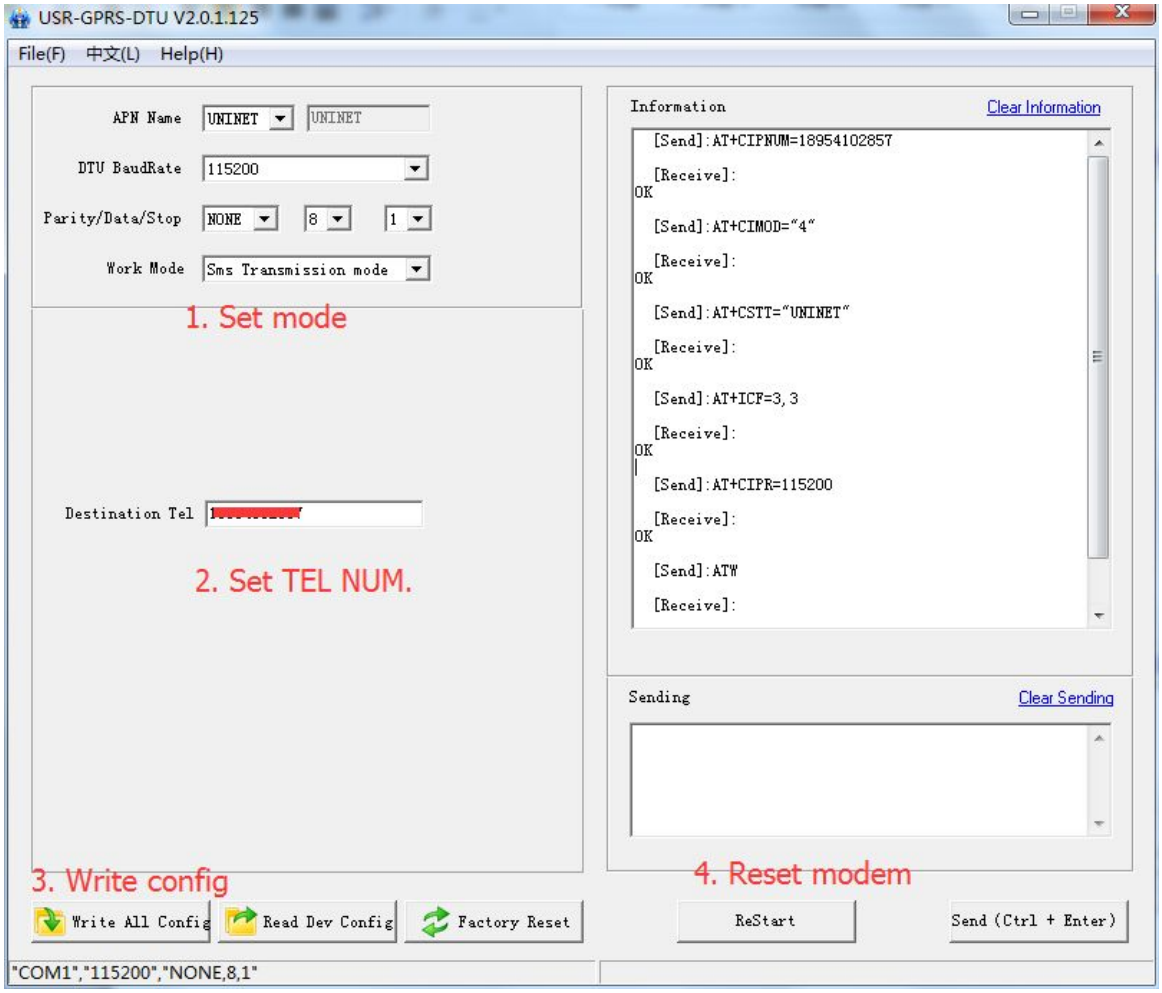


## 5.5 SMS passthrough mode

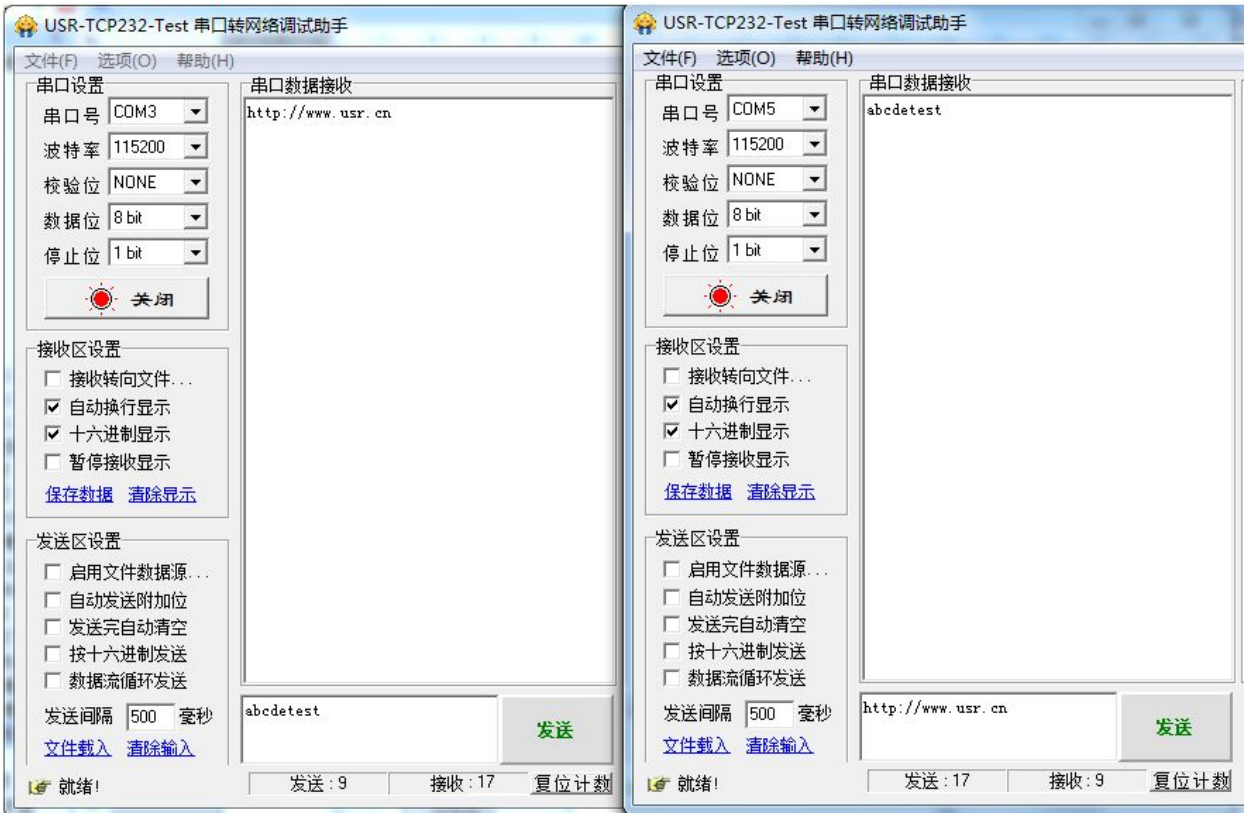
SMS module works in transparent mode, you can set a number for information purposes, and the number of the SMS content delivery set, the module receives data from the serial number and sent for information purposes, the purpose of receiving information from the information sent through the serial numbers and to the user equipment to achieve stable transmission of small amounts of data between user devices, generally applicable to the short message control, data, alarm and other occasions.

In transparent mode SMS, send and receive SMS in the format of English characters and numeric characters, does not support Chinese; in accordance with the content of messages received via the serial port passthrough reception format, do not do format conversion.

Under SMS passthrough mode supports setting a target number, the module only receives messages from the destination number, and only send text messages to the destination number, set the command to "AT + CIPNUM = PHNUM <CR> <LF>", which indicates that the destination number PNUM .



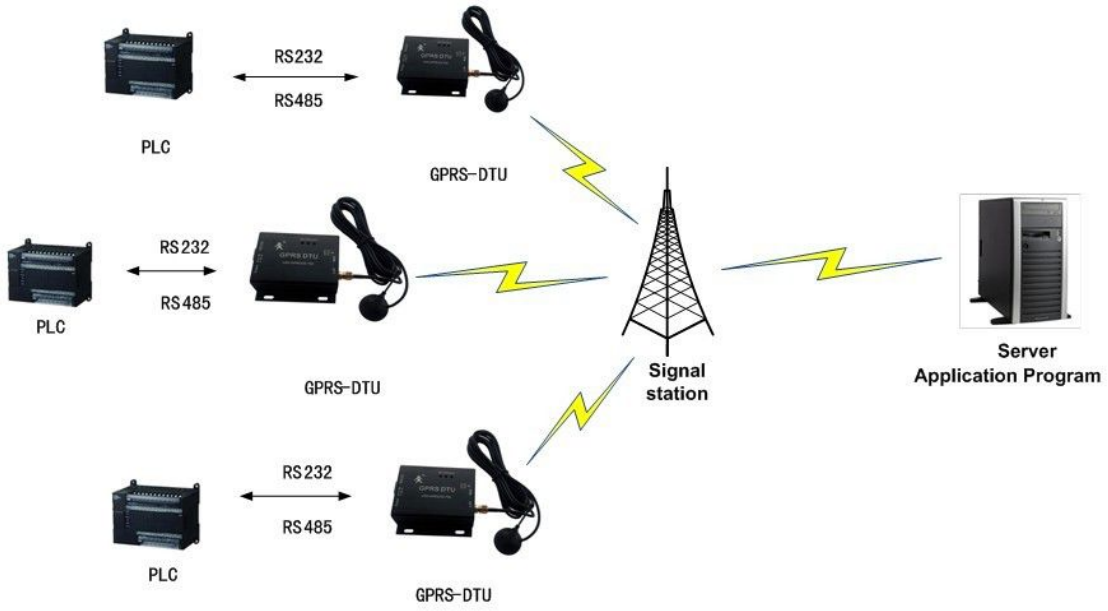
An example of SMS passthrough mode:



# 6 Application Chart

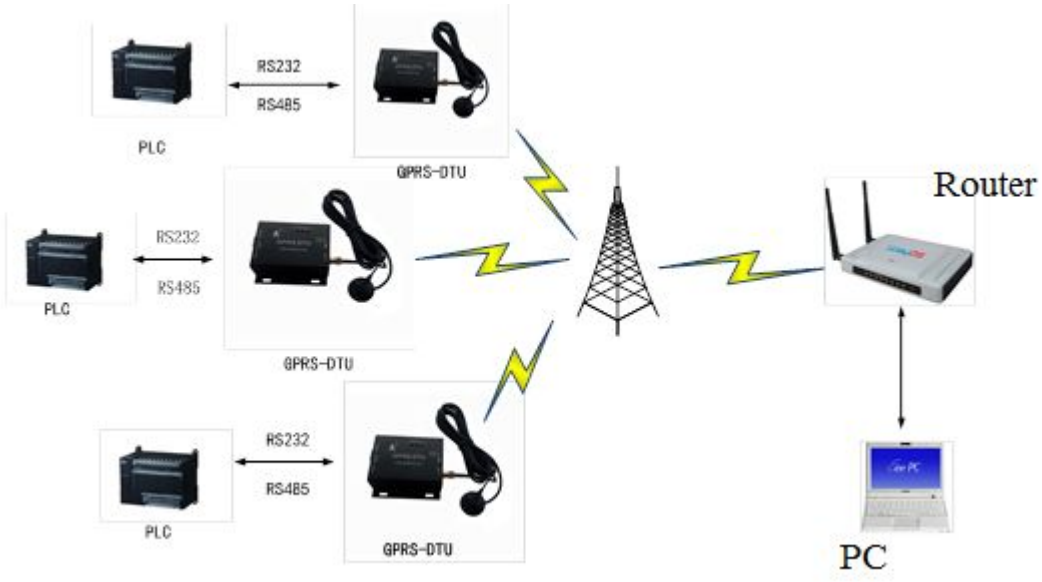
## 6.1 There are a public network server applications

Application of network server is one of the most important applications of DTU. Users set the module's connection destination address as their own server. Then run the corresponding monitoring / detecting software on the server to receive data from the production equipment through DTU, and send the control instructions forward to the production site of the device through the GPRS network, to realize the simplification, standardization, centralization of remote equipment management. The company provides free virtual serial port software, so as to simplify the server's software programming. If the production / monitoring / detecting software is based on the serial port, with the free virtual serial port software you can upgrade the whole system without change, to realize intelligent, networked management of production monitoring at low cost.



## 6.2 router class public transit server applications

By using the dynamic domain name + public network IP addresses of the router + port mapping + PC to build application environment, users can achieve the same function with the public network server. With a lower cost to build production monitoring environment, small and medium enterprises could choose this way of building / upgrading their system.

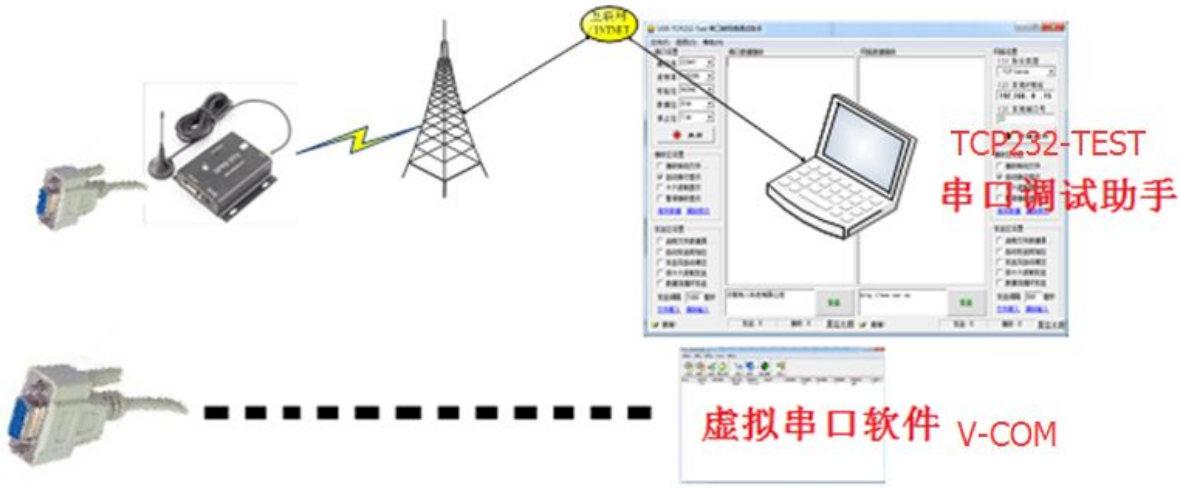



## 6.3 virtual serial port for remote applications

The DTU module of our company and other products all support the virtual serial port to realize remote serial port application. The module supports RF217 function, when using virtual serial port. This function can support dynamically changing the serial port parameter, almost no different to actual serial port , can also set the baud rate, data bits, stop bites, parity and other parameters, and the GPRS module serial and virtual serial port will change parameters at the same time. This method greatly enhances the flexibility of use, has good application value

The details to use DTU working with virtual serial, please refer to application documents of CD.

DTU working with virtual：




Note: The figure above, the upper part of the connection to the server, said DTU actual network topology; lower half represents the user serial applications, DTU virtual state.

# 7 FAQ

## Module does not send a message to the serial port after power

1. Check the power supply module is normal: POW lights lit, NET lights flashing.
2. Check the serial connection is normal: cable good contact.
3. Other parameters to check the serial debugging assistant opened the serial number is consistent with the actual serial port.
4. Open the serial port using a serial debugging assistant, re-energized to DTU module to observe whether there is return information.
5. if you use the setup software no return, use debugging assistant to return, the setup software / current port does not work in the current computer, try to replace a computer or serial retesting.

## Module constantly reboot

1 constantly restart performance.
2 Check the power supply is normal: Recommended use 12V / 1A power supply.
3 to confirm whether connected to the antenna, in the absence of the antenna, the difference signal quality easily lead to the restart.
4 Confirm SIM card is inserted, SIM card is normal. If the module does not recognize the SIM card, the module will restart.

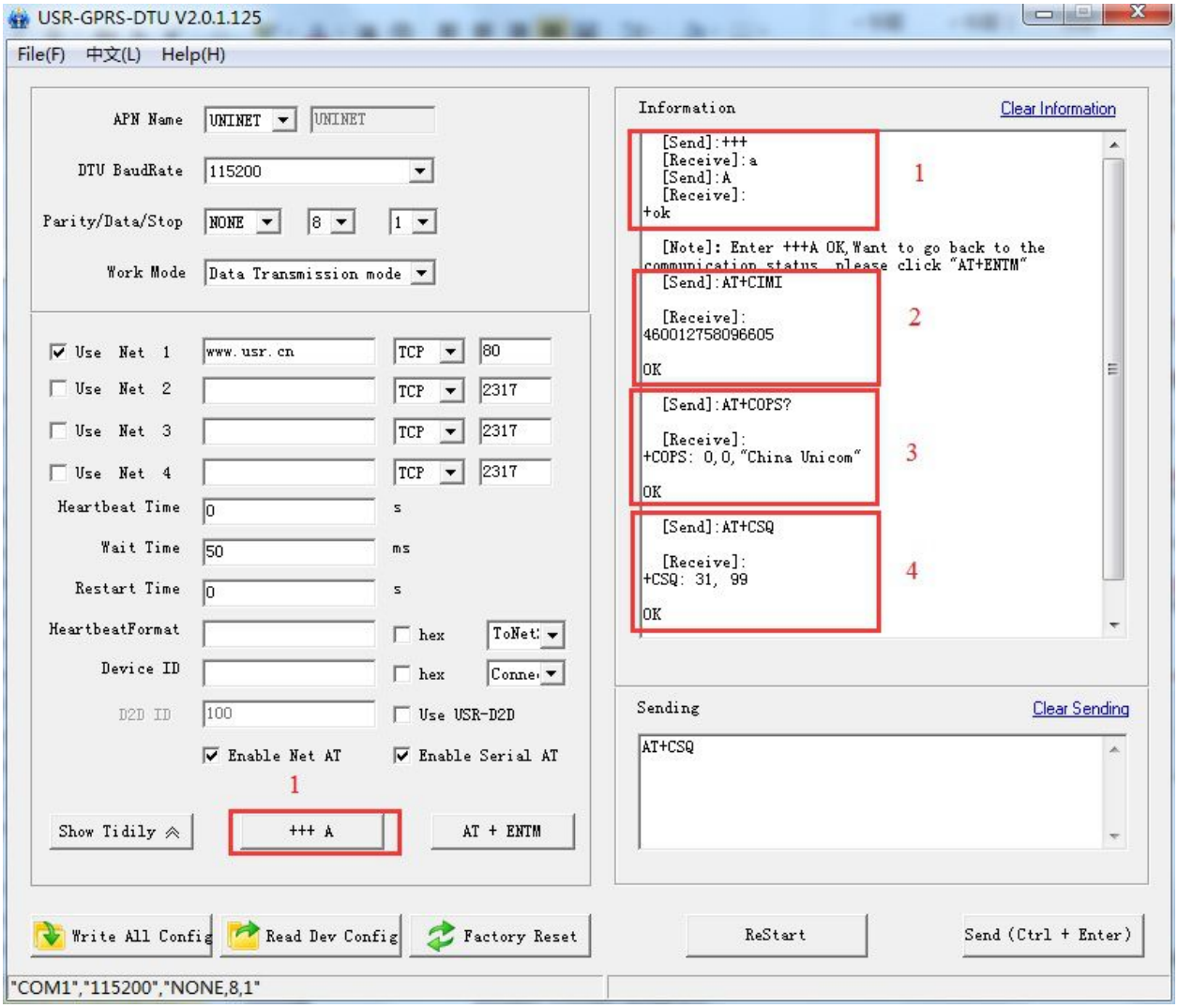
## Unable to establish a network connection module starts

1 Check the module start properly: POW lights, NET lights flashing.

2 Check that the SIM card is correctly identified: Send AT + CIMI <CR> module returns the serial number of the SIM card IMSI identifying normal; if not return any information, you try to switch to AT command state by serial +++ / a mechanism; re send commands.

3 Check whether the module is mounted to the GSM network: send AT + COPS <CR>, the module returns the network parameters are hanging mount normal.

4 Check the module signal strength, signal strength is greater than 15 modules that can be properly connected to the server.



## Modules can not be configured through the serial port parameters

First make sure the module is energized and normal work, and secondly to determine the module and the computer to open the serial port parameters match the serial parameters (baud rate parameter configuration module factory 115200, no parity, 8 data bits, 1 stop bit); check the serial cable is normal, whether serial port can be used normally.

I set up the company's software is currently not open correctly in some systems, the serial port, use the serial debugging assistant to send AT commands to test whether it is normal.

You can not configure the module parameters via SMS

Check module plug the phone card is plugged in, the module is powered on, the signal is normal; check the phone card supports SMS.

# Contact

Company: Jinan USR IOT Technology Limited
Address: Floor 11,Building1,No.1166 Xinluo Street,Gaoxin Distric,Jinan,Shandong,250101 China
Tel: 86-531-55507297, 86-531-88826739
Web: **http://www.usriot.com**
Support : **http://h.usriot.com**
Email: sales@usr.cn

Some vision: first domestic network communications brand
Corporate culture: people in serious work!
Product concept: simple, reliable and reasonable price
Someone's Creed: Virtuous Him and grow together

# Update History

2013-12-15 version V1.0 build
2014-03-10 version V1.1 update, modify the settings of the software, improve product function description
2014-04-10 version V1.2 update, correct network connection error description, improve product features, improve product features Description
2014-05-14 version V2.0 update, re already perfect product descriptions based on the description of product features, errata, FAQs Documentation
2015-02-01 version V3.0 update, re-edited in accordance with the new features, such as user feedback and corrections to the product manual
2015-09-17 version V3.1 update, delete some outdated information