USR-G785-E User Manual

File Version: V1.0.3

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Features

- ■ Support TCP Client and UDP Client
- ■ Support register package and heartbeat package
- ■ Support setting parameters by SMS
- ■ Support net transparent transmission mode and UDC mode
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1. Get Start

USR-G785-E is a product developed for serial devices and network servers to transmit data to each other. With simple AT instructions, it is easy to use this product to realize two-way data transparent transmission from serial port to network.

This chapter is a quick introduction to the USR-G785-E product. New users are advised to read this chapter carefully and follow instructions to get a systematic understanding of the product. Users can skip this chapter if they are familiar with such products. Refer to the subsequent chapters for specific details and instructions.

This chapter mainly tests the G785-E network transmission function, that is, the data transmission between the serial port and the TCP Server terminal.

Technical support: h.usriot.com

1.1. Hardware Test

1.1.1. Hardware Preparation

If you have purchased it, you will have the following accessories:

Figure 1 accessories

Data flow topology:

Figure 2   data flow topology

Before testing, please do the hardware connection as shown below.

1.   Connect G785-E and PC with USB-RS232 serial cable;
2.   Install antenna;
3.   Install SIM card;
4.   Power on G785-E with 9-36V DC power supply.

1.2. Data Transmission Test

1.2.1. Initial Parameters

Table 1 default parameters

Work mode	Network data transmission
Server address	test.usr.cn
Server port	2317
Serial parameters	115200,8,1,None
Command port	RS232

1. Connect to the computer serial port with the above connection mode. To set up the software, first select RS232's serial number, baud rate and other parameters, and open the serial port.

Note: please keep the factory parameters during this test.

2. Power supply USR-G785-E with the power adapter configured by our company. POWER lights turn on, WORK lights flicker, wait for GPRS and LINKA lights to turn on, proceed to the next step. Please refer to the following chapters for instructions.

3. When the LINKA lights up, send data to the module through RS232 serial port, for example, send "www.usr.cn", later in the software receiving window, receive "www.usr.cn", which is returned by the test server, the test is successful.
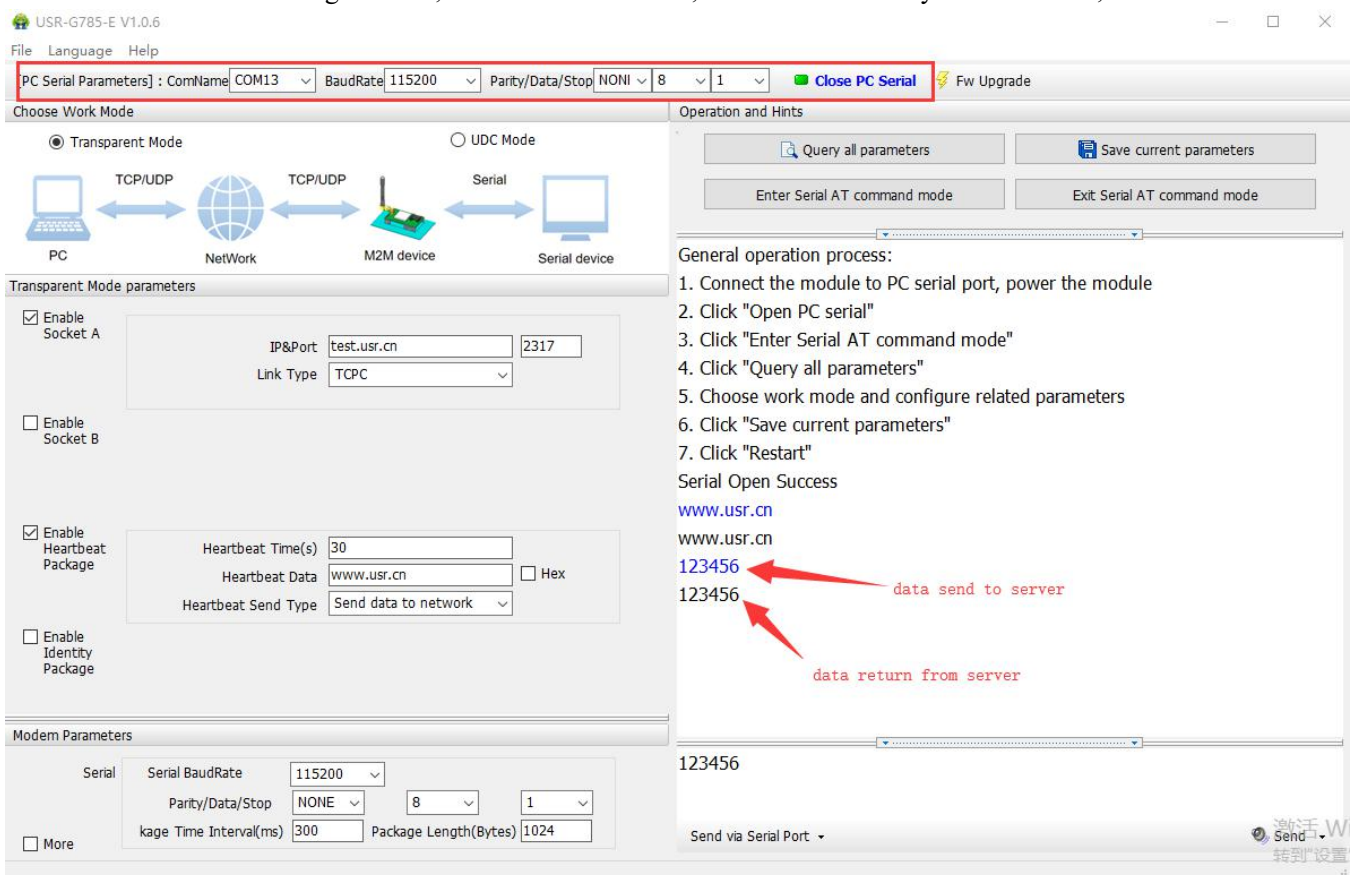

Figure 3 setup software

2. Product Overview

2.1. Product Introduction

USR-G785-E is the M2M product launched in 2018. European band .The software has perfect functions and covers most of the conventional application scenarios. Users can realize two-way data transparent transmission from serial port to network by simple settings. It also supports custom register packages, heartbeat packages, two-way Socket connections.

2.2. Module Default Parameters

Table 2 default parameters

	Item	Index	
Wireless parameters	Wireless standard	TDD-LTE，FDD-LTE，WCDMA，GSM	
	Standard frequency range	TDD-LTE	B38/B40/B41
		FDD-LTE	B1/B3/B5/B7/B8/B20
		WCDMA	B1/B5/B8
		GSM	B3/B8
	Transmitting power	TDD-LTE	Class 3 (23dBm±2dB)
		FDD-LTE	Class 3 (23dBm±2dB)
		WCDMA	Class 3 (24dBm+1/-3dB)
		GSM　Band8	Class 4 (33dBm±2dB)
		GSM　Band3	Class 1 (30dBm±2dB)
	Technical specifications	LTE	Maximum support for non-CA CAT 4 Supporting 1.4~20MHz RF bandwidth Downlink support for multi-user MIMO TDD: maximum up 35 Mbps, maximum down 130 Mbps FDD: Maximum upstream 50 Mbps, maximum downstream 150 Mbps
		WCDMA	Supports 3GPP R8 dc-hspa + Supports 16-qam, 64_QAM and QPSK modulation 3GPP R6 CAT6 HSUPA: maximum uplink rate 5.76Mbps 3GPP R8 CAT24 dc-hspa + : the maximum downlink rate is 42Mbps
		GSM	R99: CSD transmission rate: 9.6 KBPS,14.4 KBPS GPRS: supports GPRS multi-slot class 12(default 12) Coding formats: cs-1 / cs-1 / cs-3 and

|		cs-4 Maximum 4 RX slots per frame EDGE: Support EDGE multi-slot class 12(default 12)
	Antenna options	SMA interface
Hardware parameters	Data interface	RS232：2400bps - 115200bps
		RS485：2400bps - 115200bps
	Working voltage	DC 9V~36V
	Working current	Average 60ma-86ma Max: 175mA 12V
	Working temperature	-40℃- 70℃
	Storage temperature	-45℃- 90℃
	Size	96.5×70×25mm
Software parameters	Work mode	Transparent transmission mode, UDC mode.
	Set command	AT+ command
	Network protocol	TCP/UDP/DNS
	Maximum TCP connection number	2
	User configuration	Serial AT command， net AT command，message AT command
	Customer application software	Support customized application software
Software function	Domain name resolution DNS	Support
	Simple transmission mode	Support TCP Client/ UDP Client
	Heartbeat	Support
	RFC2217 similar	Support
	Registration package mechanism	Support custom /ICCID/IMEI register package

2.3. Hardware Description

Unit：mm
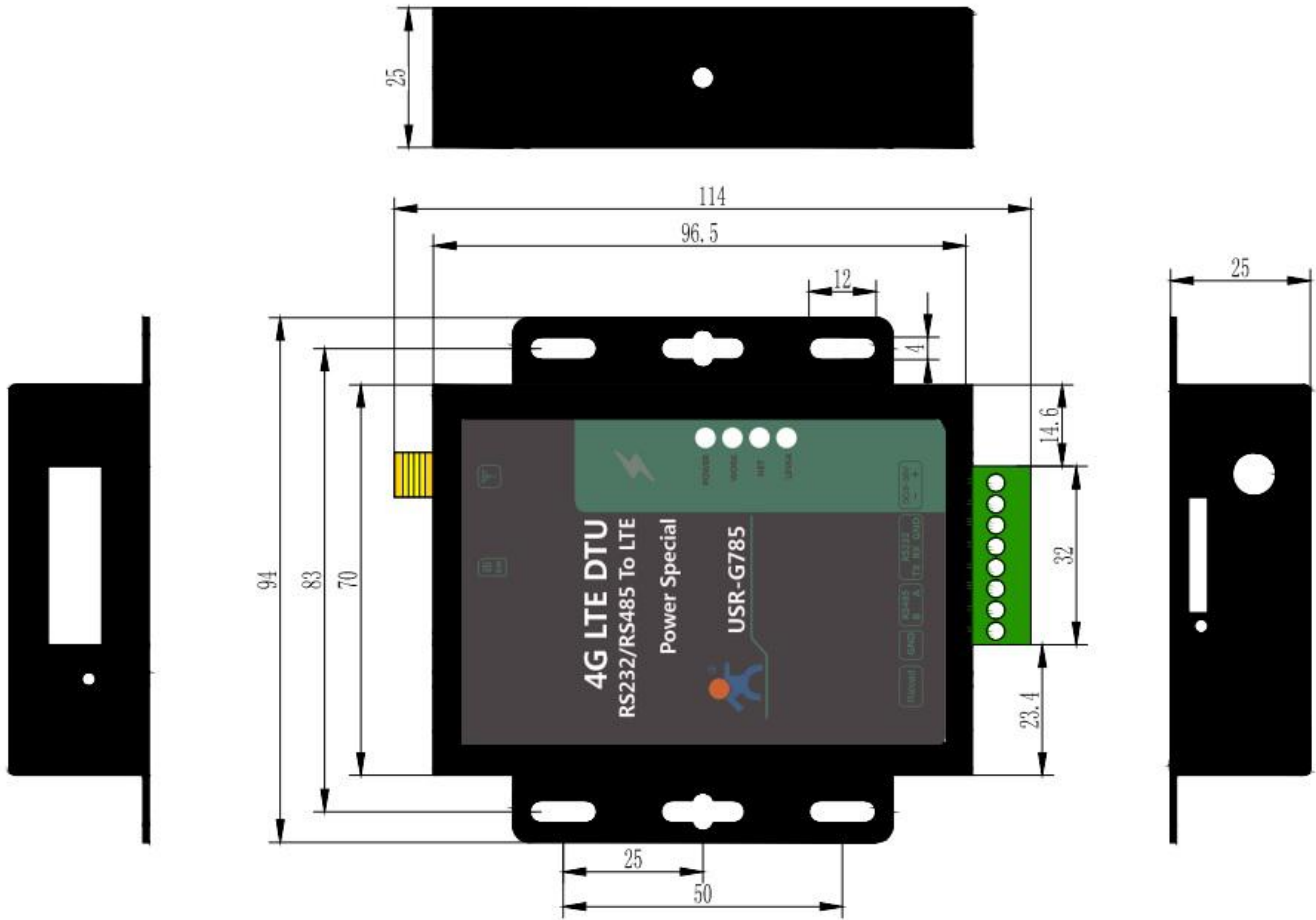
Figure 4 size

2.4. Interface Introduce

Figure 5 USR-G785-E interface

3. Product Function

This chapter introduces the functions of USR-G785-E. The following diagram is a block diagram of the function of the module. It can help you to have a general understanding of the product.
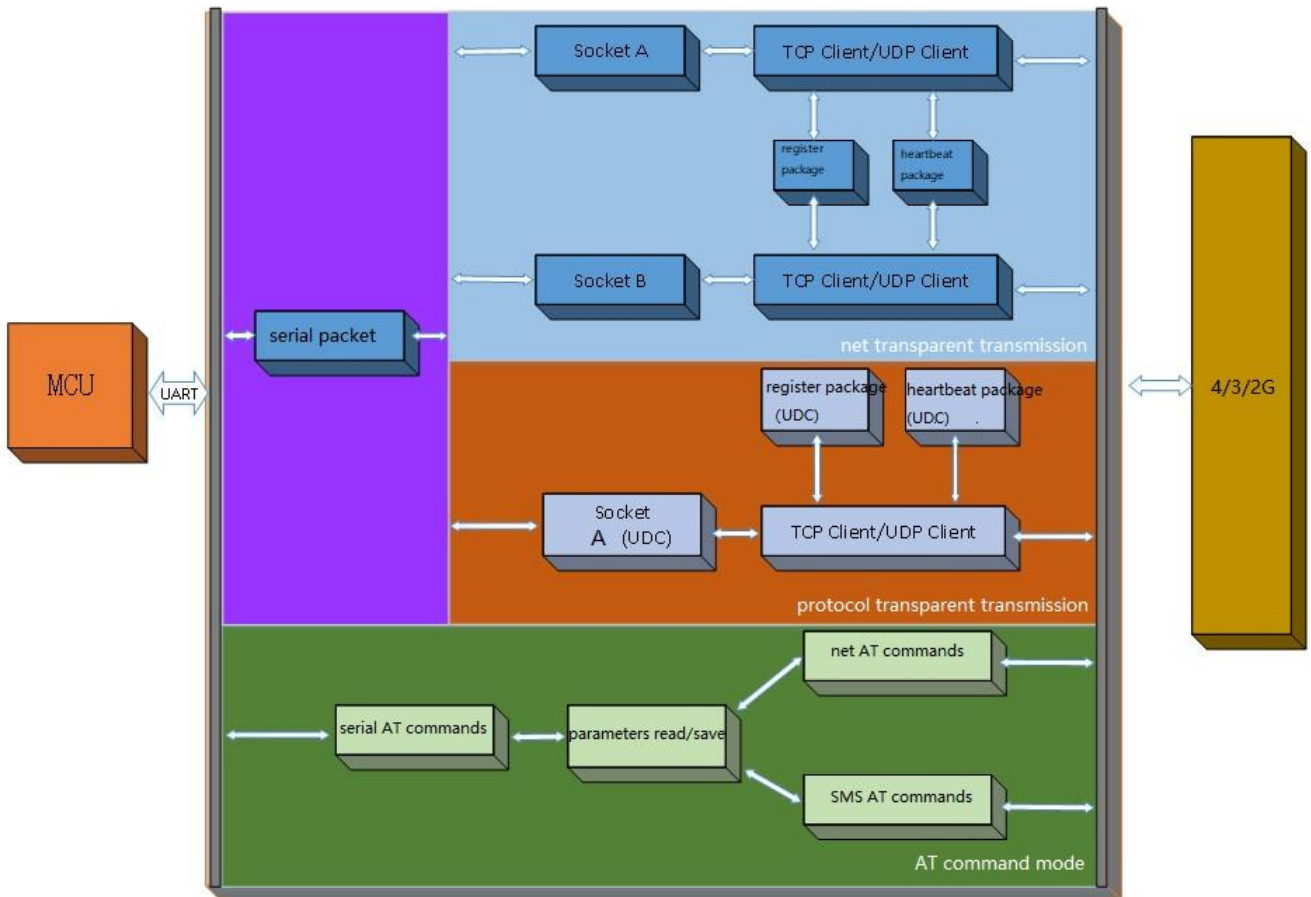
Figure 6 product function

3.1. Work Mode

3.1.1. Net Transparent Transmission Mode
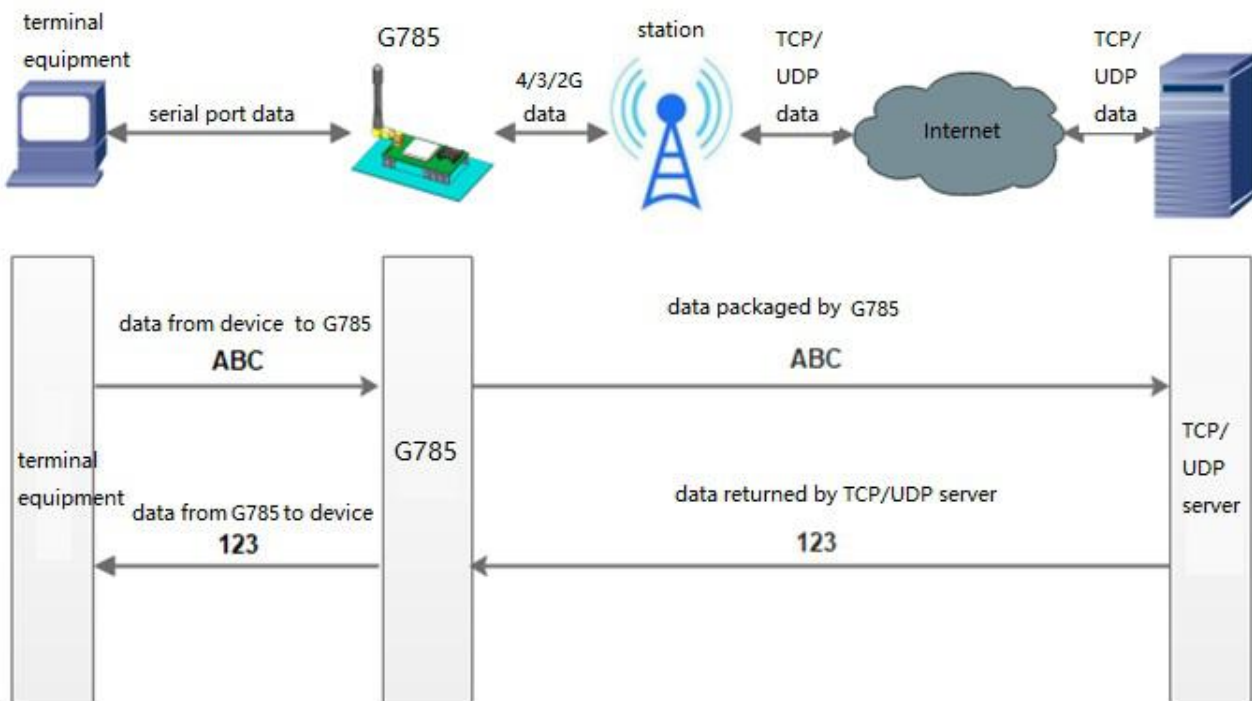
3.1.1.1. Mode Declaration

Figure 7 net transparent transmission mode

In this mode, the serial port device can send data to the specified server on the network through this module. The module can also accept data from the server and forward the information to the serial port device.

Users do not need to pay attention to the data conversion process between serial port data and network packets, only through simple parameter settings, data transparent communication between serial port devices and network servers can be achieved.

This module supports two Socket connections, Socket A and Socket B, which are independent of each other. Socket A supports TCP Client and UDP Client. Socket B support TCP Client and UDP Client

Table 3 AT commands

Command name	Command function	Default parameters
AT+WKMOD	Query / setup work mode	"NET"
AT+SOCKA	Query / setup socket A parameter	"TCPC","test.usr.cn",2317
AT+SOCKB	Query / setup socket B parameter	"TCPC","test.usr.cn",2317
AT+SOCKAEN	Query / setup whether to enable socket A	"on"

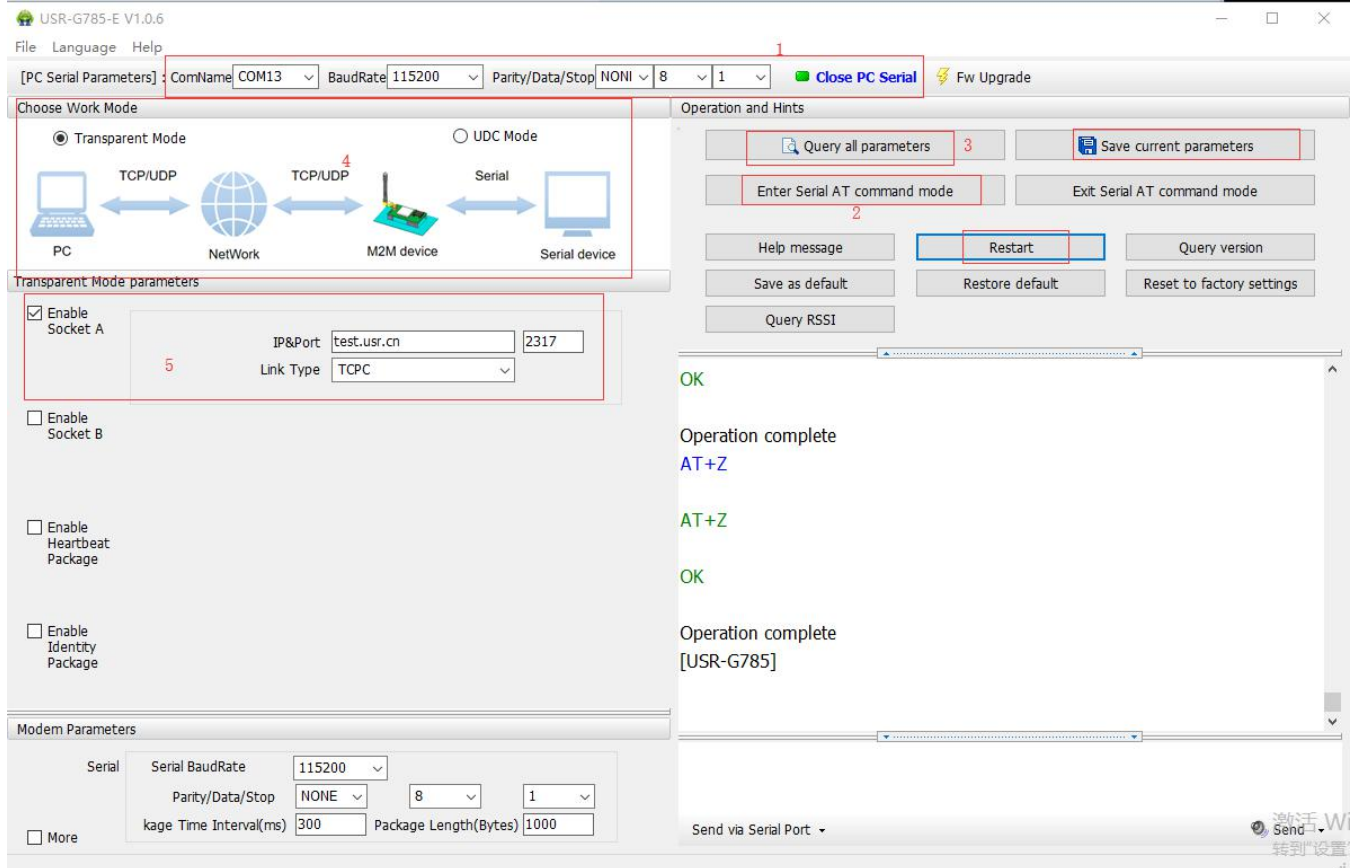| AT+SOCKBEN	Query / setup whether to enable socket B	"off"
AT+SOCKALK	Query socket A connection state	"off"
AT+SOCKBLK	Query socket B connection state	"off"

Setting up software schematic diagram:

Figure 8　setting up software schematic diagram

3.1.2. UDC Mode

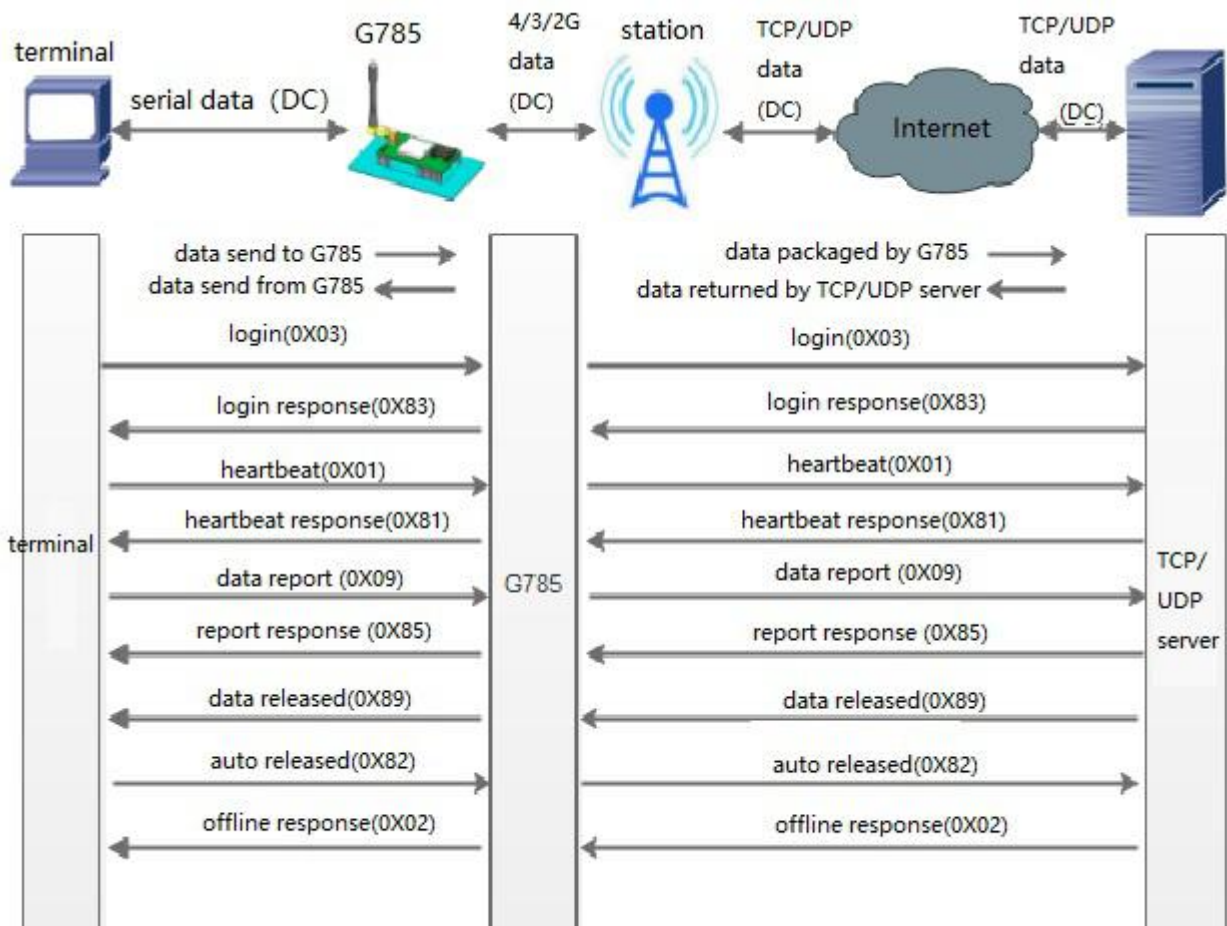### 3.1.2.1. Mode Description

Figure9 UDC mode

In this mode, the user's terminal device can send the request data to the specified HTTP server through this module, then the module receives the data from the HTTP server, parses the data and sends the results to the serial port device.

Users do not need to pay attention to the data conversion process between serial port data and network packets, only through simple parameter settings, can realize the serial port device to HTTP server data request.

Table 4 AT commands

Command name	Command function	Default parameter
AT+WKMOD	Query / setup work mode	"NET"
AT+UDCID	Query/setup protocol transparent device ID	12345678901
AT+SOCKA	Query / setup socket A parameter	"TCPC","test.usr.cn",2317
AT+SOCKB	Query / setup socket B parameter	"TCPC","test.usr.cn",2317
AT+SOCKAEN	Query / setup whether to enable socket A	"on"
AT+SOCKBEN	Query / setup whether to enable socket B	"off"
AT+SOCKALK	Query socket A connection state	"off"

AT+SOCKBLK	Query socket B connection state	"off"

Setting up software schematic diagram:
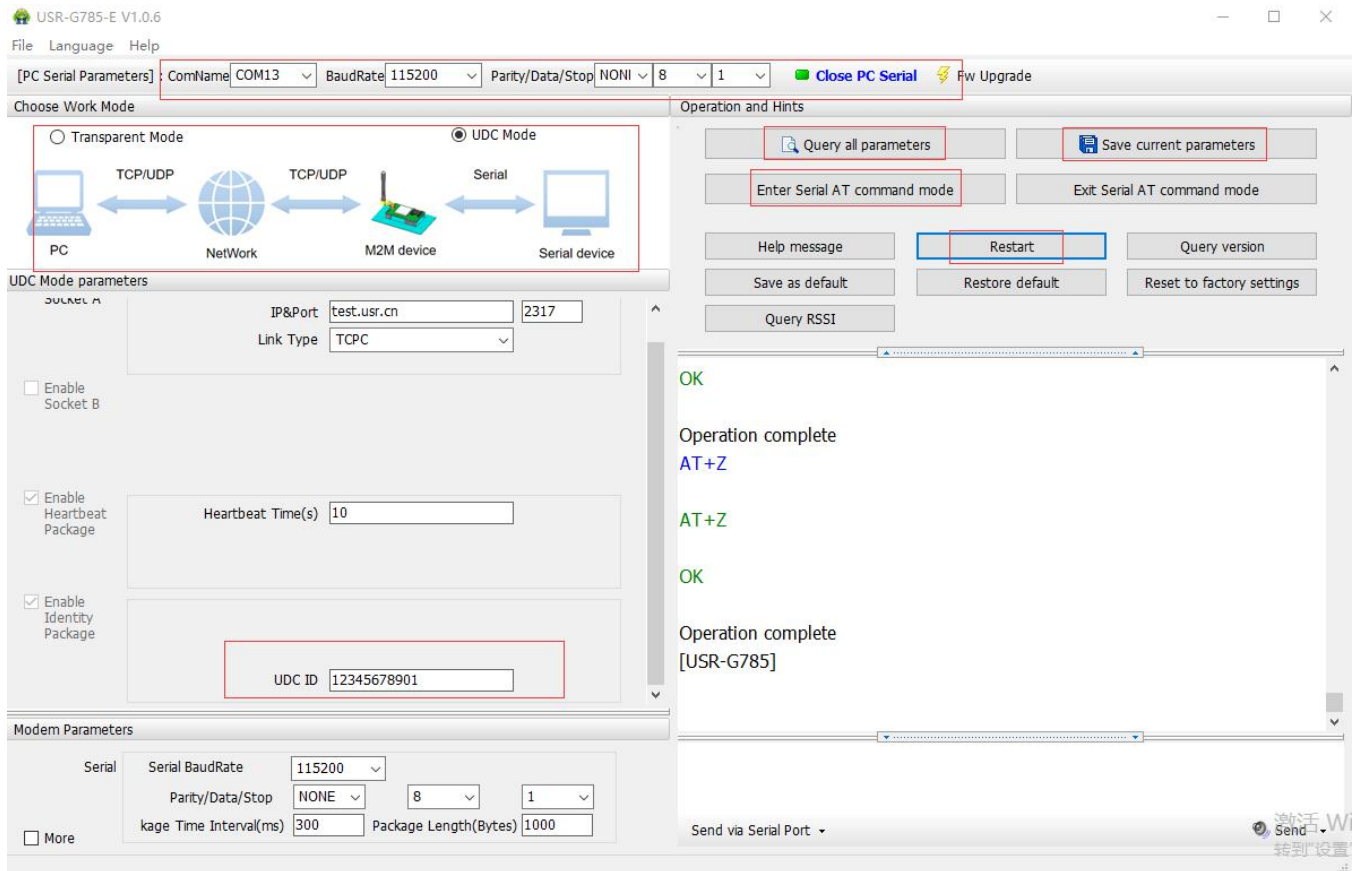
Figure10 UDC mode

3.2. Serial Port

3.2.1. Basic Parameters

Table 5 serial port basic parameters

Item	Parameter
Baud rate	2400，4800，9600，19200，38400，57600，115200
Data bit	8
Stop bit	1,2
Check bit	NONE EVEN ODD
Flow control	RS 232: NFC,CRTS RS485:None

3.2.2. Frame Forming Mechanism

3.2.2.1. Time Trigger

The packing time can be set from 300ms~60000ms. Default is 300ms.Users can send AT+UARTFT=<time> to set.

The schematic diagram is as follows:
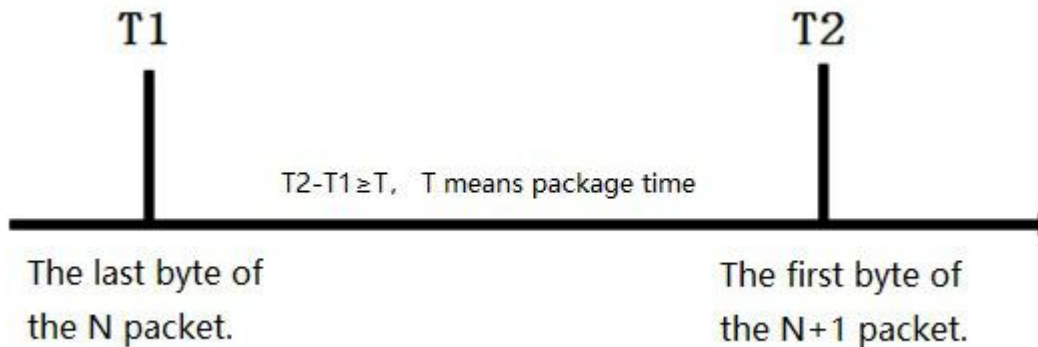

Figure11 frame forming mechanism

3.2.2.2. Length Trigger

The packing length can be set from 1~1000, default is 1000.

Users can send AT+UARTFL=<length>.

The schematic diagram is as follows:
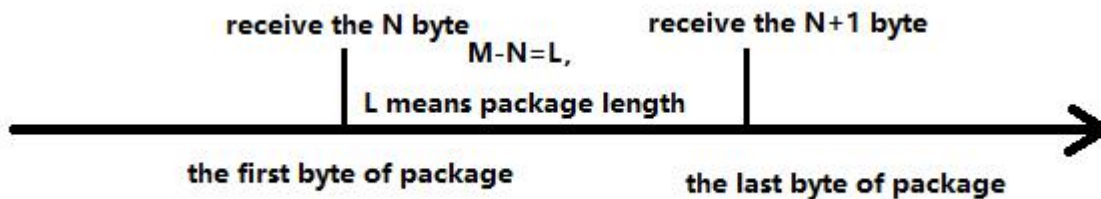
Figure12 frame forming mechanism

Note: The serial port receives 1000 bytes of cache, and the packet will be lost if the single packet exceeds 1000 bytes.

3.2.3. RFC2217 Similar Function

This function is similar to RFC2217 function, dynamically modifying serial port parameters from the network side. Sending data conforming to a specific protocol from the network side can modify the parameters of the serial port in real time. This modification is only temporary. After the module restarts, the original parameters can be restored.

Figure13 schematic diagram of RFC2217 similar function logic

3.3. Characteristic Function

3.3.1. Registration Package Function

Figure14 schematic diagram of registration function
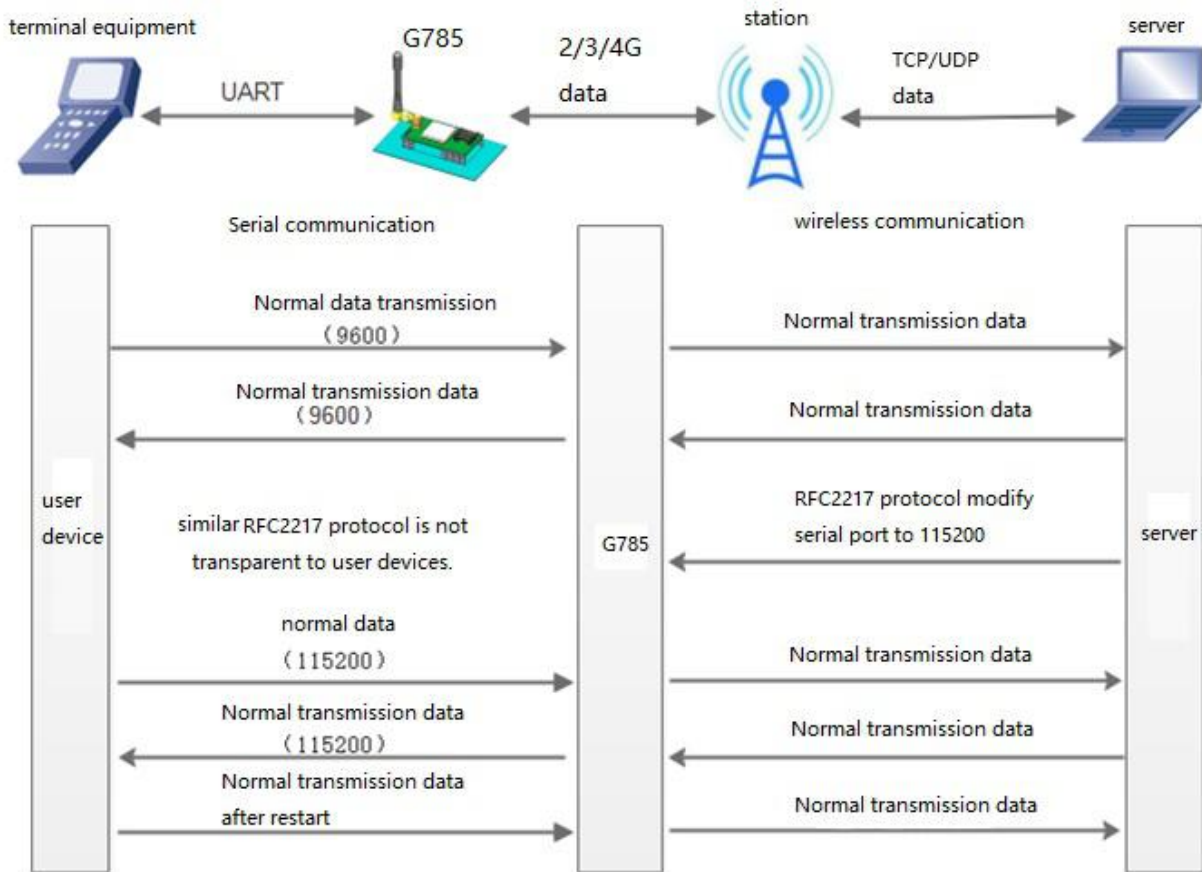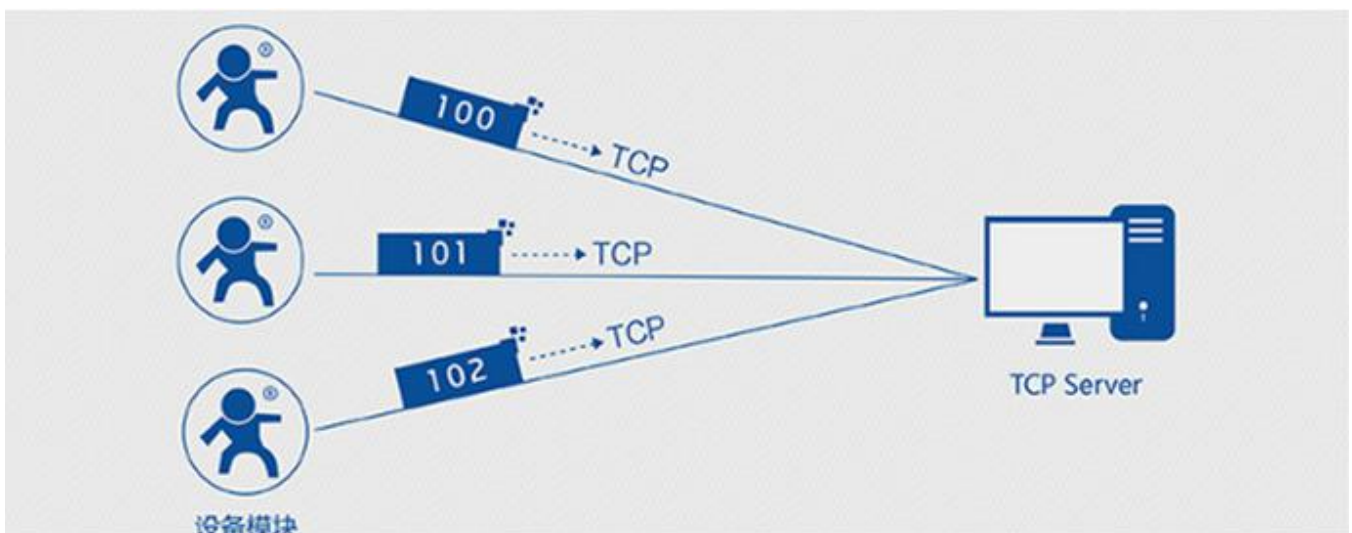
Under the network pass through mode, users can send register packets from modules to the server. Registered packages are designed to enable the server to identify the data source device, or as a password to obtain authorization for server functionality. Registered packets can be sent when the module establishes a connection with the server, and can also be spliced into the registration package data at the front end of each packet as a packet. The data of the registration package can be ICCID code, IMEI code, or custom registration data.

Table 6 AT commands

Command name	Command function	Default parameter
AT+ REGEN	Query / settings enable registration package	"off"
AT+ REGTP	Query / settings register package content type	"USER"
AT+ REGDT	Query / settings custom registration information	"7777772E7573722E636E"
AT+ REGSND	Query / settings register packet sending mode	"DATA"

Setting up software schematic diagram:
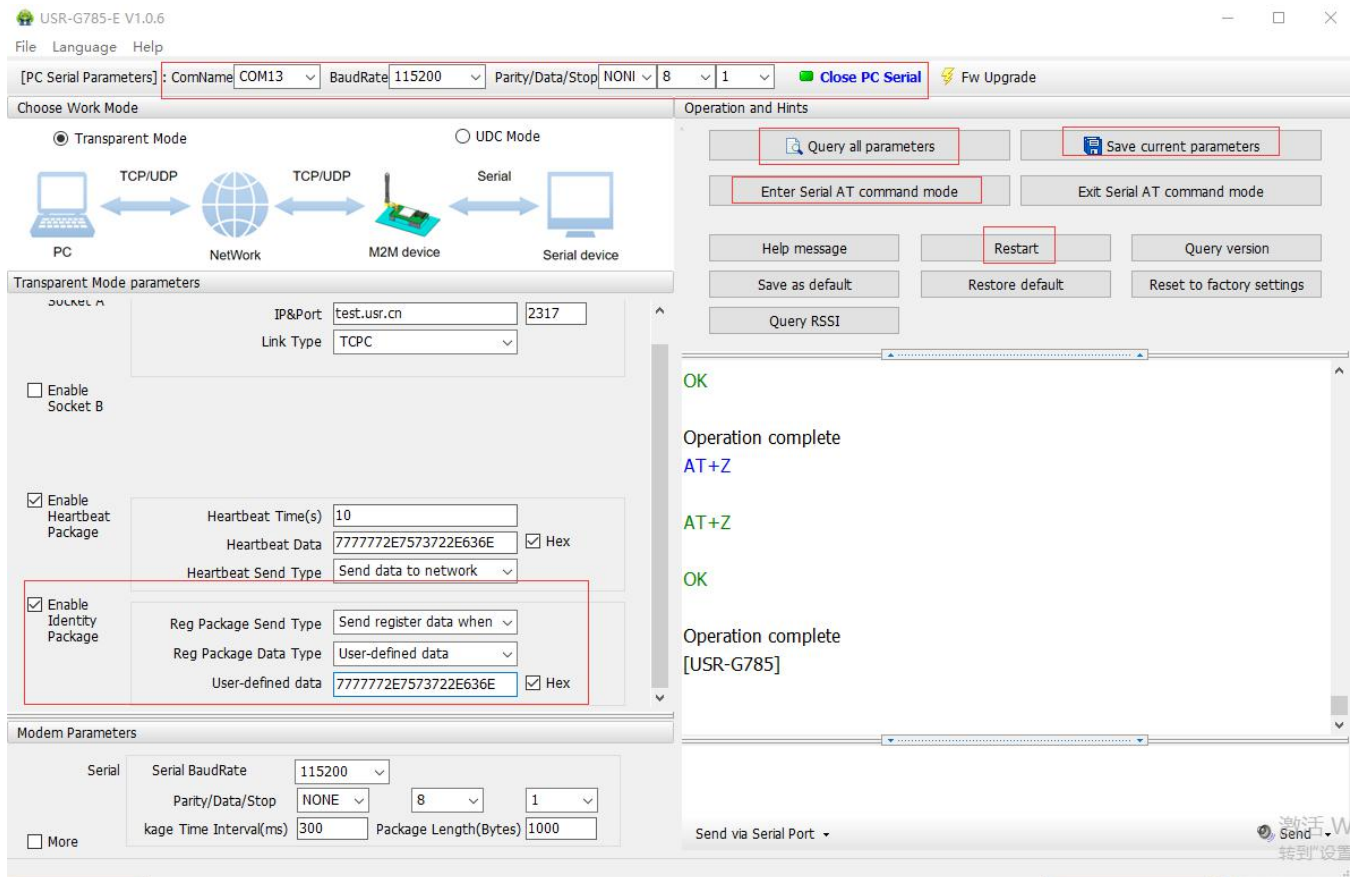
Figure15 setting up software schematic diagram

3.3.2.Heartbeat Packet

Figure16 heartbeat packet

In the network transmission mode, user can send the heartbeat package from the module. Heartbeat packets can be sent to the server side of the network, or to the device port of the serial port.

Because KEEP-ALIVE function is only used to keep online, but it can't detect machine power outages, network wire pull-out, firewalls, or other disconnection, and the logic layer processing disconnection will be very complex. So we choose the mechanism of sending heartbeat to the network to detect whether the connection between the module and the server is normal.

In applications where the server sends fixed query instructions to the device, in order to reduce traffic, users can choose to send heartbeat packets (query instructions) to the serial port device instead of sending query instructions from the server.

Table 7 AT commands

Command name	Command function	Default parameter
AT+ HEARTEN	Query / settings enable heartbeat package	"on"
AT+ HEARTDT	Query / settings heartbeat data	"7777772E7573722E636E"
AT+ HEARSND	Query / settings heartbeat packet send type	"NET"
AT+ HEARTTM	Query / settings heartbeat packet interval	10

Setting up software schematic diagram:
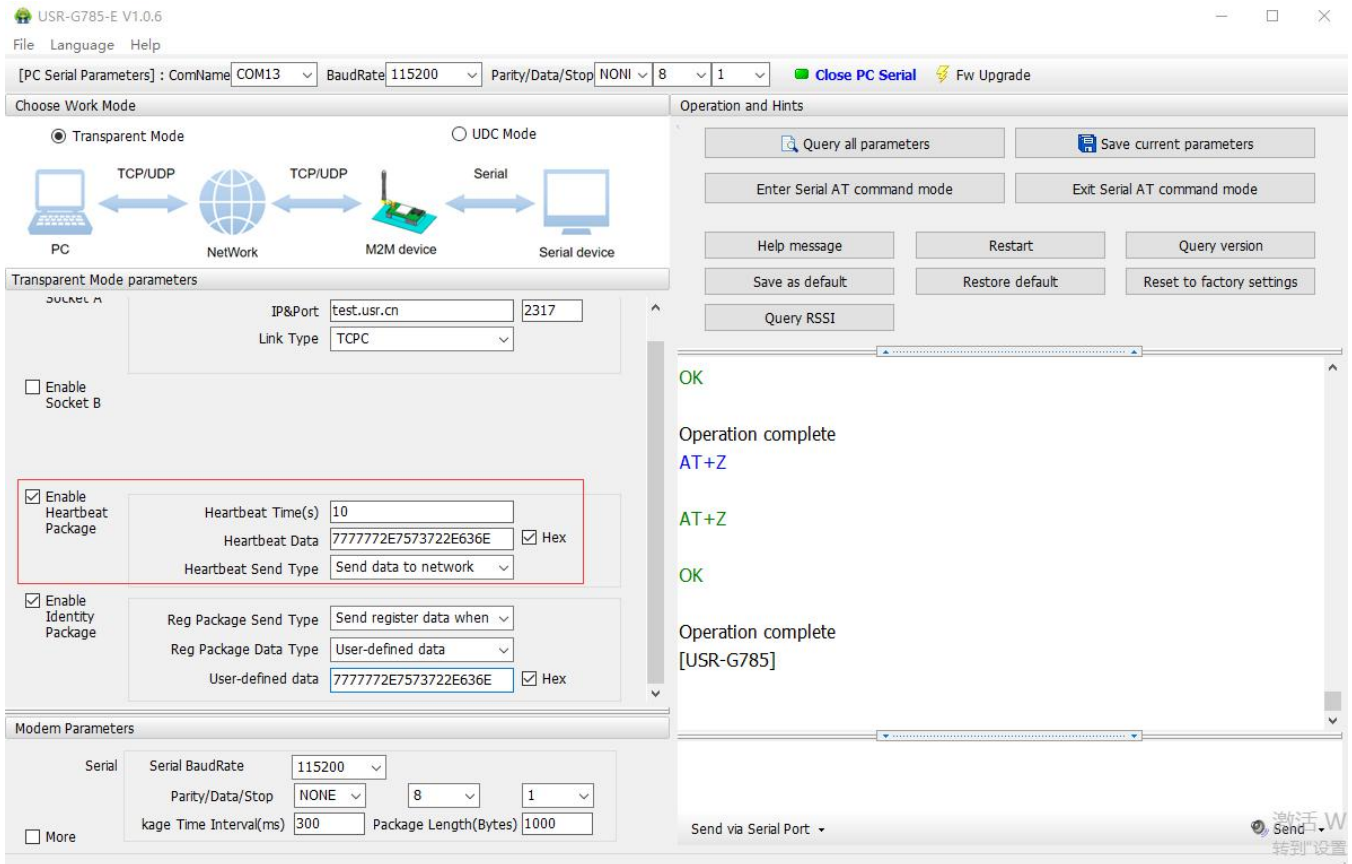
Figure17 setting up software schematic diagram

3.3.3. Indicator Status

There are four indicator lights on the G785, namely POWER, WORK, NET and LINKA. The status of the indicator is as follows:

Table 12 indicator status

Indicator name	Function	Status
POWER	Power on or not	on
WORK	Work normal or not	flicker
NET	Net status indicator	on
LINKA	Socket A connection instruction	on

3.3.4. Firmware Upgrade

USR-G785-E supports upgrading through serial ports.

3.3.5. Restore to The Factory Settings

Restore the factory default parameters. After power on, press the Reload key for 3~15S, and then release, the device parameters can be restored to the factory default parameters.

4. Parameter Setting

4.1. AT Commands Setting

4.1.1. Setup Software
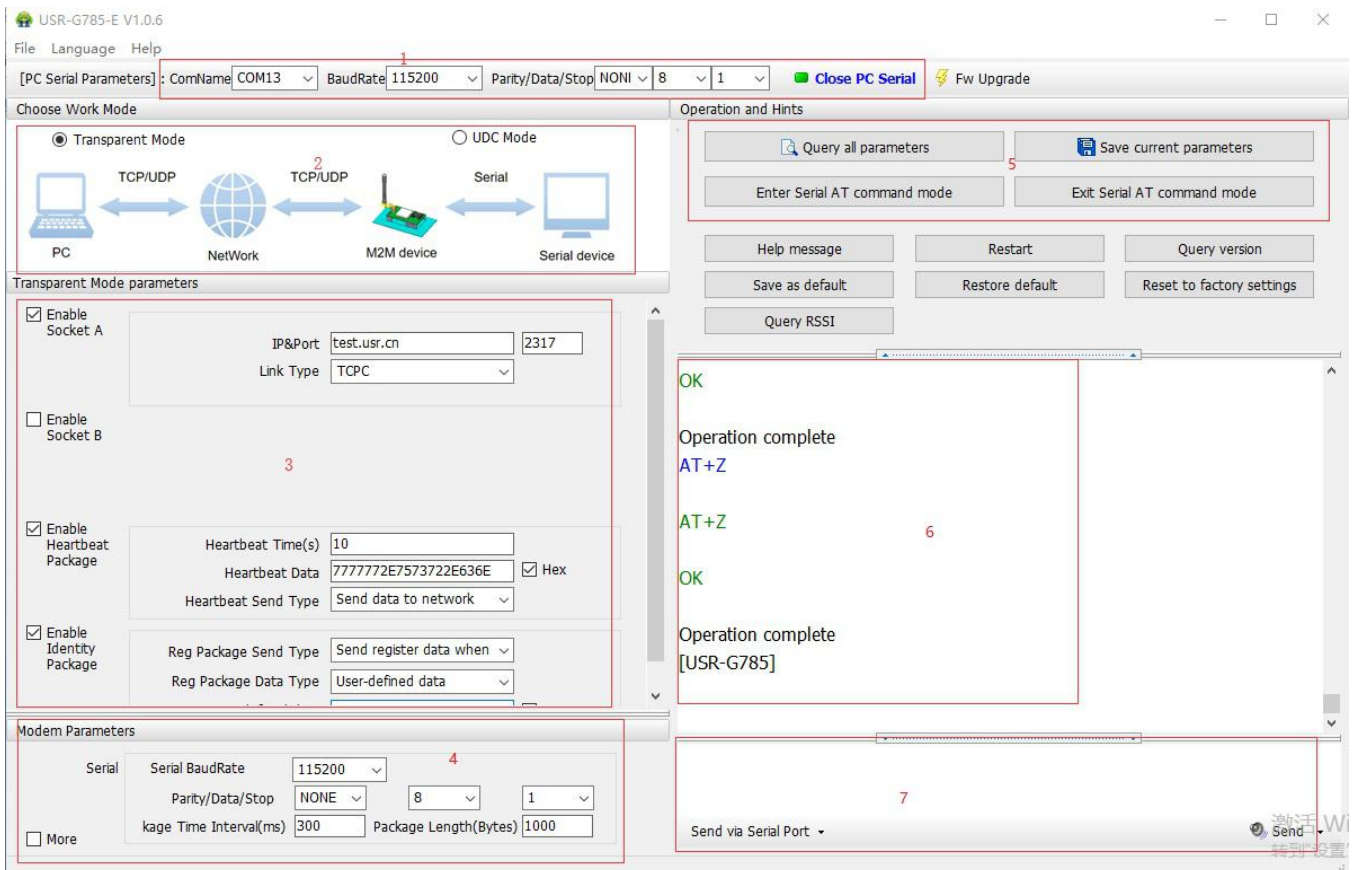
Figure18 setting up software schematic diagram

Explain:

1. Software serial port parameter setting area.

2. Work mode selection area, select module work and which mode.

3. Special feature parameter setting area, set up the special function related parameters of the module.

4. Set the basic global parameters of the module.

5. The command sending button can be sent from the input instruction.

6. Input box, from the input instruction text box.

7. The receiving box receives the return information from the module.

8. Commonly used instruction buttons, click to enter the commonly used AT commands.

4.1.2. Net AT Command

Network AT command is the way to set and query parameters by sending passwords and AT instructions through the network while working in the transmission mode.

4.1.3. SMS AT Command

SMS AT instruction is that we can use SMS to query and configure the parameters of the module.

5. AT Commands

Table 9 error code

Error	Implication
Err1	Wrong format, need AT+
Err2	Wrong command
Err3	Not meet the format of the query or Settings
Err4	Wrong parameters or number

Table 10 AT commands

NO.	Command	Function	Effective immediately
Management command			
1	AT	Test command	Y
2	H	Help information	Y
3	Z	Module reboot	Y
4	E	Does query / settings open instruction recall	Y
5	ENTM	Exit command mode	Y
6	WKMOD	Query / setup work mode	N
7	CMDPW	Query / set command password	Y
8	STMSG	Query / set module startup information	N
9	NWINFO	Query network format	Y
10	CSQ	Query the current signal strength information of the device	Y
11	CIP	Query the IP of G785	Y
Configuration parameter command			
12	RELD	Restore user default settings	Y
13	CLEAR	Restore original factory settings	Y
14	CFGTF	Save the current settings as default settings.	Y
Information query command			
15	VER	Query version information	Y
16	HDVER	Query hardware version	Y
17	SN	Query SN code	Y
18	ICCID	Query ICCID code	Y
19	IMEI	Query IMEI code	Y
Serial port parameter command			
20	UART1	Query / set uart1 parameters	N
21	UART2	Query / set uart2 parameters	N
22	UARTFT	Query/set serial port package time	N

23	UARTFL	Query/set serial port package length	N
24	CMDPT	Query/set RS232 or RS485 work as command port	N
25	RFCEN	Query/set enable/disable RFC2217 similar function	Y
Net command			
26	APN	Query / set APN information	N
27	SOCKA	Query / setup socket A parameter	N
28	SOCKB	Query / setup socket B parameter	N
29	SOCKAEN	Query / setup whether to enable socket A	N
30	SOCKBEN	Query / setup whether to enable socket B	N
31	SOCKALK	Query socket A connection state	Y
32	SOCKBLK	Query socket B connection state	Y
33	RSTIM	Query/set the reboot time without data transmission	Y
Register command			
34	REGEN	Query / settings enable registration package	N
35	REGTP	Query / settings register package content type	N
36	REGDT	Query / settings custom registration information	N
37	REGSND	Query / settings register packet sending mode	N
38	UDCID	Query/set the device ID when work at UDC mode	N
Heartbeat command			
39	HEARTEN	Query / settings enable heartbeat package	N
40	HEARTDT	Query / settings heartbeat data	N
41	HEARTSND	Query / settings heartbeat packet sending type	N
42	HEARTTM	Query / settings heartbeat packet interval	N
SMS command			
43	CISMSSEND	Send SMS	Y

Note: the details of AT commands, please view the software design manual of the module.

6.Contact Us

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8.Update History

Edition	Describe
V1.0.2	2019-02-11 establish
V1.0.3	2019-02-21 modify the error description