E70-DTU(433NW30)

User Manual

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Content

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1. Overview

1.1 Introduction

E70-DTU(433NW30) is a star network system, working in the 433MHz band, and has RS232/RS485 interface options, the module integrates coordinator and terminal, with two transmission modes: long distance and high speed. A coordinator supports up to 200 nodes to communicate with it, bidding farewell to the polling protocol. All operations are configured using industry standard AT commands, which greatly simplifies user operations and is suitable for a variety of wireless communication networking scenarios.

As a communication medium, wireless digital transmission radio, like fiber optic, microwave, open wire, has a certain scope of application: it provides real-time, reliable data transmission of monitoring signals in the special network under certain special conditions, has the characteristics of low cost, easy installation and maintenance, strong bypass capability, flexible network structure, and far coverage, suitable for many scattered points, complex geographic environments, etc., and can be used in conjunction with PLC, RTU, rain gauge, liquid level meter, etc., and can also be used as a communication medium. It can be connected with PLC, RTU, rain gauge, liquid level meter and other data terminals.

1.2 Features

★Multi-send and one-receive to achieve star self-organizing network (the technology was authorized by the National Invention Patent), the maximum support for 200 nodes concurrently concurrent data, without polling;

★Support AT command;

★Support RS232/RS485, one of the two can be used;

★In coordinator mode, support broadcast transmission, short address transmission, long address transmission;

★Firmware integration of long distance mode, high speed rate mode, to adapt to a variety of different applications;

★Communication is encrypted with AES128 data encryption to ensure packet security and reliability;

★Carrier sense multiple access with collision avoidance (CSMA-CA);

★Single packet support up to 128 bytes, adapted to Modbus;

★Simple and efficient power supply design, support power adapter or crimping method, support 10～28V power supply;

★Transmit power up to 1W, and multi-level adjustable, all technical indicators to meet European industry standards;

★Temperature compensation circuit, frequency stability better than ±1.5PPM;

★ Operating temperature range: -40 ℃ ～ +85 ℃, to adapt to a variety of harsh working environment, the real industrial-grade products;

★ All-aluminum alloy shell, compact size, easy to install, good heat dissipation; perfect shielding design, good

electromagnetic compatibility, anti-interference ability;

★ Power reverse connection protection, over-connection protection, antenna surge protection and other multiple protection functions, greatly increasing the reliability of the radio;

★Powerful software functions, all parameters can be set by programming: such as power, frequency, air rate, address ID, etc.;

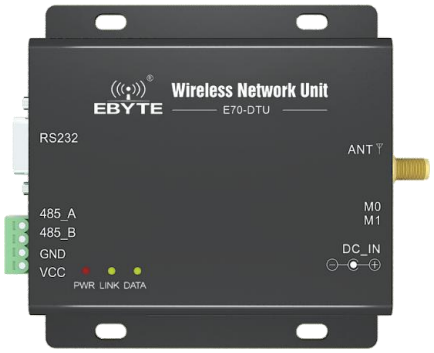
★ Ultra-low power consumption, watchdog current is only 23mA (power saving mode and sleep mode power consumption is even lower), transmit current ≤ 0.3A;

★ Built-in watchdog, and precise time layout, once an exception occurs, the module will automatically restart, and can continue to continue to work in accordance with the previous parameter settings.

2. Quick Start

2.1 Hardware preparation

The following hardware devices are required for this test. Before testing, connect the hardware such as power supply and antenna;

	
One E70-DTU (433NW30)	One 12V power adapter
	
USB to RS485 cable or USB to RS232 cable (choose one)	One 433M suction cup antenna

2.2 Data transmission test

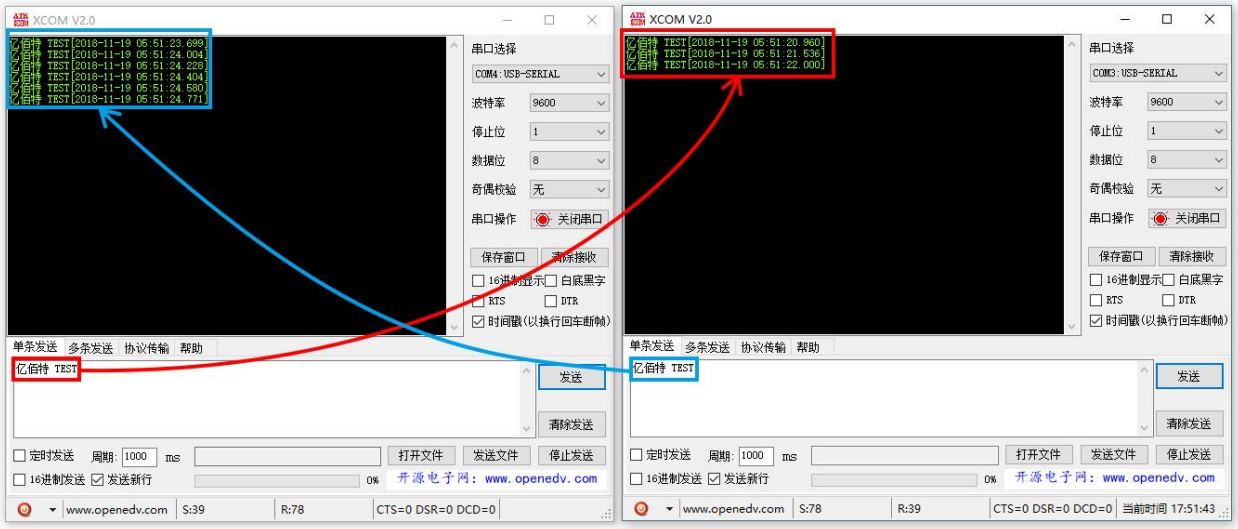
This data transmission test requires the use of software tools;

Any serial port assistant, this paper selects XCOM, the software driver can be downloaded from our official website www.cdebyte.com itself.

2.3 Test Steps

Product factory default mode 4 (use external hardware to select the working mode), will radio A dipswitch are dialed down (i.e.: M1 = 1, M0 = 1), at this time the LINK lamp (yellow) is lit, indicating that the radio into the coordinator mode. Wave radio B dip switch M1 down (i.e., M1=1, M0=0);

Wait for about 10s, the LINK lamp (yellow) of Radio B lights up, indicating that Radio B is connected to Radio A. At this point you can communicate with each other.



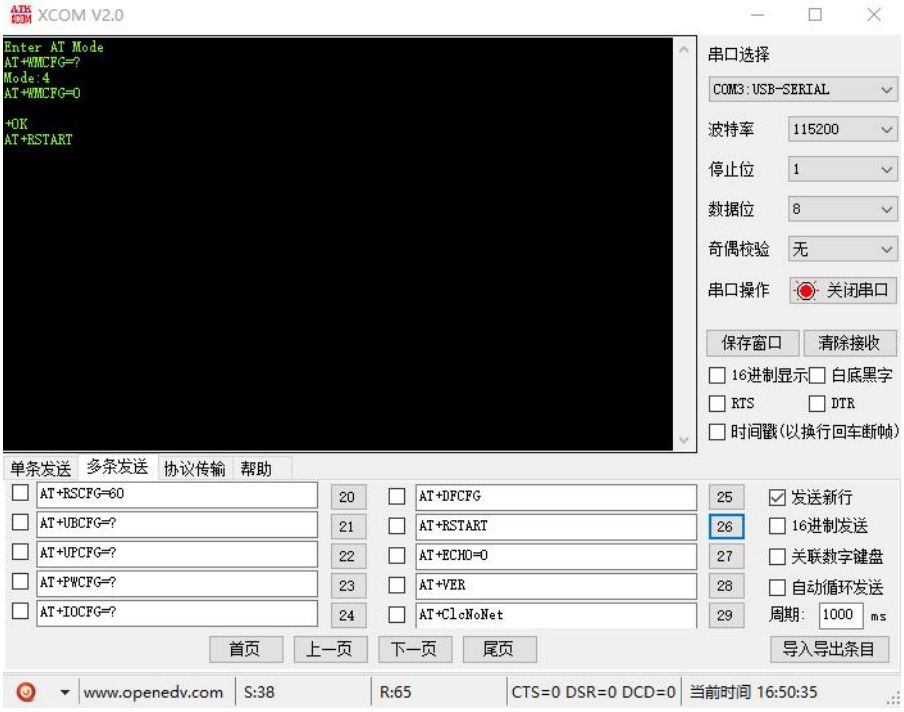
Use the Serial Port Assistant to make mode changes to the E70-DTU (433NW30);

+++ Enter AT command

AT+WMCFG=? Read current working mode

AT+WMCFG=0 Change to mode 3 (coordinator mode)

AT+RSTART Restart the radio

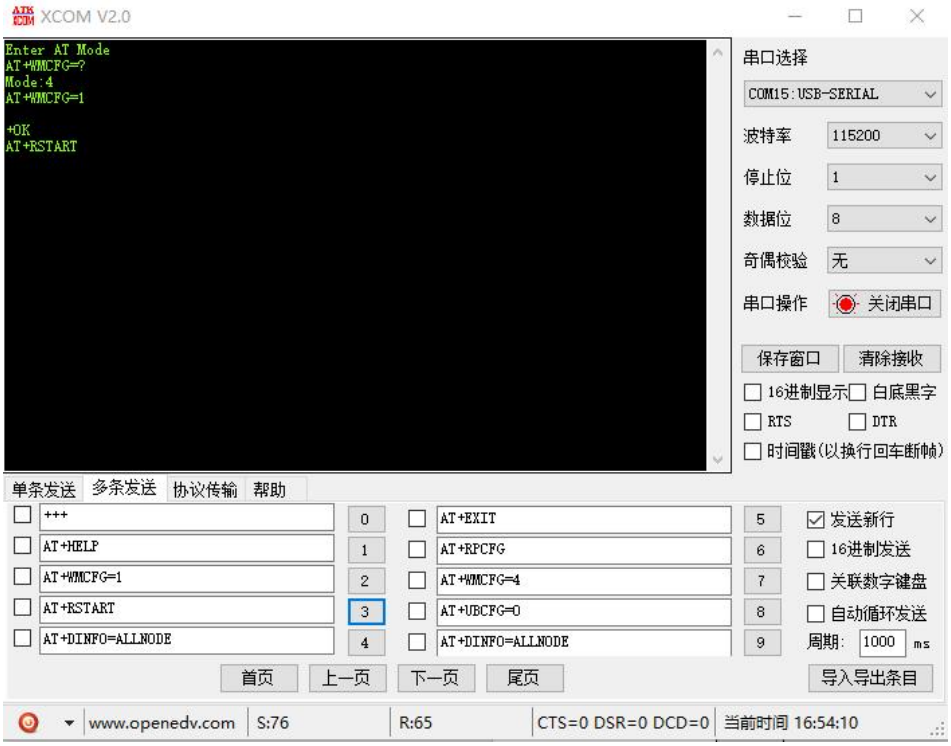


+++ Enter the AT command

AT+WMCFG=? Read current operating mode

AT+WMCFG=1 Change to mode 0 (node mode)

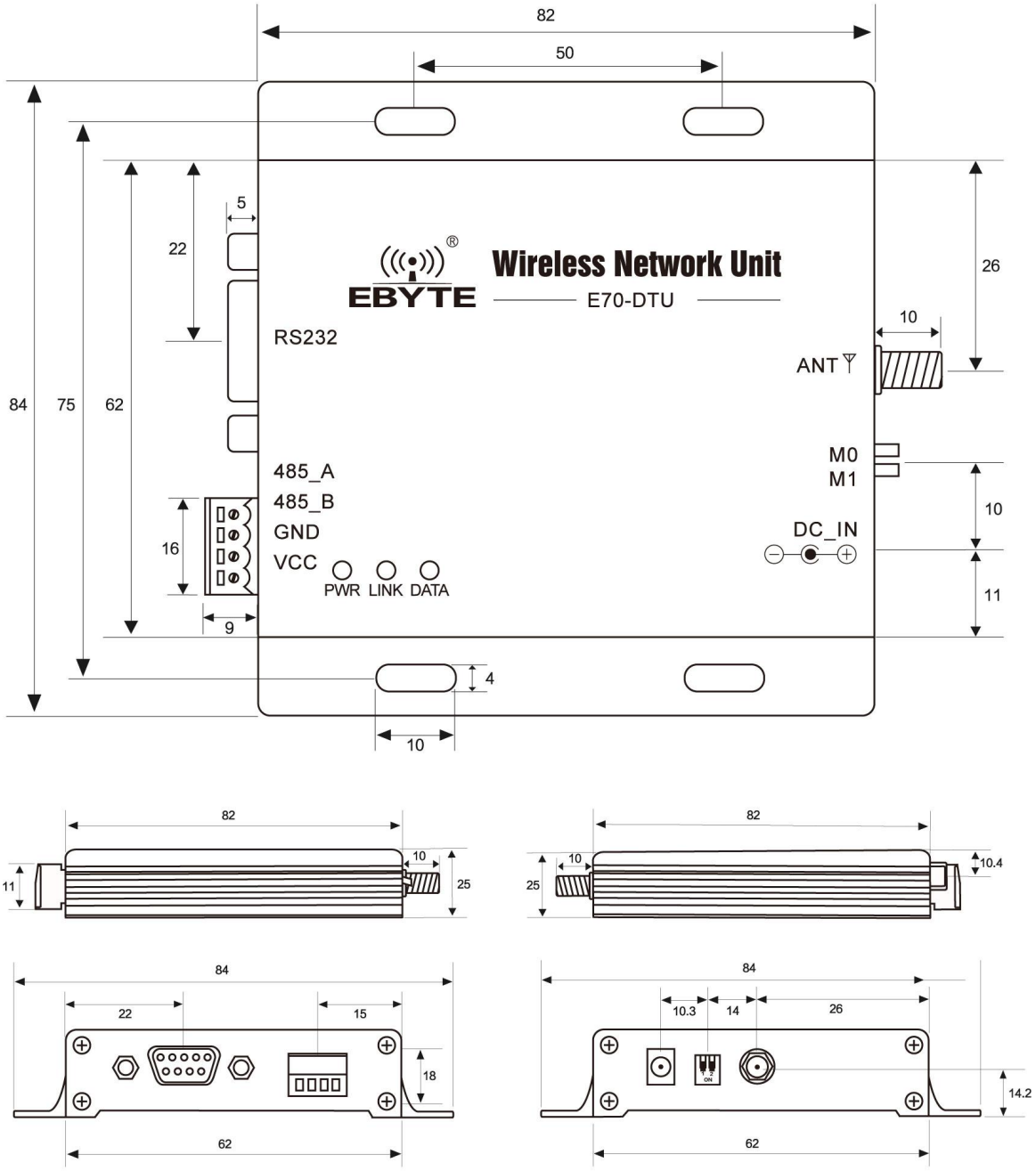
AT+RSTART Restart the radio



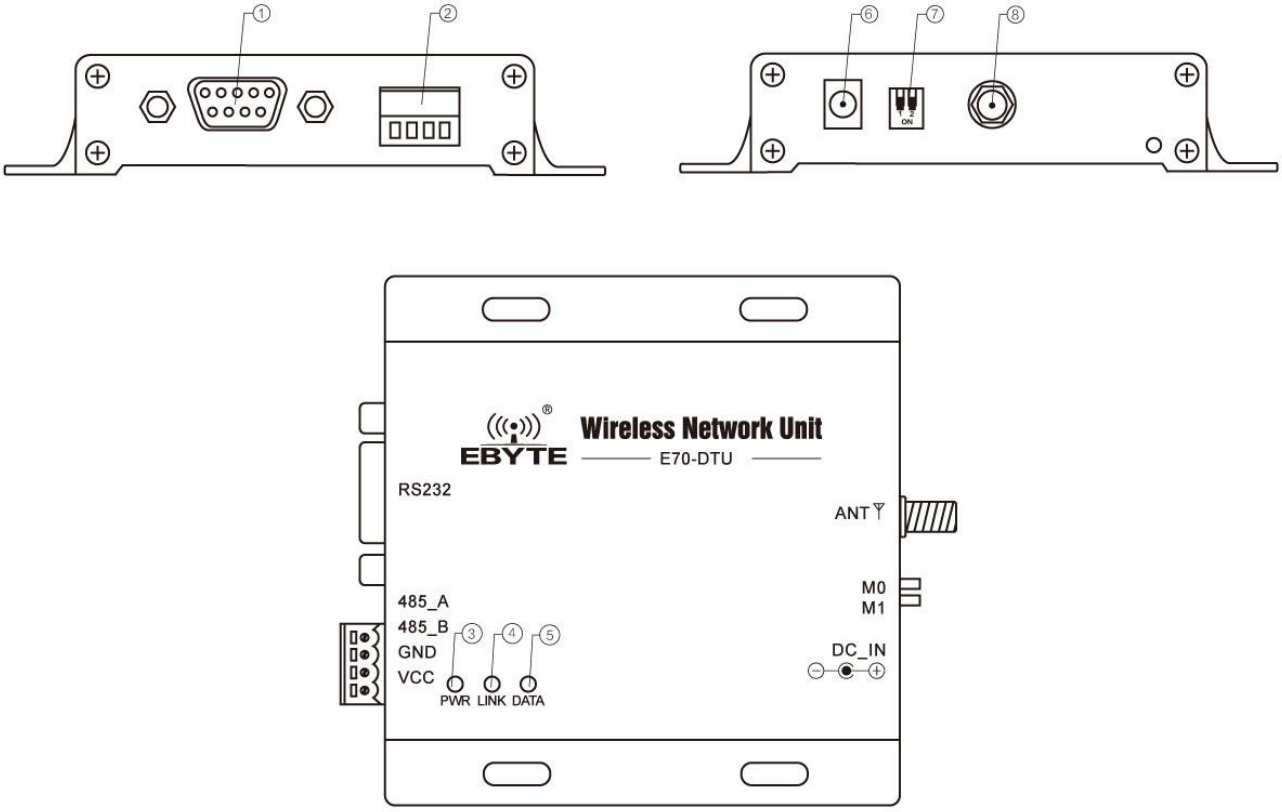
Note: When both dial codes M0M1 are 1 (both dip switches are up), the radio will be forced to enter the hibernation mode, in which the radio's serial communication parameters are: 115200, 8 N 1 The parameters can also be set using the E70-DTU's upper computer software.

3. Hardware Designs

3.1 Product dimensions



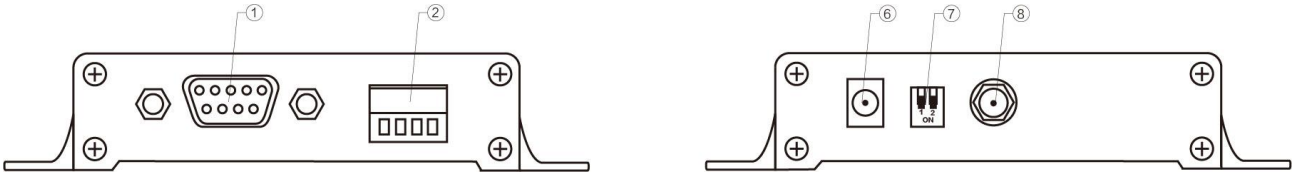
3.2 Interface Description



No	Name	Functions	Instruction
1	DB-9 Female Sockets	RS232 interface	Standard RS232 interface
2	3.81 Terminal Block	RS485, Power Interface	Standard RS485 Interface with Crimp Power Connector
3	PWR-LED	Power indicator	Red, illuminates when power is on
4	LINK-LED	Networking Indicator	Yellow, blinks when network access is successful
5	DATALED	Receiving indicator	Yellow, blinking when sending or receiving data
6	DC Power Connector	Power connector	In-line round hole, outer diameter 5.5mm, inner diameter 2.5mm
7	DIP Switch	DIP Switch	Operating mode control
8	Antenna Interface	SMA-K Interface	External threaded bore, 10mm long, 50Ω characteristic impedance

4. Interface Definitions

4.1 Power Interface Description



Users can choose to ⑥ DC power supply interface power supply, use the interface for 5.5mm outer diameter, inner diameter 2.5mm power adapter power supply;

You can also use the VCC terminal and GND terminal in ② to supply power, just choose any one of the power supply methods;

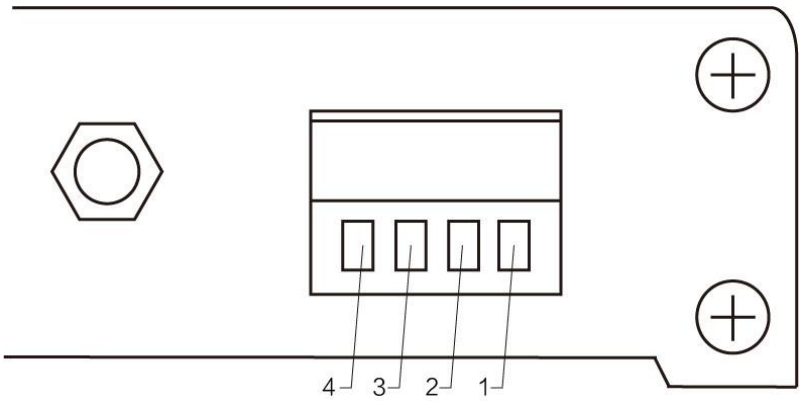
E70-DTU can be powered by 10-28V DC power supply, and it is recommended to use 12V or 24V DC power supply.

4.2 RS232 Interface Definition

The E70-DTU can be connected to the device via RS232 using a standard DB-9 interface.

4.3 RS485 Interface Definition

The E70-DTU can be connected to the RS-485 terminals A and B of the device using the 485_A and 485_B terminals in ②.



No	Name	Functions	Instruction
1	VCC	Crimp Wire Power Connector, Positive	DC 10-28V, 12V or 24V recommended
2	GND	Crimp Wire Power Interface,	The negative pole of the power supply is

		Negative	connected to the system ground and shell.
3	485_B	RS-485 Interface, B Socket	RS-485 interface B interface is connected to the device B interface.
4	485_A	RS-485 Interface, A Connector	RS-485 interface A interface is connected to device A interface.

Note: When connecting the radio to more than one device, the communication is not smooth, but not when connecting to a single device, please try to connect a 120Ω resistor in parallel between the 485_A and 485_B terminals.

5. Technical indicators

No	Causality	Descriptions
1	Overall Dimension	82 * 62 *25mm
2	Weight	116g±2g
3	Frequency Band	433MHz
4	Transmit power	30dBm
5	Supply Voltage	8 ~ 28V DC, note: higher than 28V will lead to permanent damage to the module
6	Communication Mode	8N1, 8E1, 8O1, 1200 ~ 115200 total 8 baud rates (default 115200)
7	Radio Frequency Interface	SMA-K
8	Communication Interface	RS232, RS485
9	Transmit Length	128 bytes
10	Receive Length	128 bytes
11	Driving Mode	Can be set to push-pull/pull-up, open drain
12	User Configuration	AT command configuration
13	RSSI Support	Supported, configurable outputs
14	Operating Current	Transmit: 468mA@12V, Receive: 24.2mA@12V
15	Operating Temperature	-40 ~ +85℃, industrial grade
16	Operating Humidity	10% to 90%, Relative Humidity, Non-Condensing
17	Storage Temperature	-40 ~ +125℃, industrial grade

6. Firmware launch mode

6.1 Transmitted emission

When the coordinator is set to transmit through, the coordinator will send a broadcast message, at which time all non-dormant nodes in the entire network receive the data.

6.2 Short address launch

	binary	summaries
The coordinator sends a short address in the following format: short address + valid data 00 00 or FF FF is the broadcast address;		
Coordinator	Hexadecimal	Send: 00 01 AA BB CC
A node address 00 01	Hexadecimal	Receive: AA BB CC
B node address 00 02	Hexadecimal	Receive: None
C node address 00 03	hexadecimal	Receive: None
Coordinator	Hexadecimal	FF FF AA BB CC
A node address 00 01	Hexadecimal	AA BB CC
B node address 00 02	Hexadecimal	AA BB CC
C node address 00 03	hexadecimal	AA BB CC

6.3 Long address launch

	Binary	Summaries
The coordinator long address sends the format: long address + valid data		
Coordinator	Hexadecimal	Send: 0A 01 AA 45 65 13 12 44 AA BB CC
A node address :	Hexadecimal	Receive: AA BB CC
0a 01 aa 45 65 13 12 44	Hexadecimal	Receive: None
Node B Address	hexadecimal	Receive: None

Coordinator	Hexadecimal	FF FF FF FF FF FF FF FF AA BB CC
A node address	Hexadecimal	AA BB CC
0a 01 aa 45 65 13 12 44	Hexadecimal	AA BB CC
B node address	hexadecimal	AA BB CC

7. Operating modes

模式 0

模式 1

模式 2

模式 3

Mode	Categories	M1	M0	Comments
Mode 0	Coordinator Mode	0	0	Build a network and manage the information of the incoming nodes (transmit data according to the input and output modes)
Mode 1	Normal Node	0	1	Send and receive data at any moment (high real-time)
Mode 2	Low Power Node	1	0	Low-power reception, send data at any moment (reception delay, send need to wake up the serial port)
Mode 3	Configuration mode	1	1	Unable to send and receive data, system hibernation, parameter configuration (baud rate fixed 115200 8N1)

7.1 Coordinator model

If the user-configured system operating mode is 4 and the M0M1 combination is 00 or the user-configured system mode is 0, the module operates in the coordinator mode. In the coordinator mode, the coordinator can build the network, the information of the nodes in the network, and it is the center point of the network, and there must be a coordinator present in the network.

The configurable data input modes for the coordinator are:

Broadcast send: when configured as broadcast send, all non-dormant devices in the whole network receive the data, and the ACK pin unconditionally indicates that the send is successful.

Short Address Send: When configured as Short Address Send, the user needs to specify the short address of the receiving device before sending data.

Long Address Send: When configured as Long Address Send, the user needs to specify the long address of the receiving device before sending data.

7.2 Coordinator model

If the user-configured system operating mode is 4 and the M0M1 combination is 01 or the user-configured system mode is 1, the module works in the normal node mode. In the normal node mode, it can receive and send data in real time, which is suitable for application scenarios that do not have high requirements for power consumption but require timely response.

7.3 Low-power nodes

If the user-configured system operating mode is 4 and the M0M1 combination is 10 or the user-configured system mode is 2, the module will work in low-power node mode, in low-power node mode, the device will wake up regularly according to the user-configured hibernation period to ask the coordinator whether there is data sent, the coordinator sends the non-broadcast data will be stored temporarily inside the coordinator, during the hibernation week the system is in the Low power consumption, if the low-power node wants to send data actively, the user serial port needs to send any data no more than two bytes to wake up the device, after the wake-up byte is sent, the user needs to wait for more than 100ms to send the real data, and the wake-up data will be discarded, after waking up the device, the module will open the serial port to receive the user's data, and after receiving, it starts to send the data wirelessly to the coordinator, if it takes more than 2 seconds, the device serial port has no data input, and no data is sent to the coordinator. If there is no data input from the device serial port for more than 2 seconds, the module will turn off the serial port and enter into low-power mode. The low-power node is suitable for applications where users have high requirements for power consumption but not high requirements for real-time data.

7.4 Configuration mode

At any moment in any mode, as long as the M0M1 combination is set to 11, the system will switch to configuration mode 3, in configuration mode, the module serial port parameters are: 115200, 8N1. in this mode, the module can not send to receive data, external AT instructions to configure the module, you need to user serial port to send any no more than two bytes of data to wake up the device, wake up bytes sent, the user has to After the wake-up byte is sent, the user needs to wait for more than 100ms to send the real data, the wake-up data will be discarded, after waking up the device, the module will open the serial port to receive the AT command, if more than 2 seconds, the device serial port has no data input, the module will close the serial port to enter into hibernation. The next AT command, the user needs to re-send the wake-up byte

7.5 Mode switching

No	Note
1	By default, users can select the system working mode by using M1M0 combination.
2	In any working mode, users can configure the system working mode by AT command, specifically refer to the introduction of AT command.
3	Users in any mode, as long as the combination of M0M1 is 11, then enter the configuration mode, the mode, the serial port parameters are fixed 115200,, 8N1

8. AT command

Serial port into AT mode, you need to open the serial port assistant, set the serial port (default parameters) baud rate 115200, data bit 8 bits, stop bit 1 bit, open the serial port, enter "+ + +" without bringing back the car. All the parameter configuration will reply "\r\n+OK\r\n".

1	++++ Enter AT command mode	
	+++	Parameter Description: No parameters Response: Enter AT Mode
	Example:+++	
	Attention: 1、Only after using this instruction to enter AT instruction mode, you can use AT instruction to operate. 2、After entering AT command mode, only after exiting AT command mode, resetting or rebooting can you use this instruction to enter AT command mode again. 3、When writing this instruction, the serial port debugging assistant must be set to not send a new line; writing other AT instructions must be set to send a new line.	
2	AT+EXIT to exit AT command mode	
	AT+EXIT	Parameter Description: No parameters Response: Exit AT Mode
	Example:AT+EXIT	
	Attention:1. After exiting the AT command mode, all AT commands are invalidated	
3	AT+HELP help command	
	AT+HELP	Parameter Description. No parameters Response: All commands and corresponding help messages
	Example:AT+HELP	
4	AT+ WMCFG set/query the device's operating mode configuration (effective on reboot)	
	AT+ WMCFG =?	Parameter Description: Queries the current operating mode Response:

		WMCFG：4
	AT+ WMCFG =Value	Parameter Description: Value: 0~4 0,Coordinator; 1,Normal node. 2,Dormant node; 3,Dormant mode; 4,(factory default), dial code control;
	Example:AT+ WMCFG =4	
	Attention:1. After setting a new mode, reset or power-down restart is required	
5	AT+ TFOCFG Setup/Query Output Transfer Format Configuration (effective on reboot)	
	AT+ TFOCFG=?	Parameter Description: Get current output transport format configuration Response: TFOCFG:0
	AT+ TFOCFG=Value	Parameter Description: Value: 0~7 0：Output: valid data (pass-through) 1: Output: valid data + long address of sending device 2: Output: valid data + short address of sending device 3: Output: valid data + RSSI 4: Output: valid data + sending device long address + sending device short address 5: Output: valid data + long address of sending device + RSSI 6：Output: valid data + sending device short address + RSSI 7: Output: valid data + long address of sending device + short address of sending device + RSSI
	Example:AT+ TFCFG=0	
6	AT+ TFICFG Setup/Query Input Transmission Format Configuration (effective on reboot)	
	AT+ TFICFG=?	Parameter Description: Get current input transfer format configuration Response: TFICFG:0
	AT+ TFICFG=Value (This instruction is valid only for the coordinator)	Parameter Description: Value: 0~2 0：Input Broadcast 1: Input Receive device short address + data (0x0000 0xffff) for broadcast address 2：Input Receive device long address + data
	Example:AT+TFICFG=0	
7	AT+TMCFG Setup/Query Transmission Mode Configuration (reboot effective)	
	AT+TMCFG=?	Parameter Description: Gets the current transmission mode configuration Corresponds: TMCFG:0
	AT+TMCFG=Value	Parameter Description: Value: 0 or 1 0: Long distance mode, LRM 1: Standard transmission mode, GFSK
	Example:AT+TMCFG=0 Attention:The coordinator and the node have the same transmission mode to be able to enter the network properly	
8	AT+ PIDCFG Setting/Querying Device PANID Configuration (effective on reboot)	
	AT+PIDCFG=?	Parameter Description: Get the PANID configuration of the current device Response:

		PIDCFG:65535
	AT+PIDCFG=Value	Parameter Description: Value:0~65535
	Example:AT+PIDCFG=65535 Attention:Nodes can only join networks with the same PANID as them (when configured as 65535 they can join any network)	
9	AT+ DMCFG Setting/Querying Device Sleep Time Configuration (Effective on Reboot)	
	AT+DMCFG=?	Parameter Description: Get current device hibernation time configuration Response: DMCFG:0~60
	AT+DMCFG=Value	Parameter Description: Configure the wake-up period of the dormant node Value: hibernation time, unit second (S). 0~60 S. （Attention: when configured as 0, the node will never wake up, i.e., the node cannot receive data, but can upload data.）
	Example:AT+DMCFG=0	
10	AT+RSCFGSetting/querying device automatic reboot parameter configuration (reboot takes effect)	
	AT+RSCFG=?	Parameter Description: Get current device auto-restart parameter configuration Response: RSCFG:0
	AT+RSCFG=Value	Parameter Description: Value: 0 or 60~65535 seconds (S) Less than 60 when the system determines 60, equal to 0, no reboot
	Example:AT+RSCFG=0	
	Attention: This parameter can be used for node disconnection detection and is recommended to be turned on.	
11	AT+UBCFG Setting/querying serial port baud rate parameter configuration (effective upon reboot)	
	AT+UBCFG=?	Parameter Description: Get current device serial port baud rate parameter configuration Response: UBCFG:7
	AT+UBCFG=Value	Parameter Description: Value:0~7 0：1200 1：2400 2：4800 3：9600 4：19200 5：38400 6：57600 7：115200
	Example:AT+UBCFG=7	
12	AT+UPCFG Setting/Querying Serial Port Check Bit (Effective from reboot)	
	AT+UPCFG=?	Parameter Description: Get current device serial parity bit parameter configuration Response: UPCFG:0
	AT+UPCFG=Value	Parameter Description: Value:0~2 0: no parity 1：Odd parity 2: even parity
	Example:AT+UPCFG=0	

13	AT+PWCFG Setting/Querying Device Power Parameter Configuration (effective on reboot)	
	AT+PWCFG=?	Parameter Description: Get current device power parameter configuration Response: PWCFG:3
	AT+PWCFG=Value	Parameter Description: Value:0~3 0：extremely high 1：High 2：Medium 3：Low
	Example:AT+ PWCFG=3	
14	AT+IOCFG Setting/querying IO port parameter configuration (effective upon reboot)	
	AT+IOCFG=?	Parameter Description: Get current device IO port parameter configuration Response: IOCFG:0
	AT+IOCFG=Value	Parameter Description: Value: 0 or 1 0：Push-pull 1：Open drain
	Example:AT+IOCFG=0	
15	AT+DFCFG Restore device default parameters	
	AT+DFCFG	Parameter description: no parameters Restore device system default parameters
	Example:AT+DFCFG	
16	AT+RSTART reboot	
	AT+RSTART	Parameter description: no parameters Reboot hardware device
	Example:AT+RSTART	
17	AT+ECHO Setting the AT command to disable display back	
	AT+ECHO=Value	Parameter Description: Value:0 or 1 1：Close the display 0：Open the display back
	Example:AT+ECHO=1	
	Attention: This setting only takes effect on the current boot, and the default setting is restored after reboot to enable display back by default.	
18	AT+VER Retrieve software version number	
	AT+VER	Parameter Description:
	Example:AT+VER	
19	AT+CLINFO Clear module internal network information	
	AT+CLINFO	Parameter Description:
	Example:AT+CLINFO	
	Attention: Clear the network after the module can not communicate need to re-establish the network (this command can user when the coordinator node device number reaches 50, clear all the information)	
20	AT+TLCFG Setup/Query module concurrent performance parameter configuration (effective on reboot)	
	AT+TLCFG=?	Parameter Description: Get current module concurrent performance parameter configuration Response: TLCFG:0

	AT+TLCFG=value	Parameter Description: Value:0~3 0: Low concurrency performance 1: Medium concurrency performance 2: High concurrency performance 3: Very high concurrency performance
	Example:AT+ TLCFG =0 (Attention: This parameter mainly configures the module concurrency performance, i.e., when multiple nodes concurrently concurrently send data, the maximum number of nodes supported, the higher the performance, the more the maximum number of concurrency supported by the system, but the delay in sending data and the average power consumption of the node will increase; the lower the performance, the node sends the data in real time is very high, but when the environmental interference is large, or multiple nodes send at the same time, the data may be be lost.)	

9. Programming the radio

Working Modo	M1	M0	Marginal notes
Configuration Mode	OFF	OFF	1. The radio can only be programmed in the current mode using the configuration software; 2. Or program the radio in any mode using AT commands.

Attention:

1、Programming can only be carried out in a specific working mode (see the above table), when programming fails, please make sure the working mode of the radio is correct.

2、If there is no need for complex programming, open the E70-DTU digital transmission radio configuration software (please visit the official website to download www.ebyte.com), you can modify the relevant parameters.

10. Caution

- Dormant mode, the serial port baud rate format is fixed 115200, 8N1, if the user forgets the current baud rate, it can be reconfigured with AT command in this mode.
- After the node is associated with the coordinator, the information of the node will be saved, and the information still exists after the node is disconnected from the network, and this mechanism has two benefits:
- Increase the speed of network entry when the same node joins the network established by this coordinator;
- After a node joins the network, the short address is always the same as long as the current network exists.
- If the coordinator wants to continue to associate new devices after the number of devices it once associated is greater than 200, it needs to call the AT+CLINFO instruction to clear the current network information.
- The average power consumption of a low-power node depends on the user-configured wake-up period; the larger the period, the power consumption is approximately lower, but the delay in receiving data sent down by the coordinator will be greater.
- The low-power node cannot receive broadcast data sent down by the coordinator.
- The node is powered up for more than 60S and has not yet entered the network, a system reset will be initiated.
- The node PANID is set to 0Xffff (65535), the node can join any network, otherwise it will only be able to join in the network with the same PANID as its PANID.

11. Common problems

[Unable to enter the network]: If the node is unable to enter the network, check whether the node PANID setting is consistent with the coordinator.

[One reason is that the baud rate of the serial port does not match, and the other reason is that the power supply capacity is insufficient.

[Delay is too high]: If the current channel noise is too large when the node sends data, it will actively back off and wait for the cycle and then start sending when it is idle.

[Receive Response Time]: When the node is configured as a dormant node, the maximum receive delay may be equal to the configured period.

[Unable to communicate]: The module must be on the network to communicate with the coordinator.

[Unable to read parameters]: Check whether the serial port baud rate is correct, which can be queried in the configuration mode.

[Too long time to enter the network]: In the process of entering the network, the node and the coordinator have a lot of information interaction, the process does not have any protection mechanism, the information is easy to be interfered with, the node fails to enter the network for a single time, and then it will request again after a certain period of time.

12. Related Products

SKU	Interface	working frequency Hz	firing power W	Communications distance km	Functional Features
E70-DTU(433NW30)	RS232/RS485	433M	1	6.5	Multi-Master, Multi-Slave, Star Networking

E70-DTU(433NW30-ETH)	RJ45 Ethernet	433M	1	6.5	Multi-Master, Multi-Slave, Star Self-Grouping

13. Precautions for use

1. Please keep the warranty card of this equipment, the warranty card has the factory number of the equipment (and important technical parameters), for the user's future maintenance and new equipment has an important reference value.
2. Radio in the warranty period, if due to the quality of the product itself and not man-made damage or damage caused by lightning and other natural disasters, enjoy free warranty; please do not repair the user, the problem is to get in touch with our company, Yibaiyi BaiTe provide first-class after-sales service.
3. In some flammable places (such as coal mine) or explosive hazardous objects (such as detonation detonator) in the vicinity, do not operate the radio.
4. Use suitable DC voltage regulator power supply, which is required to have strong resistance to high-frequency interference, small ripple and sufficient load carrying capacity; it is also preferable to have over-current, over-voltage protection and lightning protection to ensure the normal operation of the digital transmission radio.
5. Don't use the digital radio in the working environment beyond the environmental characteristics, such as high temperature, humidity, low temperature, strong electromagnetic field or dusty environment.
6. Don't let the digital radio continuously in full load transmitting state, otherwise it may burn out the transmitter.
7. The ground wire of the digital radio should be well connected with the ground wire of external devices (such as PC, PLC, etc.) and the ground wire of the power supply, otherwise it is easy to burn the communication interface, etc.; do not plug or unplug the serial port with electricity.
8. When testing the digital radio, you must connect a matching antenna or 50Ω dummy load, otherwise the transmitter will be easily damaged; if you connect an antenna, it is better to keep the human body away from the antenna for more than 2 meters to avoid injury, and do not touch the antenna when transmitting.
9. Wireless digital transmission radios often have different communication distance in different environments, communication distance is often affected by temperature, humidity, obstacle density, obstacle volume, electromagnetic environment; in order to ensure that you can get stable communication, it is recommended to reserve more than 50% of the communication distance margin.
10. If the measured communication distance is not ideal, it is recommended to analyze and improve the communication distance from the antenna quality and antenna installation. Please contact with support@cdebyte.com for help.
11. When selecting the power supply, in addition to the need to retain 50% of the current margin in accordance with the recommendations, it should be noted that its ripple should not exceed 100mV.

14. Important statement

1. Yeppert reserves the right of final interpretation and modification of all contents of this manual.
2. Due to the continuous improvement of the hardware and software of the product, this manual may be changed without further notice, and the latest version of the manual should prevail.
3. Protecting the environment is everyone's responsibility: in order to reduce the use of paper, this manual is only printed in Chinese, the English manual only provides electronic documents, if necessary, please download from our official website; In addition, if not specifically requested by the user, the user bulk order, we only provide product manuals according to a certain percentage of the number of orders, not every digital transmission radio with one by one, please

understand.

Revision history

Version	Date	Revision note	Maintainer
1.0	2017-11-17	Initial version	huaa
1.6	2020-8-17	Content Revision	Li
1.7	2020-11-4	Content Revision	Li
1.8	2021-4-1	Content Revision	Li

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