Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual

Contents

1. Introduction

1.1 Brief Introduction

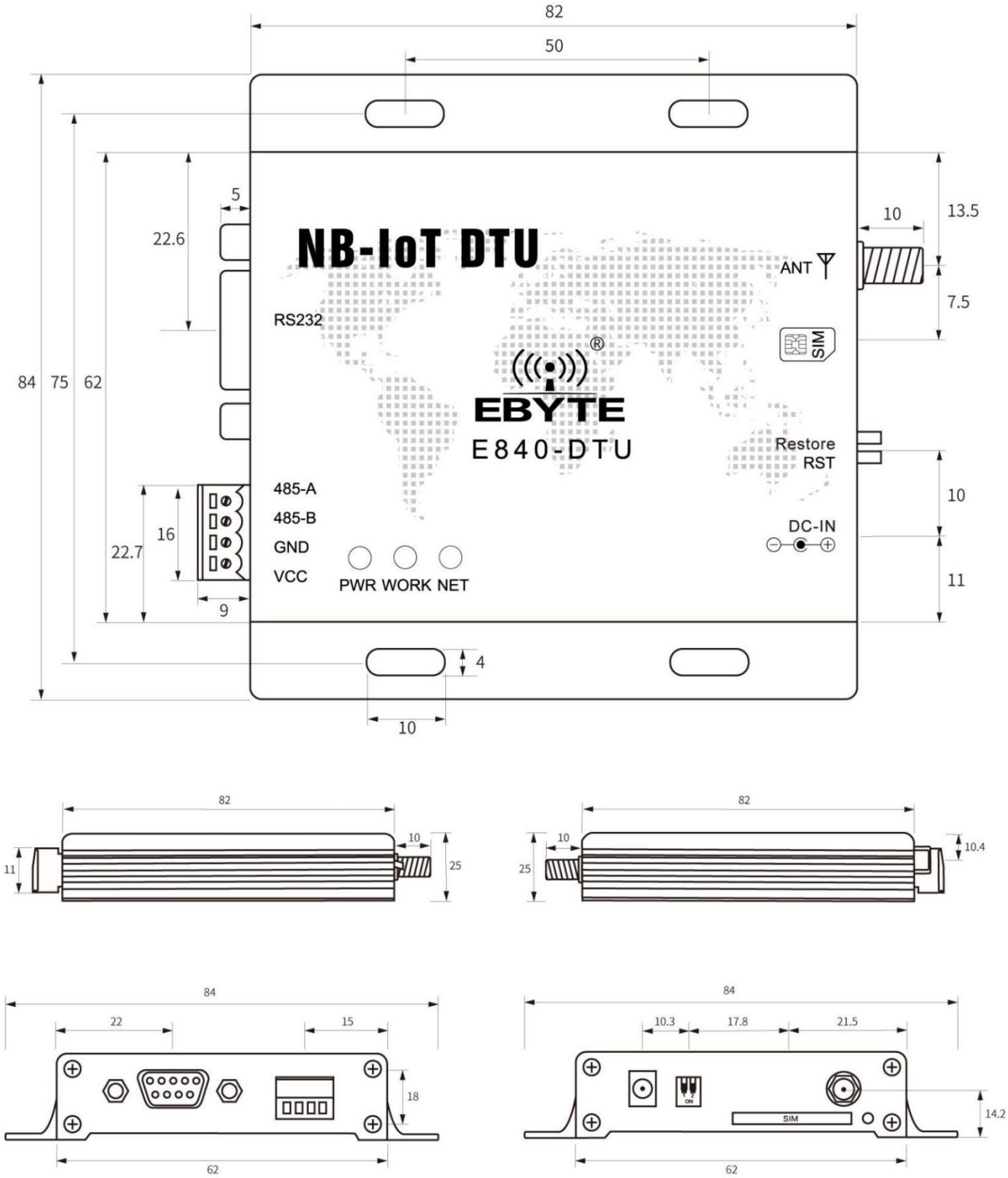
E840-DTU(NB-03) is a NB-IoT DTU produced by Ebyte. It features a certain scope of applications which cover most common application scenarios. The user can realize bidirectional transparent data transmission from the serial port to the network server by simple setting.

E840-DTU(NB-03) supports DC and terminal power supply. Its voltage ranges from 5V to 36V. RS232 and RS485 apply electric isolation which enables anti-interference. It is applicable in some environment with strong electromagnetic interference like power sector.

1.2 Parameters

Item	Parameter	Description
Frequency	Band 5	Receiving Frequency: 869MHz~894MHz Transmitting Frequency: 824MHz~849MHz
Hardware features	Antenna Type	SMA
	Data Interface	RS485/RS232
	Baud Rate	Default is 115200bps, maximum 921600bps
	Maximum transmitting power	23dBm±2dB
	Sensitivity	-129dBm±1dB
	Current consumption (typical value)	Idle Mode(Idle): 18.4mA
	Working Voltage	DC 5V-36V
	Working Temperature	-40℃- 70℃
	Storage Temperature	-40℃- 85℃
	Size	82×84×24mm
	RS485/RS232	With both RS485 and RS232, Electrical isolation, and
Software features	Wireless data rate	Single Tone, Sub-carrier 15kHz and 3.75kHz: 21.25kbps (Downlink)， 15.625kbps (Uplink)
	Working Mode	Network transmission mode, cloud platform working mode
	Setting command	Abide by 3GPP TS 27.007 V14.3.0 and Quectel AT command
	Network protocol	Support multiple protocol, such as CoAP, UDP, IPv4, LwM2M etc.
	Device ID	Users can configure the device ID by AT command

1.3 Interface Description



1.4 Pin Definition

Pin No.	Name	Description
1	RS232	RS232 interface
2	485_A	Side A of external interface for other RS485 devices
3	485_B	Side B of external interface for other RS485 devices
4	GND	Ground electrode
5	VCC	Power supply，default: 5~36V
6	PWR	Power indicator
7	WORK	UART communication indicator
8	NET	Net working indicator
9	DC-IN	5V-36V
10	RST	Reset switch(downward, reset)
11	Restore	Restore factory settings switch(downward, 5-10S)
12	SIM	SIM card slot
13	ANT	Antenna interface(SMA-K, 50Ω)

2. Quick Start

2.1 Device Preparation

	
E840-DTU(NB-03)	12V Power adaptor
	
USB to RS485 or USB to RS232	NB-IoT sucker antenna

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

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.

(1) Place the SIM card in the E840-DTU (NB-03) card slot and connect to the computer using the above connection method. Open the COM debugging assistant software, select the corresponding COM port number, baud rate and other parameters (115200 baud rate), and open the COM port.

(2) When the E840-DTU (NB-03) is powered on (please note that the reset pin is high), the POWER light is on to indicate that the radio is working normally.

(3) E840-DTU (NB-03) has two working modes: network transparent transmission mode and cloud platform working mode; the E840-DTU (NB-03) configuration tool can be used to configure the working mode, or it can be configured by AT command.

(4) After the configuration is completed, you can do the test. Please note that the maximum data of a single packet in the network transparent transmission mode is 486, the maximum data of a single packet of the cloud platform working mode is 100, and the interval of sending data is no less than 5s.

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)
REGINFONEW	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+MAC

Function: Query device MAC.

Format: Query

Send: AT+MAC<CR>

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

Para: mac Device MAC address

AT+IMEI

Function: Query device IMEI.
Format: Query
Send: AT+IMEI<CR>
Return: <CR><LF>+OK=<imei><CR><LF>
Para: imei Device IMEI code

AT+SN

Function: Set/Query SN.
Format: Query
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>

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 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+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.

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