

USR-G785-E User Manual

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Contents

U	USR-G785-E User Manual	1
Fe	eatures	
1.	Get Start	4
	1.1. Hardware Test	
	1.1.1. Hardware Preparation	
	1.2. Data Transmission Test	5
	1.2.1. Initial Parameters	
2.	Product Overview	6
	2.1. Product Introduction	6
	2.2. Module Default Parameters	6
	2.3. Hardware Description	7
	2.4. Interface Introduce	9
3.	Product Function	9
	3.1. Work Mode	
	3.1.1. Net Transparent Transmission Mode	11
	3.1.1.1. Mode Declaration	11
	3.1.2. UDC Mode	
	3.1.2.1. Mode Description	
	3.2. Serial Port	14
	3.2.1. Basic Parameters	14
	3.2.2. Frame Forming Mechanism	
	3.2.2.1. Time Trigger	
	3.2.2.2. Length Trigger	
	3.2.3. RFC2217 Similar Function	
	3.3. Characteristic Function	16
	3.3.1. Registration Package Function	16
	3.3.2. Heartbeat Packet	
	3.3.3. Indicator Status	
	3.3.4. Firmware Upgrade	19
	3.3.5. Restore to The Factory Settings	
4.	Parameter Setting	20
	4.1. AT Commands Setting	20
	4.1.1. Setup Software	
	4.1.2. Net AT Command	
	4.1.3. SMS AT Command	
5.	AT Commands	
6.0	Contact Us	
7.I	Disclaimer	23
8. I	Update History	



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
- Support AT commands
- Support RFC2217 similar function
- Support apply server-side secondary development information



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

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

Table 1 default nanometers

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. A LISR-G785-F V106

noose Work Mode			Operation and Hints	
Transparent	: Mode	○ UDC Mode	Query all parameters	🔚 Save current parameters
		Serial	Enter Serial AT command mode	Exit Serial AT command mode
PC	NetWork	M2M device Serial devic	General operation process:	*
ansparent Mode par	rameters		1. Connect the module to PC serial port, po	wer the module
I Enable			2. Click "Open PC serial"	
Socket A	ID&Port tes	t.usr.cn 2317	3. Click "Enter Serial AT command mode"	
			4. Click "Query all parameters"	
			5. Choose work mode and configure related	parameters
Enable			6. Click "Save current parameters"	 Lister of constraint set of constraints of the
Socket B			7. Click "Restart"	
			Serial Open Success	
			www.usr.co	
Enable			www.usi.cn	
Heartbeat	Heartbeat Time(s) 30		122456	
Package	Heartbeat Data	ww.usr.cn	data send to se	rver
	Heartbeat Send Type Se	nd data to network $$	123450	
Enable				
Identity Package				
-			data return from server	
odem Parameters				······································
Sorial	Serial BaudRate 115200		123456	
Sena				
	Parity/Data/Stop NONE			
k	kage Time Interval(ms) 300	Package Length(Bytes) 1024	Send via Serial Port -	Ø. S

Figure 3 setup software

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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

	Item	Index		
	Wireless standard	TDD-LTE, FDD-LTE, WCDMA, GSM		
		TDD-LTE	B38/B40/B41	
	Standard fraguancy range	FDD-LTE	B1/B3/B5/B7/B8/B20	
	Standard frequency range	WCDMA	B1/B5/B8	
		GSM	B3/B8	
		TDD-LTE	Class 3 (23dBm±2dB)	
		FDD-LTE	Class 3 (23dBm±2dB)	
	Transmitting power	WCDMA	Class 3 (24dBm+1/-3dB)	
		GSM Band8	Class 4 (33dBm±2dB)	
		GSM Band3	Class 1 (30dBm±2dB)	
		LTE	Maximum support for non-CA CAT 4	
			Supporting 1.4~20MHz RF bandwidth	
	3		Downlink support for multi-user MIMO	
Wireless			TDD: maximum up 35 Mbps,	
parameters			maximum down 130 Mbps	
•			FDD: Maximum upstream 50 Mbps,	
			maximum downstream 150 Mbps	
		WCDMA	Supports 3GPP R8 dc-hspa +	
	Technical specifications		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	

Table 2 default parameters



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

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

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	"on"	
	socket A		

Table 3 AT commands



Be Honest, Do Best !	USR-G785-E User Manual	Technical Support: h.usriot.com
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.

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"		

Table 4 AT commands



Be Honest, Do Best !	USR-G785-E User Mar	ual	Technical Support: h.usriot.com
AT+SOCKBLK Que	ry socket B connection state	"off"	
Setting up software schematic	diagram:	ł	
🙀 USR-G785-E V1.0.6			- 🗆 X
File Language Help			
[PC Serial Parameters] : ComName COM13 V BaudRa	e 115200 V Parity/Data/Stop NONI V 8 V 1 V	Close PC Serial 🗧 Fw Upg	grade
Choose Work Mode	Operation and I	lints	
 Transparent Mode 	UDC Mode	Query all parameters	Save current parameters
		er Serial AT command mode	Exit Serial AT command mode
PC NetWork N	2M device Serial device He	p message R	estart Query version
UDC Mode parameters	Sav	as default Resto	re default Reset to factory settings
IP&Port test.us Link Type TCPC		iery RSSI	<u> </u>
Enable Heartbeat Package Heartbeat Time(s) 10	Operation co AT+Z AT+Z	mplete	
C Enable Identity Package	OK Operation cc	mplete	
UDC ID 12345	i78901		
Modern Parameters		*	*
Serial Serial BaudRate 115200 Parity/Data/Stop NONE >	8 ~ 1 ~		
More kage Time Interval(ms) 300	Package Length(Bytes) 1000 Send via Seria	Port •	 Sendi-Wi 转到"设置

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		
	NONE		
Check bit	EVEN		
	ODD		
Flow control	RS 232: NFC,CRTS		
	RS485:None		

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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



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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.

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	"7777772E7573722E6
		36E"
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.

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

Table 7 AT commands

Setting up software schematic diagram:



Technical Support: h.usriot.com

🔮 USR-G785-E	V1.0.6							>	<
File Language	Help								
[PC Serial Parame	ters] : ComName COM13 ~	BaudRate 115200 ~	Parity/Data/Stop NONI ~	8 ~ 1	Close PC Series	ial Fw Upgrade			
Choose Work Mod	le			Operation	and Hints				
Transpar	ent Mode		OC Mode	·	🗟 Query all parame	eters	📑 Save	current parameters	
					Enter Serial AT comman	nd mode	Exit Serial	AT command mode	
PC	NetWork	M2M device	Serial device		Help message	Restart		Query version	
Transparent Mode	parameters				Save as default	Restore defa	ult	Reset to factory settings	
JULKEL A	IP&Port Link Type	test.usr.cn TCPC	2317		Query RSSI				
Enable Socket B	Heartbeat Time(s) Heartheat Data	10	Hex	Operatio AT+Z AT+Z	on complete				
Enable Identity Package	Heartbeat Send Type Reg Package Send Type Reg Package Data Type User-defined data	Send data to network Send register data wher User-defined data 7777772E7573722E6361	✓ Hex	OK Operatio [USR-G]	on complete 785]				
Modem Parameter	rs			*				3	•
Serial	Serial BaudRate 1152 Parity/Data/Stop NON	200 V IE V 8 V	1 ~						
More	kage Time Interval(ms) 300	Package Length(B	ytes) 1000	Send via	Serial Port 🔹			の Send-・	W

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

😭 USR-G785-E \	V1.0.6				>
[PC Serial Parame	ters]: ComName COM13	8 ~ 1 ~ Close PC	Serial 🥰 Fw Upgrad	le	
Choose Work Mod	de	Operation and Hints			
Transpare	ent Mode O UDC Mode	Query all par	ameters	8	Save current parameters
	CP/UDP Serial	Enter Serial AT com	mand mode	Exit 9	Serial AT command mode
PC	NetWork M2M device Serial device	Help message	Rest	art	Query version
ransparent Mode	parameters	Save as default	Restore (lefault	Reset to factory settings
Enable Socket A	108.0ort fest lier m 2317	Query RSSI			
	Link Type TCPC V	ОК			
Enable Socket B	3	Operation complete AT+Z			
Enable Heartbeat Package	Heartbeat Time(s) 10 Heartbeat Data 7777772E7573722E636E V Hex Heartbeat Send Type Send data to network V	AT+Z OK	6		
Enable Identity Package	Reg Package Send Type Send register data when ~ Reg Package Data Type User-defined data ~	Operation complete [USR-G785]			
Modem Parameter	rs				
Serial	Serial BaudRate 115200 ~ 4 Parity/Data/Stop NONE ~ 8 ~ 1 ~		7		
More	kage Time Interval(ms) 300 Package Length(Bytes) 1000	Send via Serial Port 👻			Ø Send -

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		

NO.	Command	Function	Effective		
			immediately		
		Management command			
1	AT	Test command	Y		
2	Н	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	Ν		
7	CMDPW	Query / set command password	Y		
8	STMSG	Query / set module startup information	Ν		
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		

Table 10 AT commands



23	UARTFL	Query/set serial port package length	Ν	
24	CMDPT	Query/set RS232 or RS485 work as command port	Ν	
25	RFCEN	Query/set enable/disable RFC2217 similar function	Y	
	1	Net command		
26	APN	Query / set APN information	Ν	
27	SOCKA	Query / setup socket A parameter	Ν	
28	SOCKB	Query / setup socket B parameter	Ν	
29	SOCKAEN	Query / setup whether to enable socket A	Ν	
30	SOCKBEN	Query / setup whether to enable socket B	Ν	
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	Ν	
35	REGTP	Query / settings register package content type	Ν	
36	REGDT	Query / settings custom registration information	Ν	
37	REGSND	Query / settings register packet sending mode	Ν	
38	UDCID	Query/set the device ID when work at UDC mode	Ν	
		Heartbeat command		
39	HEARTEN	Query / settings enable heartbeat package	Ν	
40	HEARTDT	Query / settings heartbeat data	Ν	
41	HEARTSND	Query / settings heartbeat packet sending type	Ν	
42	HEARTTM	Query / settings heartbeat packet interval	Ν	
		SMS command		
43	CISMSSEND	Send SMS	Y	

USR-G785-E User Manual

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

Technical Support: h.usriot.com



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