E840-TTL-GPRS03 User Manual

2G Wireless module



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Chengdu Ebyte Electronic Technology Co.,Ltd.

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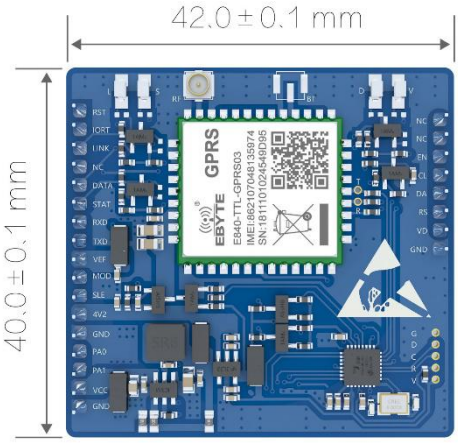
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E840-TTL-GPRS03 is designed for the communication between UART and net server via GPRS. With easy AT setting, the dual transparent transmission can be conducted. The module supports GSM850, EGSM900, DCS1800 and PCS1900 with GSM/GPRS standard.

This chapter focuses on the brief introduction of E840-TTL-GPRS03. It explains how to make the simplest hardware environment and test the transparent transmission. The transparent transmission is between UART devices（referring to PC）and net sever (replaced by TCP testing tools).

Feature

- Meets almost all M2M requirement;
- Support data transparent transmission, support TCP, UDP network protocol, support heartbeat package, registration package;
- Support serial port caching function, the serial port data can be cached locally before the connection is established with the server;
- Maximum GPRS data downstream rate is 85.6kbps, maximum upstream rate is 85.6kbps;
- Support TCP/UDP/FTP/PPP/HTTP/NTP/MMS/SMTP/PING，code format include CS-1、CS-2、CS-3 and CS-4；

1. Introduction

1.1 Brief Introduction

E840-TTL-GPRS03 is a new generation wireless module developed by Ebyte. The software of this product is fully functional and covers most of the conventional application scenarios. Users can realize the transparent transmission of bidirectional data from serial port to network server through simple setting.

On the module 2.0mm pin header is used for easy integration by user. It is powered by a wide voltage of 5.0V to 25.0V. It supports 2G SIM card. Communication and LED use compatible communication level of 3.3v and 5v, 3.3v as default. The module has anti-interference ability and can be used in some environments with strong electromagnetic interference, such as some power industries.

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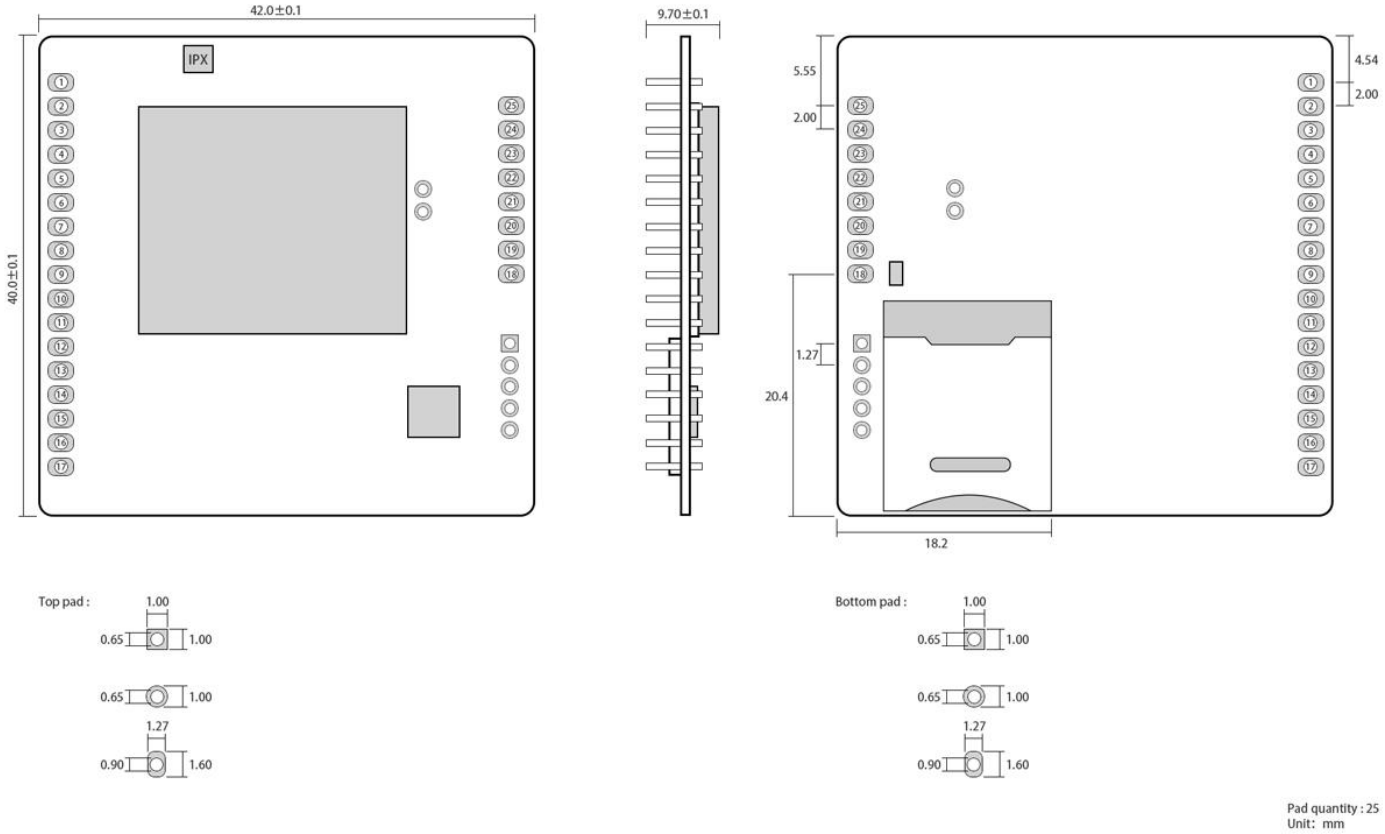
1.2 Parameters

Item	Value	Description
Characteristic Features	Support Band	Quad Band: GSM850, EGSM900, DCS1800, PCS1900 Module automatically searches for frequencies Band selection can be set by AT command Compliant with GSM Phase 2/2+
	GPRS connection characteristic	GPRS multi-slot class 12 (default) GPRS multi-slot class 1~12 (configurable) GPRS mobile station class B
	GPRS data feature	GPRS data downstream transmission: up to 85.6kbps GPRS data upstream transmission: up to 85.6kbps Encoding format: CS-1, CS-2, CS-3 and CS-4 Support for PAP (Password Authentication Protocol) protocols commonly used for PPP connections Support is usually used for CHAP (Interrogation Handshake Authentication Protocol) protocol Embedded protocol: TCP/UDP/FTP/PPP/HTTP/NTP/MMS/SMTP/PING, etc. Support for unstructured supplementary data services (USSD)
Hardware Features	Antenna	IPEX
	Data interface	TTL@3.3V compatible with 5V
	Baud rate	Max of 921600bps, 115200bps as default
	TX power	Class 4 (2W): GSM850 and EGSM900 Class 1 (1W): DCS1800 and PCS1900
	Current consumption (typical)	48mA@5V（idle）
		22mA@12V（idle）
		14mA@20V（idle）
	Operating temperature	-30℃- +70℃； extending to -40℃~+85℃
	Operating voltage	DC：5V~20V；powered by lithium battery：3.8V~4.6V
	Size	42×40×9.7 mm
	SIM card holder	MICRO SIM card holder

3GPP frequency	1 Timeslot	2 Timeslot	4 Timeslot
CS-1	9.05kbps	18.1kbps	36.2kbps
CS-2	13.4kbps	26.8kbps	53.6kbps
CS-3	15.6kbps	31.2kbps	62.4kbps
CS-4	21.4kbps	42.8kbps	85.6kbps

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1.3 Interface Description



1.4 Pin Definition

Pin NO.	Name	Description
1	RST	Reset
2	IORT	When in low level for 3~10S, module returns to factory setting and start over immediately
3	LINK	The link connection status indication pin corresponds to the onboard left 1 LED. High: successfully connect with network server; Low: fail to connect with network server;
4、24、25	NC	Suspended, N/A
5	DATA	The data transceiver indication pin, when the network receives the data or the serial port receives the data (50ms high/10ms low), corresponding to the onboard left 3LED light.
6	STAT	The device status indication pin corresponds to the onboard left 2 LED. Low: The device is powered on to search for SIM card 1800ms for low, 200ms for high: the device checks the correct SIM card and is attaching to the network; High: The device is attached to the network successfully.
7	RXD	Data RX, default 3.3V, compatible with 5V
8	TXD	Data TX, default 3.3V, compatible with 5V
9	VEF	Drive level power supply pin, if user need to achieve serial communication and LED indication of 5V drive level, user need to input 5V level on this pin.
10、11、14、15、23	MOD、SLE、PA0、PA1、EN	Suspended, N/A

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12	4V2	Lithium battery power supply pin，range：3.8V~4.6V. This pin is prohibited from being reversed and is not allowed to be supplied with VCC.
16	VCC	DC power supply pin，range：5V~20V. This pin is prohibited from being reversed and is not allowed to be supplied with 4V2.
19	VD	Power pin to connect SIM externally, NC for pcb SIM card holder.
20	RS	Reset pin to connect SIM externally, NC for pcb SIM card holder.
21	DA	Data pin to connect SIM externally, NC for pcb SIM card holder.
22	CL	Clock pin to connect SIM externally, NC for pcb SIM card holder.
13、17、18	GND	Ground

2. Quick start

2.1 Devices preparation

Please get UART, SIM card, sucker antenna and etc. ready according to the recommended circuit before test.









1、 Enter the AT command mode and send +++ in the serial port assistant (+++ does not need to check to send a new line, other AT commands need to tick to send a new line to be valid), one must send any other AT command within 3 seconds after sending +++ (except for AT command for restarting) to enter the AT command mode completely.

2、 After entering the AT command mode, use AT+CPIN to check the SIM card access:

For example: AT+CPIN

+OK=1

Indicates that the SIM card is connected, and use AT+CSQ to view the current signal strength：

For example： AT+CSQ

+OK=26

Indicates that the current signal strength is normal. If the response is 99, the current signal strength is abnormal. Check whether the current antenna is connected or the surrounding base station is abnormal.

3. Access server, AT+SOCK=TCPC, 116.62.42.192, 31687 (parameters are separated by commas in English characters, and IP commands are separated by English characters).

SOCK settings

For example: AT+SOCK=TCPC, 116.62.42.192, 31687

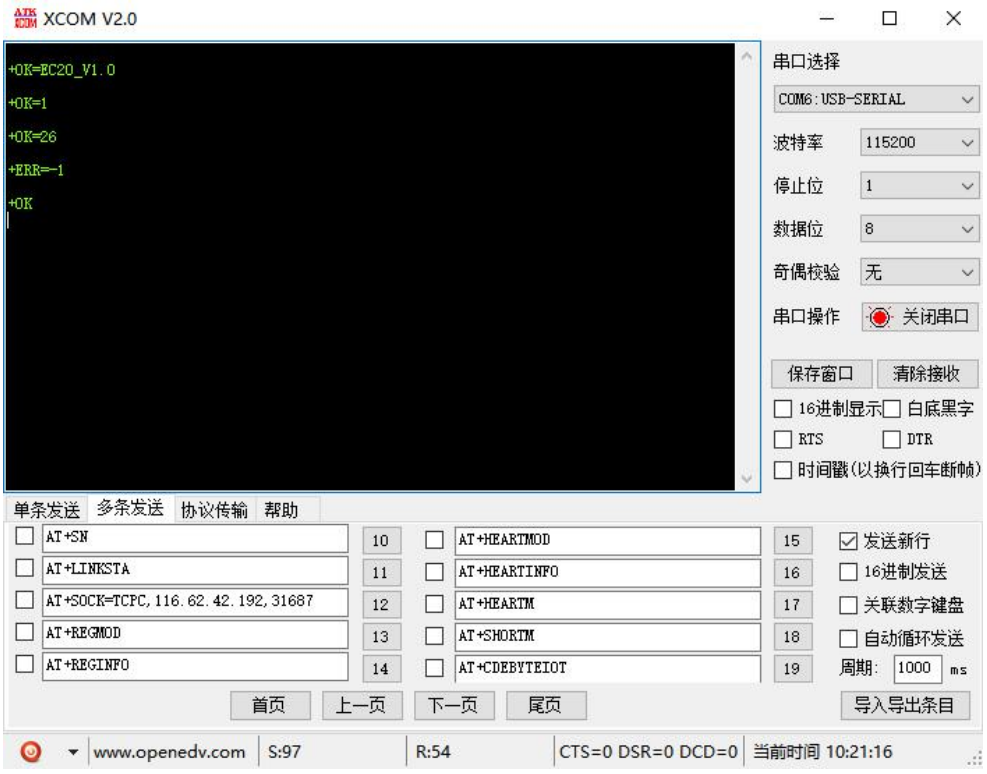
+OK

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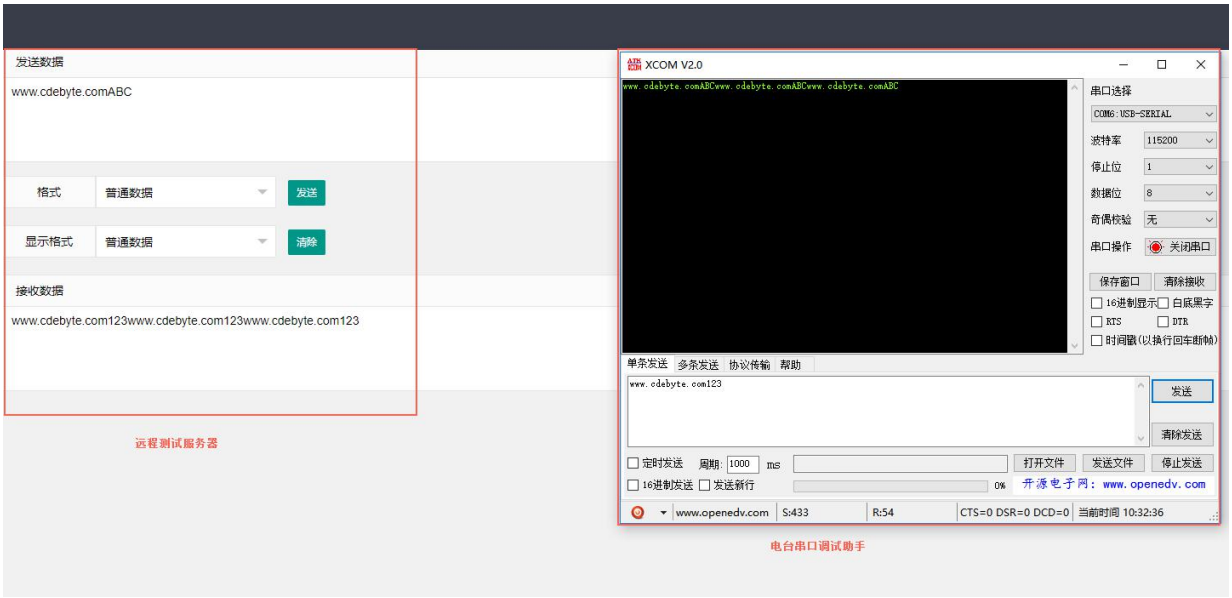
Indicates that the setting was successful.

4. Restart (after all AT commands modify parameters, the device will take effect after restarting)

After the execution command AT+REBT returns OK, the device restarts immediately. Here, the IP only performs the demonstration. The actual connection is based on the IP of the server to be connected.



5. After the base station is connected, the NET light is always on to indicate that the server is connected, and transparent transmission is possible at this time.



2.2 Data Transmission Test

Software tools required for this data transfer test:

For any serial port assistant, such as XCOM we used, the software driver can be downloaded from our official website.

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2.2.1 Operating modes are as follows:

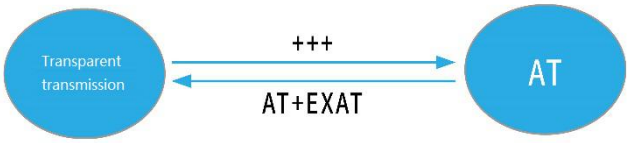
1, The operating mode is divided into: transparent transmission mode, AT configuration mode

a) Transparent transmission mode: After power-on, the module works in the transparent transmission mode by default, and automatically starts the network connection. When the connection is established with the server, any data received by the serial port will be transparently transmitted to the server. At the same time, it can also receive the data from the server. After receiving the server data, the module will output directly through the serial port. The maximum length of data supported by this module is 512 bytes.

b) This module supports one-way Socket connection. The user can configured it as TCP Client or UDP Client. In transparent transmission mode, the received serial port data will be directly transmitted to the network server, and the received network server data will be directly output through the serial port.

c) AT mode: In this mode, the serial port data is regarded as an AT command.

d) Mode switching, after the serial port receives the "+++" frame data in the transparent transmission mode, the RX pin receives any AT command within 3 seconds, and the mode switches to the AT mode. In AT mode, send AT+EXAT<CR><LF> to switch to transparent transmission mode.



3. Network Function

a) Short connection: In TCP Client mode, the short connection function is enabled. If there is no data reception in the serial port or network port within the set time, the network connection will be automatically disconnected. The short connection function is turned off by default. The connection time can be set from 2 to 255 seconds. When set to 0, the short connection function is disabled.

b) Registration package: The registration package is closed by default. 4 options include: physical address when connecting, send custom data when connecting, add physical address before each packet of data, add custom data before each packet of data. The maximum data length for customize registration package is 40 bytes (when set to HEX format, the maximum length is 20 bytes)

c) Heartbeat packet: In the idle state of network communication, the heartbeat packet is used for network state maintenance. The heartbeat period can be set from 0 to 65535 seconds, and the maximum length of the heartbeat packet is 40 bytes (when set to HEX format, the maximum length is 20 bytes). Supports two types of heartbeats, network heartbeat, serial heartbeat. User selects network heartbeat, starts timing when in communication idle, and sends heartbeat packets to the server according to the configured heartbeat period. User selects the serial port heartbeat, start timing when in communication idle, and send heartbeat packets to the serial port according to the configured heartbeat period.

Clear the cache: Before the connection to the server is established, the data received by the serial port will be cached. When the connection with the server is established, you can choose whether to clear the cached data. By default, the cache is cleared.

The maximum packet length of the local cache is 256 bytes.

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4. Base station positioning

The E840-TTL-GPRS03 supports the base station positioning function. The user can send the AT+LBS command in the AT mode to read the current LBS information of the device. The device returns the data format as follows:

+OK=LAC,xxxx;CID,xxxx, where LAC is the unique identification number of the global cell, CID is the base station number, (xxxx is the hexadecimal value);

The LAC and CID number can be used to query the current location information of the device. For the query method, refer to the link: http://www.gpsspg.com/bs.htm

5. Ebyte IoT platform

AT+EBTIOT command is used to set whether the module enables the transparent transmission function of the Ebyte cloud platform, after the device is turned on, the information such as the heartbeat and registration package configured by the user will be invalid. The user only needs to set the forwarding relationship of the corresponding device to the platform to implement the transparent transmission. For details of the related operations, please refer to the "Transparent Transmission Guide for Ebyte Cloud Platform ".

6. AT Command

a) Command format:

AT+<CMD>[op][para1, para2, para3,…]<CR><LF>

AT+: Command prefix

CMD: Control command

[op]: "="indicate parameter configuration

"NULL"indicate parameter query

[para-n]: parameter list

<CR><LF>: Enter, start new line, ASCII 0x0D 0x0A

b) Error code:

Error code	Description
-1	Invalid command format
-2	Invalid command
-3	Invalid Operator
-4	Invalid parameter
-5	Operation not allowed

c) Command set:

Command	Description
REBT	Restart Module
VER	Query version number
INFO	Query device info.
EXAT	Exit AT command mode
RESTORE	Restore factory setting
UART	Set/Query UART parameter

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UARTCLR	Set/query whether UART cache is cleared before module connection
MAC	Set/query MAC address
IMEI	Set/query IMEI
LINKSTA	Set/query SOCK connection
LINKSTA1	Set/query SOCK1 connection
LINKSTA2	Set/query SOCK2 connection
LINKSTA3	Set/query SOCK3 connection
SOCK	Set/query SOCK parameter
SOCK1	Set/query SOCK1 parameter
SOCK2	Set/query SOCK2 parameter
SOCK3	Set/query SOCK3 parameter
REGMOD	Set/query registration package mode
REGINFO	Set/query customized registration package information（ASCII）
REGINFONEW	Set/query customized registration package information（HEX）
HEARTMOD	Set/query Heartbeat Packet mode
HEARTINFO	Set/Query Customized Heartbeat Packet Information（ASCII）
HEARTINFOEW	Set/query custom heartbeat packet information (hexadecimal)
HEARTM	Set/query heartbeat time
SHORTM	Set/query short connection time
EBTIOT	Set/Query EBYTE IoT Cloud Platform Enable
CREG	Query whether registered to network
CSQ	Query signal strength
CPIN	Query SIM status

d) Command details:

AT+REBT

Function: Restart module

Format: Set

TX: AT+REBT<CR>

Return: <CR><LF>+OK<CR><LF>

Parameter: None

Description: After the command is executed correctly, the module restarts immediately and enters the transparent transmission mode after restarting.

AT+VER

Function: Query firmware version

Format: Set

TX AT+VER<CR><LF>

Return <CR><LF>+OK=<ver><CR><LF>

Parameter: Ver firmware version

description: None

AT+INFO

Function: Query module type and version

Format: Set

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TX AT+INFO<CR><LF>
return <CR><LF>+OK=<mod_name>,<hw_ver>,<sw_ver><CR><LF>

Parameter: mod_name module name
hw_ver hardware version
sw_ver software version

description: None

AT+EXAT

Function: exit command mode, enter transparent transmission mode

Format: Set
TX AT+EXAT<CR><LF>
return <CR><LF>+OK<CR><LF>

Parameter: None

Description: After the command is executed correctly, the module is switched from command mode to transparent mode.

AT+RESTORE

Function: Restore factory setting

Format: Set
TX AT+RESTORE<CR><LF>
return <CR><LF>+OK<CR><LF>

Parameter: None

description: None

AT+UART

Function: Query/set UART parameter

Format: Query
TX: AT+ UART <CR>
return: <CR><LF>+OK=<baudrate>,< parity ><CR><LF>
Set
TX: AT+UART=<baudrate>,< parity ><CR><LF>
return: <CR><LF>+OK<CR><LF>

Parameter: baudrate Baud rate as follows
9600,
19200,
38400,
57600,
115200,
230400,
460800,
921600,

Parity Parity NON None parity
EVEN Even parity
ODD Odd parity

Description: None

AT+UARTCLR

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Function: Query/set whether the serial port cache is cleared before module is connected

Format: Query

TX: AT+ UARTCLR <CR>

return: <CR><LF>+OK=< sta ><CR><LF>

Set

TX: AT+ UARTCLR =< sta ><CR>

return: <CR><LF>+OK<CR><LF>

Parameters: sta state

ON Clear the serial port cache before connecting.

OFF The serial port cache is not cleared before the connection.

AT+MAC

Function: Query MAC

Format: Query

TX: AT+MAC<CR>

Return: <CR><LF>+OK=<mac><CR><LF>

Parameter: MAC MAC address of the module

AT+IMEI

Function: Query IMEI

Format: Query

TX: AT+IMEI<CR>

Return: <CR><LF>+OK=<imei><CR><LF>

Parameter: imei IMEI code

AT+LINKSTA

Function: Query whether TCP link is connected

Format: Query

TX: AT+LINKSTA<CR>

Return: <CR><LF>+OK=<sta><CR><LF>

Parameter: Sta whether TCP link connection is established, Connect(TCP connection)/ Disconnect(TCP cut off)

AT+LINKSTA1

Function: Query whether TCP link is connected

Format: Query

TX: AT+LINKSTA1<CR>

Return: <CR><LF>+OK=<sta><CR><LF>

Parameter: Sta whether TCP link connection is established, Connect(TCP connection)/ Disconnect(TCP cut off)

AT+LINKSTA2

Function: Query whether TCP link is connected

Format: Query

TX: AT+LINKSTA2<CR>

return: <CR><LF>+OK=<sta><CR><LF>

Parameter: Sta whether TCP link connection is established, Connect(TCP connection)/ Disconnect(TCP cut off)

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AT+LINKSTA3

Function: Query whether TCP link is connected

Format: Query

TX: AT+LINKSTA3<CR>

return: <CR><LF>+OK=<sta><CR><LF>

Parameter: Sta whether TCP link connection is established, Connect(TCP connection)/ Disconnect(TCP cut off)

AT+SOCK

Function: Set/query the network protocol parameter format.

Format: Query

TX: AT+SOCK<CR>

return: <CR><LF>+OK=<protocol>,<ip>,< port ><CR><LF>

Set

TX: AT+SOCK=<protocol>,<ip>,< port ><CR>

return: <CR><LF>+OK<CR><LF>

Parameter: protocol protocol type, TCPC / UDPC

TCPC corresponding TCP client

UDPC corresponding UDP client

ip The IP address or domain name of the target server when the module is set to "CLIENT"

port Server port number, in decimal, less than 65535.

AT+REGMOD

Function: Set the query registration package mechanism.

Format: Query

TX: AT+REGMOD<CR>

return: <CR><LF>+OK=<status><CR><LF>

Set

TX: AT+REGMOD =<status><CR>

return: <CR><LF>+OK<CR><LF>

Parameter: status registration package mechanism

EMBMAC adds MAC/IMEI as registration packet data before each packet sent to the server.

EMBCSTM adds custom registration package data before each packet is sent to the server.

OLMAC sends a MAC/IMEI registration packet only when it is first linked to the server.

OLCSTM sends a user-defined registration package only the first time it is linked to the server.

OFF Disables the registration of the packet mechanism.

AT+REGINFO

Function: Set the query custom registration package content

Format: Query

TX: AT+ REGINFO <CR>

return: <CR><LF>+OK=<data><CR><LF>

Set

TX: AT+ REGINFO =<data><CR>

return: <CR><LF>+OK<CR><LF>

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parameter：data ASCII code within 40 bytes

AT+REGINFONEW

Function： Set and query custom registration package content

Format： query

TX：AT+ REGINFONEW<CR>

Return：<CR><LF>+OK=<type>,<data><CR><LF>

Set

TX：AT+ REGINFONEW =<type>,<data><CR>

Return：<CR><LF>+OK<CR><LF>

Parameter：type

0 HEX

1 ASCII

data

ASCII code within 40 bytes, when the registration packet type is HEX, the content must be a legal HEX format and the length must be an even number.

AT+HEARTMOD

Function： Set/query heartbeat packet mode.

Format： Query

TX：AT+ HEARTMOD<CR>

return：<CR><LF>+OK=<mode><CR><LF>

Set

TX：AT+ HEARTMOD=<mode><CR>

return：<CR><LF>+OK<CR><LF>

Parameter：mode

NET network heartbeat packet

UART UART heartbeat packet

AT+HEARTINFO

Function： Set/query heartbeat packet data

Format： Query

TX：AT+ HEARTINFO<CR>

return：<CR><LF>+OK=<data><CR><LF>

Set

TX：AT+ HEARTINFO=<data><CR>

return：<CR><LF>+OK<CR><LF>

parameter：data ASCII code heartbeat packet data within 40 bytes

AT+HEARTINFONEW

Function： Set/query heartbeat packet data

Format： Query

TX：AT+ HEARTINFONEW<CR>

Return：<CR><LF>+OK=<type>,<data><CR><LF>

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Set

TX：AT+ HEARTINFO=<type>,<data><CR>

Return：<CR><LF>+OK<CR><LF>

Parameter：type

0 HEX

1 ASCII

data

ASCII code within 40 bytes, when the heartbeat packet type is HEX, the content must be a legal HEX format and the length must be an even number.

AT+HEARTM

Function： Set/Query short heartbeat time

Format： Query

TX：AT+ HEARTM <CR>

return：<CR><LF>+OK=<time><CR><LF>

Set

TX：AT+ HEARTM =<time><CR>

return：<CR><LF>+OK<CR><LF>

parameter：time heartbeat time，0 off，1～65535 seconds

AT+SHORTM

Function： Set/Query short connection time

Format： Query

TX：AT+ SHORTM<CR>

return：<CR><LF>+OK=<time><CR><LF>

Set

TX：AT+ SHORTM=<time><CR>

return：<CR><LF>+OK<CR><LF>

parameter： time short connection time，0 off，2-255 seconds

AT+EBTIOT

Function： Set/query the ebyte IoT platform.

Format： Query

TX：AT+EBTIOT <CR>

return：<CR><LF>+OK=<ctrl><CR><LF>

Set

TX：AT+EBTIOT =<ctrl><CR>

return：<CR><LF>+OK<CR><LF>

Parameter: ctrl IoT Function Switch, 0 off / 1 on.

Note: After the Internet of Things cloud function is turned on, the module is automatically connected to the Ebyte IoT platform, ignoring the sock configuration, registration package, and heartbeat package Function.

AT+CSQ

Function： Query signal strength

Format： Query

TX AT+CSQ<CR><LF>

return <CR><LF>+OK=<csq><CR><LF>

parameter： csq signal strength

Description： None

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AT+CREG

Function: Check if it is registered to the carrier.

Format: Set

TX AT+CREG<CR><LF>

Return <CR><LF>+OK=<creg><CR><LF>

Parameter: creg

1 Network registered

2 Network not registered

Description: None

AT+CPIN

Function: Query SIM status

Format: Set

TX AT+CPIN<CR><LF>

return <CR><LF>+OK=<cpin><CR><LF>

Parameter: cpin

1 SIM card detected

0 SIM card not detected

Description: None

7. Notes

- The Socket link of this module will always be opened. After the initialization is successful, it will automatically establish a connection with the configured network server.
- After the module is powered on, it cannot be initialized successfully. That is, the State indicator has no indication for more than 30 seconds. In this case, check whether the module is installed properly, whether the SIM card is properly inserted, and whether the SIM has failed.
- Short connection can be used to reduce the connection pressure of multiple devices to the server. When the short connection function is enabled (AT+SHORTM>2), the module will actively disconnect the connection when the network or serial port has no data duration exceeding the short connection setting period. After the disconnection, the network cannot send data, and the local serial port sends valid data, the module will immediately establish a connection with the server. If the local clear cache function is turned off, the packet will be cached (maximum 10K bytes). After the connection is successful, the data will be sent to the server. The local cache function is cleared and the packet will be discarded.
- The heartbeat function is used to maintain the connection after the module and the server are successfully connected. In the network, if the client and the network server successfully establish a connection and there is no data transmission for a long time, the Socket link may appear “dead”, that is, the chain exists but cannot send and receive data. Therefore, in actual use, it is recommended to enable the heartbeat packet function to ensure the reliability of the network link.
- In actual use, it is normal for the data delay of the two communications to be different.
- When the device serial port outputs the words “pdp error, device will be reset!”, it indicates that the PDP context is disabled by the network. The SIM card may be loose or the current network channel is occupied abnormally.

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8. Important Statement

1. CDEBYTE reserves the right of final interpretation and modification of all the contents of this manual.

2. As the hardware and software products continuously improving, this manual may subject to change without notice, please refer to the latest version.

3. Everyone is responsible for protecting the environment: to reduce the use of paper, we only provide electronic documents of the English manual, if necessary, please go to our official website to download.

9. Revision history

Version	Revision history	Description	Issued by
1.00	2018-12-05	Initial version	Huaa

10. About Us

CDEBYTE after-sales technical support: support@cdebyte.com
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