



# **E840-TTL-NB03 User Manual**

**NB Wireless Module**



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E840-TTL-NB03 is developed for serial port devices and network servers to transmit data through the network. It supports B8 frequency band. It can be easily set up with simple AT commands. It can be used to realize serial-to-network two-way data transparency transmission. This chapter is a quick introduction to the E840-TTL-NB03 product. It is the easiest hardware environment to test the E840-TTL-NB03 network transmission function, that is, realize the two-way transparent transmission of data from the serial device (the computer) to the network server.



## Feature

- It meets almost all M2M application needs;
- Support data transparent transmission, support TCP/UDP network protocol, and heartbeat packet and registration package function can be customized;
- Serial port caching is supported. The serial port data can be cached locally before the server is connected;
- The maximum downlink rate of NB data is 85.6 kbps, and the maximum uplink rate is 85.6 kbps;
- Supports protocols such as TCP/UDP, encoding formats CS-1, CS-2, CS-3, and CS-4

## 1. Product overview

### 1.1 Introduction

E840-TTL-NB03 is a NB data transmission module developed by Ebyte. The software is fully functional and covers most common application scenarios. Users can realize two-way data transparency from serial port to network server through simple setup transmission.

The module uses 2.0mm pin headers to facilitate customer device integration, using 5V ~ 18V voltage supply. Support mobile NB card, communication and LED indication with compatible level, default 3.3V can be applied to 5V

level, with anti-interference ability, can be used in some environments with strong electromagnetic interference, such as some power industry.

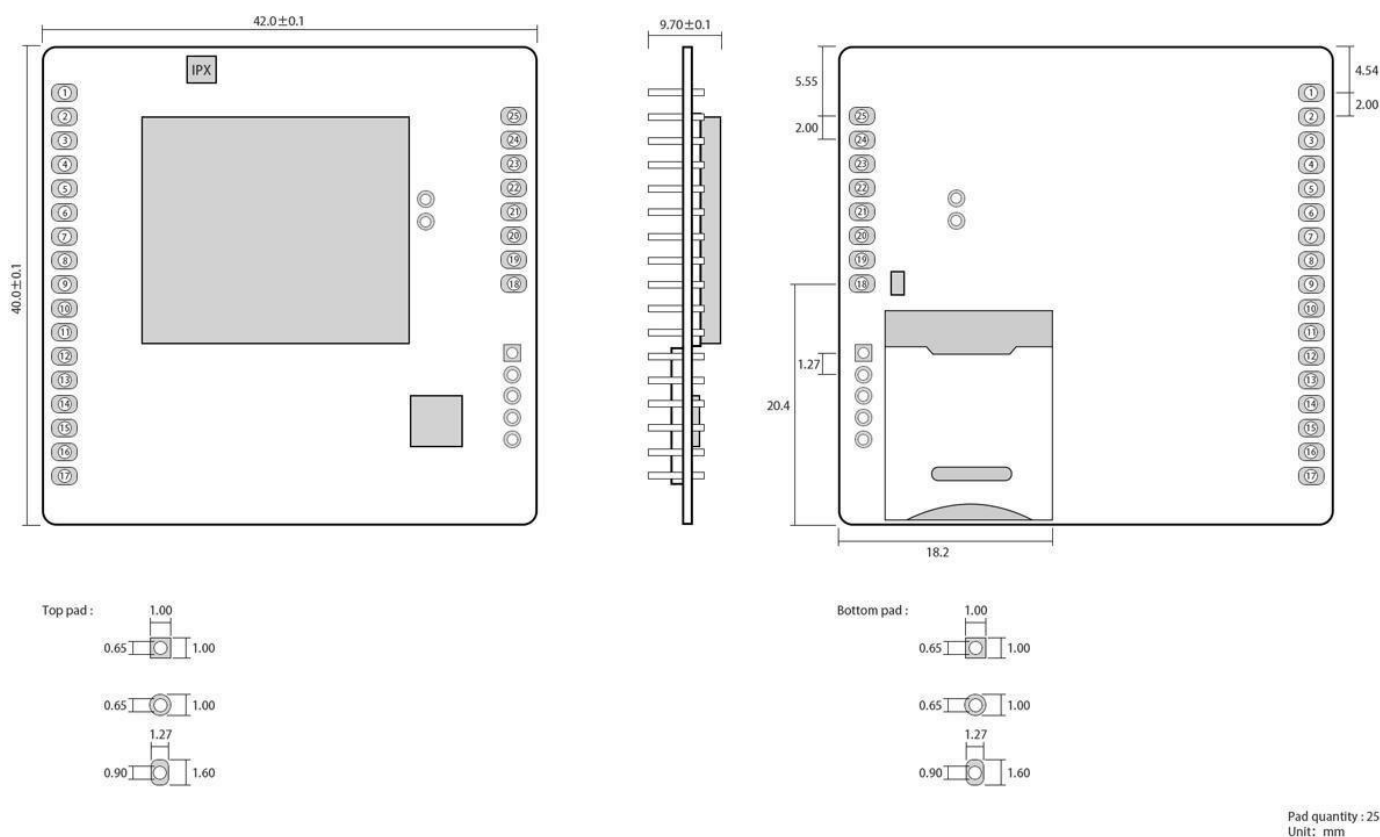
## 1.2 Parameter

Name	Value	Description
Hardware features	Frequency	B8 Module will search frequency automatically
	NB data feature	NB data downlink transmission: max 85.6kbps NB data uplink transmission: max 85.6kbps Coding format: CS-1、CS-2、CS-3 and CS-4 Support for PAP (Password Authentication Protocol) protocols commonly used for PPP connections Support usually used for CHAP (InterrogationHandshake Authentication Protocol) protocol Embedded protocol: TCP/UDP etc Support for unstructured supplementary data services (USSD)
Software features	Antenna	IPEX
	IoT cloud	Ebyte-IOT
	Data interface	TTL@3.3V, compatible with 5V
	Baud rate	Max 230400bps, default 115200bps
	Tx power	23dBm±2dB
	Working Temperature	-30°C - +70°C; working at -40°C~+85°C
	Working Voltage	DC: 5V~18V; Battery: 2.5V~3.6V
	Size	42×40×9.7 mm
	SIM	MICRO SIM card

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

### 1.3 Interface description



### 1.4 Pin definition

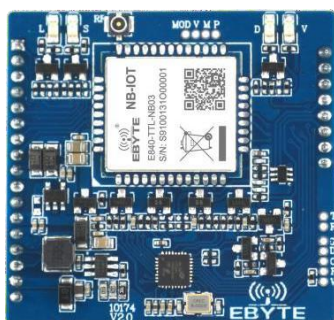
Pin no.	Name	Function
1	RST	Module reset
2	IORT	The low level lasts for 3~10S, the module parameters will be restored to the factory settings, and will be restarted immediately.
3	LINK	The link connection status indication pin corresponds to the onboard left 1 LED. High: Successful connection to the web server; Low: failed to connect to the web server;
4、24、25	NC	Not used
5	DATA	Data transmission and reception indication pin, when the network receives data or the serialport receives data (50ms high/10ms low), corresponding to the onboard third LED light from the left.
6	STAT	The device status indication pin corresponds to the onboard second LED from the left.

		<p>Low: The device is powered on to search for SIM card 1800ms low, 200ms high: the device checks the correct SIM card and is attaching to the network;</p> <p>High: The device is attached to the network successfully.</p>
7	RXD	Data receiving pin, default 3.3V, compatible with 5V
8	TXD	Data transmitting pin, default 3.3V, compatible with 5V
9	VEF	Drive level power supply pin, if you need to achieve 5V serial communication and LED indication is 5V drive level, you need to input 5V level on this pin.
10、11、14、15、23	MOD、SLE、PA6、PA7、EN	Unavailable
12	4V2	Lithium battery power supply pin, power supply range: 2.5V~3.6V. This pin is prohibited from being reversed and is not allowed to be supplied with VCC.
16	VCC	DC power supply pin, power supply range: 5V~18V. This pin is prohibited from being reversed and is not allowed to be supplied with 4V2.
19	VD	Connect to external SIM card power supply pin, if the onboard SIM card holder is used, the pin NC can be used.
20	RS	Connect to external SIM reset pin, if the onboard SIM card holder is used, the pin NC can be used.
21	DA	Connect to external SIM data pin, if the onboard SIM card holder is used, the pin NC can be used.
22	CL	Connect to external SIM clock pin, if the onboard SIM card holder is used, the pin NC can be used.
13、17、18	GND	Ground

## 2. Quick start

### 2.1 Hardware preparation

Before testing, please connect serial port line as per recommended circuit, there are SIM card and antenna.



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USB 转 TTL

1. Enter the AT command mode and send +++ in the serial port assistant (except that +++ does not need to check to send a new line, other AT commands need to tick to send a new line to be valid), you must send +++ command 3s Sending any other AT command (except for restarting the AT command) can completely enter the AT command mode.

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 uses AT+CSQ to view the current signal strength:

For example: AT+CSQ+OK=26Indicates 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

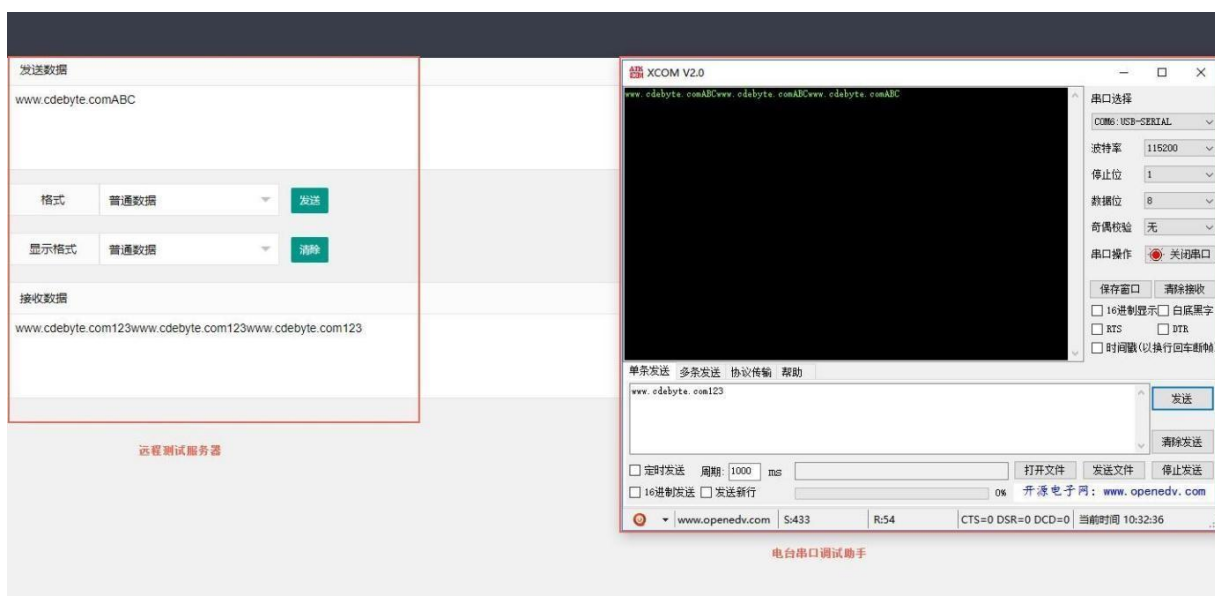
+OK

Indicates that the setting was successful.

4. Restart (all AT commands modify parameters, the device will take effect after restart) 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 can be performed at this time.



## 2.2 Data Transmitting Test

Software is needed for data transmitting test:

Xcom is applied here for the test and you can download it at our website. Users can also apply other test tools that are available.



## 2.2.1 Working mode:

1. Working mode: Transparent transmission mode, AT configuration mode, cloud platform mode

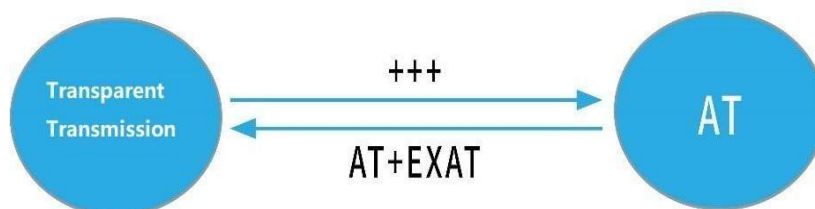
a) Transparent transmission mode: After power-on, the module works in the transparent transmission mode by default, and automatically starts the network connection. When the connection is established with the server, any data received by the serial port will be transparently transmitted to the server. At the same time, it can also receive the number 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 486 bytes.

This module supports one-way Socket connection. The user can be configured 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.

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

c) Cloud platform mode: The E840-DTU (NB-03) configuration tool can be used to switch to the cloud platform mode. After the configuration is completed, the data can be tested. It should be noted that the maximum data of the single package in the cloud platform working mode is 100. , the time interval for sending data packets is not less than 5s.

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.



## 2. 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 65535 seconds. When set to 0, the short connection function is disabled.

b) Registration packet: The registration packet is closed by default. The total of 4 options are: send 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, customize The maximum length of the registration packet 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

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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 heartbeat types, network heartbeat, serial heartbeat, selects network heartbeat, starts timing with communication idle, and sends heartbeat packets to the server according to the configured heartbeat period. Select the serial port heartbeat, start timing with communication idle, and send heartbeat packets to the serial port according to the configured heartbeat period.

d) 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 512 bytes.

### 3. Ebyte Internet of Things platform function

After the AT+EBTIOT command is used to set whether the module will enable the transparent transmission function of the Ebyte cloud platform, after the device is turned on, the information such as the heartbeat and registration packet 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 device. Data is transparent. For specific operations, please refer to the "Ebyte Special Cloud Platform Transparent Transmission Guide".

### 3. AT Command

a) Command format: AT+<CMD>[op][ para1, para2, para3,...]<CR><LF>

AT+: Command prefix

CMD: Control command

[op]: “=” Parameter configuration

“NULL” Parameter query

[para-n]: List of parameters, can be omitted

<CR><LF>: Line Feed, ASCII 0x0D 0x0A

b) Command 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
VER	Query version number
INFO	Query device information
EXAT	Exit AT command mode
RESTORE	Restore factory settings
UART	Set/query serial port parameters
UARTCLR	Set/Query whether to clear the serial port cache before connecting
MAC	Query MAC address
IMEI	Query IMEI
SN	Set/query SN code
LINKSTA	Query the SOCK connection status
SOCK	Set/query SOCK parameters
REGMOD	Set/Query Registration Packet Mode
REGINFO	Set/Query User Registration Packet information (ASCII)
REGINFOEW	Set/Query User Registration Packet information (HEX)
HEARTMOD	Set/query heartbeat packet mode
HEARTINFO	Set/Query User Heartbeat Packet information (ASCII)
HEARTINFOEW	Set/Query User Heartbeat Packet information (HEX), Supporting index
HEARTM	Set/query heartbeat time
SHORTM	Set/query short connection time

CDEBYTEIOT	Set/query the IP and port address of the Ebyte IoT cloud platform
EBTIOT	Set/query the Ebyte IoT cloud platform enable
CREG	Query whether to register to the network
CSQ	Query signal strength
CPIN	Query SIM card status
LBS	Query LAC & CID code
RSTIME	Set/query reset time

d) Command details:

**AT+REBT**

Function: Restart the device.

Format: Set

Send: AT+REBT<CR>

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

Para: None

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

**AT+VER**

Function: Query firmware version.

Format: Set

Send: AT+VER<CR><LF>

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

Para: ver firmware versin

Note: None

**AT+INFO**

Function: Query device type and version information

Format: Set

Send: AT+INFO<CR><LF>

Return: <CR><LF>+OK=<mod\_name>,<hw\_ver>,<sw\_ver><CR><LF>

Para: mod\_name Device name  
hw\_ver Hardware version  
sw\_ver Software version

Note: None

**AT+EXAT**

Function: Exit command mode and enter transparent transmission mode.

Format: Set

Send: AT+EXAT<CR><LF> Return:

<CR><LF>+OK<CR><LF>

Para: None

Note: After the command is executed correctly, the device switches from command mode to transparent

transmission mode.

### AT+RESTORE

Function: Restore factory settings.

Format: Set

Send: AT+RESTORE<CR><LF>

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

Para: None

Note: None

### AT+UART

Function: Set/Query UART parameters.

Format: Query

Send: AT+UART<CR>

Return: <CR><LF>+OK=<baudrate>,< parity ><CR><LF>

Set

Send: AT+UART=<baudrate>,< parity ><CR><LF>

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

Para: baudrate, can be configured to: 9600, 19200, 38400, 57600, 115200, 230400, 460800,921600.

Parity Parity bit NON

E No Check EVEN Even check ODD Odd check

Note: None

### AT+UARTCLR

Function: Set/Query whether to clear the serial port cache before connecting.

Format: Query

Send: AT+ UARTCLR <CR>

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

Set

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

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

Para: sta status

ON Clear the serial port cache before connecting

OFF Don't clear the serial port cache before connecting

### AT+IMEI

Function: Query device IMEI.

Format: Query

Send: AT+IMEI<CR>

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

Para: imei Device IMEIcone

### AT+SN

Function: Set/Query SN.

Format: Query

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Send: AT+SN<CR>  
Return: <CR><LF>+OK=<sn><CR><LF>  
Set  
Send: AT+SN=<sn><CR>  
Return: <CR><LF>+OK<CR><LF>

### AT+LINKSTA

Function: Query whether the TCP link has been established.

Format: Query

Send: AT+LINKSTA<CR>  
Return: <CR><LF>+OK=<sta><CR><LF>

Para: Sta Connect(TCP Connected) / Disconnect(TCP Disconnected)

### AT+SOCK

Function: Set/Query network protocol parameter format.

Format: Query

Send: AT+SOCK<CR>  
Return: <CR><LF>+OK=<protocol>,<ip>,< port ><CR><LF>

Set

Send: AT+SOCK=<protocol>,<ip>,< port ><CR>  
Return: <CR><LF>+OK<CR><LF>

Para: protocol TCPC / UDPC

TCPC: TCP client

UDPC: UDP client

ip The IP address or domain name of the target server

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

### AT+REGMOD

Function: Set/Query registration packet mechanism.

Format: Query

Send: AT+REGMOD<CR>  
Return: <CR><LF>+OK=<status><CR><LF>

Set

Send: AT+REGMOD =<status><CR>  
Return: <CR><LF>+OK<CR><LF>

Para: status Registration packet mechanism

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

EMBCSTM Add user registration packet data before each packet sent to the server

OLMAC Send a MAC/IMEI registration packet only when connecting to the server at the first time

OLCSTM Send a user registration packet only when connecting to the server at the first time

OFF Registration packet mechanism off

### AT+REGINFO

Function: Set/Query the contents of the user registration packet.

Format: Query

Send: AT+ REGINFO <CR>

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

Set

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

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

Para: data Less than 40 bytes ASCII code

### AT+REGINFONEW

Function: Set/Query the contents of the user registration packet.

Format: Query

Send: AT+ REGINFONEW<CR>

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

Set

Send: AT+ REGINFONEW =<type>,<data><CR>

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

Para: type

0 registration packet is HEX

1 registration packet is ASCII code

data

Less than 40 bytes ASCII code, when the registration packet type is HEX, the content must be in the legal HEX format and the length must be an even number

### AT+HEARTMOD

Function: Set/Query heartbeat packet mode.

Format: Query

Send: AT+ HEARTMOD<CR>

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

Set

Send: AT+ HEARTMOD=<mode><CR>

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

Para: mode

NET Network heartbeat packet

UART UART heartbeat packet

### AT+HEARTINFO

Function: Set/Query heartbeat packet data.

Format: Query

Send: AT+ HEARTINFO<CR>

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

Set

Send: AT+ HEARTINFO=<data><CR>

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

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Para: data Less than 40 bytes ASCII code

### AT+HEARTINFONEW

Function: Set/Query heartbeat packet data.

Format: Query

Send: AT+ HEARTINFONEW<CR>

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

Set

Send: AT+ HEARTINFO=<type>,<data><CR>

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

Para: type

0 Heartbeat packet data is HEX

1 Heartbeat packet data is ASCIIcode

data

Less than 40 bytes ASCII code, when the registration packet type is HEX, the content must be in the legal HEX format and the length must be an even number

### AT+HEARTM

Function: Set/Query heartbeat packet time.

Format: Query

Send: AT+ HEARTM <CR>

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

Set

Send: AT+ HEARTM =<time><CR>

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

Para: time

Heartbeat time 0 OFF, range 1~65535 seconds

### AT+SHORTM

Function: Set/Query short connection time.

Format: Query

Send: AT+ SHORTM<CR>

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

Set

Send: AT+ SHORTM=<time><CR>

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

Para: time

Short connection time 0 OFF, range 2~65535 seconds

### AT+ CDEBYTEIOT

Function: Set/Query the IP and port address of the Ebyte IoT cloud platform.

Format: Query

Send: AT+ CDEBYTEIOT<CR>

Return: <CR><LF>+OK=<ip>,<port><CR><LF>



Set  
Send: AT+ CDEBYTEIOT=<ip>,<port><CR>  
Return: <CR><LF>+OK<CR><LF>

### AT+EBTIOT

Function: Set/Query Ebyte IoT platform.

Format: Query  
Send: AT+EBTIOT <CR>  
Return: <CR><LF>+OK=<ctrl><CR><LF>  
Set  
Send: AT+EBTIOT =<ctrl><CR>  
Return: <CR><LF>+OK<CR><LF>

Para: ctrl Ebyte IoT platform switch ON Turn on / OFF Turn off

Note: After the IoT cloud function is enabled, the device is automatically connected to the Ebyte IoT platform, ignoring the sock configuration and registration packet, heartbeat packet function.

### AT+CSQ

Function: Query signal strength.

Format: Query  
Send: AT+CSQ<CR><LF>  
Return: <CR><LF>+OK=<csq><CR><LF>

Para: csq signal strength

Note: None

### AT+CREG

Function: Query whether to register to the operator network.

Format: Query  
Send: AT+CREG<CR><LF>  
Return: <CR><LF>+OK=<creg><CR><LF>

Para: creg  
1 Registered to the network  
0 Not registered to the network

Note: None

### AT+CPIN

Function: Query SIM card status.

Format: Query  
Send: AT+CPIN<CR><LF>  
Return: <CR><LF>+OK=<cpin><CR><LF>

Para: cpin  
1 SIM card detected  
0 No SIM card detected

Note: None

### **AT+LBS**

Function: Query LAC & CID code.

Format: Query

Send: AT+LBS<CR><LF>

Return: <CR><LF>+OK=<lac><cid><CR><LF>

### **AT+RSTIME**

Function: Set/Query reset time.

Format: Query

Send: AT+RSTIME<CR><LF>

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

Set

Send:

AT+RSTIME=<rstime><CR><LF>

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

## 4. Notes

1. The Socket link of this device will always be opened. After the initialization is successful, it will automatically establish a connection with the configured network server.
2. After the device 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 been invalid.
3. The short connection feature can be used to reduce the connection pressure of multiple devices to the server. After the short connection function is enabled (AT+SHORTM>2), when the network or serial port has no data for more than the short connection setting cycle, the device will actively disconnect the connection. After disconnection, the network cannot send data. When the serial port sends valid data, the device will immediately establish a connection with the server. If the local clear cache function is turned off, the current packet will be cached (up to 10K bytes). After the connection is successful, the data will be sent to the server. If the clear local cache function is enabled, the packet will be discarded.
4. The heartbeat function is used to maintain the state after the device and the server are successfully connected. Because 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 be "dead", that is, the link exists, but cannot send or receive data. Therefore, in actual use, it is recommended to enable the heartbeat packet function to ensure the reliability of the network link.
5. In actual use, it is normal that there is different data delay of two communications.
6. 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. Maybe the SIM card is loose or the current network channel is occupied abnormally.

## 5. Important Statement

1. Ebyte 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.

## 6. Revision history

Version	Date	Specification	Issued by
1.1	2019-05-30	Initial version	Blue
1.2	2019-07-05	Revised version	Lyl
1.3	2020-04-15	Revised version	du
1.4	2021-05-26	Revised version	HLL
1.5	2022-8-31	Revised version	Hao

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## 7. About Us

Technical support: [support@cdebyte.com](mailto:support@cdebyte.com)

Documents and RF Setting download link: <https://www.cdebyte.com>

Thank you for using Ebyte products! Please contact us with any questions or suggestions: [info@cdebyte.com](mailto:info@cdebyte.com)

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