Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



E800-DTU(433Lxx-485)-V8

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1. Product Overview

1.1. Brief introduction

E800-DTU is a wireless data transceiver with the function of digital data processing, digital modulation and demodulation, FEC, balanced soft decision, etc.. Wireless data transceiver provides transparent RS232 / RS485 interface, different with the analog FM transceiver plus MODEM analog digital transceiver.

Wireless data transceiver working as a communication medium, as well as the fiber, microwave, the same line, has a certain scope of application: it provides some special conditions in the private network monitoring signal real-time, reliable data transmission, with the features of low cost, convenient installation and maintenance, diffraction ability, flexible network structure, range of coverage, suitable for the occasion of dot and scatter, complex geographical environment , connecting with PLC, RTU, rain gauge, level gauge and other data terminals.

1.2. Features

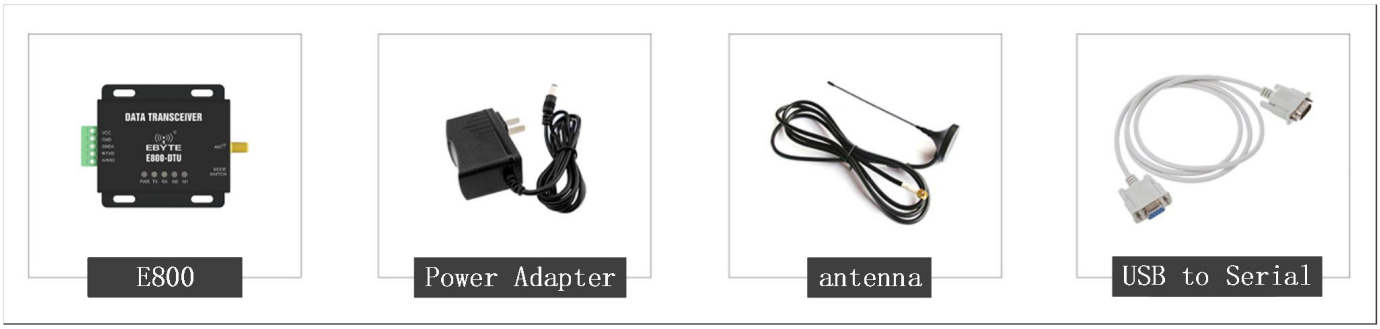
- Transmission power is optional, all technical indicators have met the European industry standards.
- Use temperature compensation circuit, the frequency stability is better than ±2PPM.
- With operating temperature range: -40 ℃ ~ +85 ℃, adapting to a variety of harsh working environment.
- All with aluminum alloy shell, compact, easy installation, good heat dissipation; perfect shielding design, good electromagnetic compatibility and strong anti-interference ability.
- Power reverse protection, over-protection, antenna surge protection and other multiple protection functions, greatly increase the reliability of the transceiver.
- Powerful software features, all parameters can be programmed to set: such as power, frequency, air data rate, address ID, etc.
- Ultra-low power consumption, standby current is 20mA (the power consumption of power saving mode and sleep mode is lower), the transmitting current ≤ 350A (1W).
- With watchdog and accurate time layout, in the event of an exception, the module will automatically restart and continue to follow the previous parameters to operate.
- All the core components are imported originally , compared with the current imports of digital transceiver , we are the most advanced, most cost effective and the smallest one.

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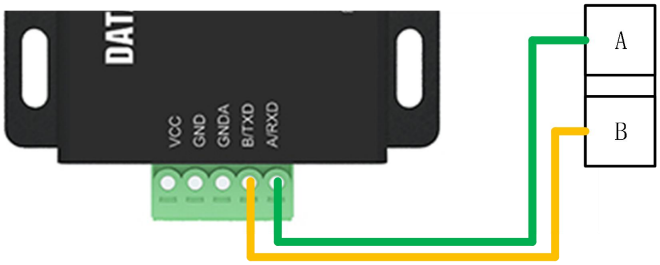
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2. Quick start

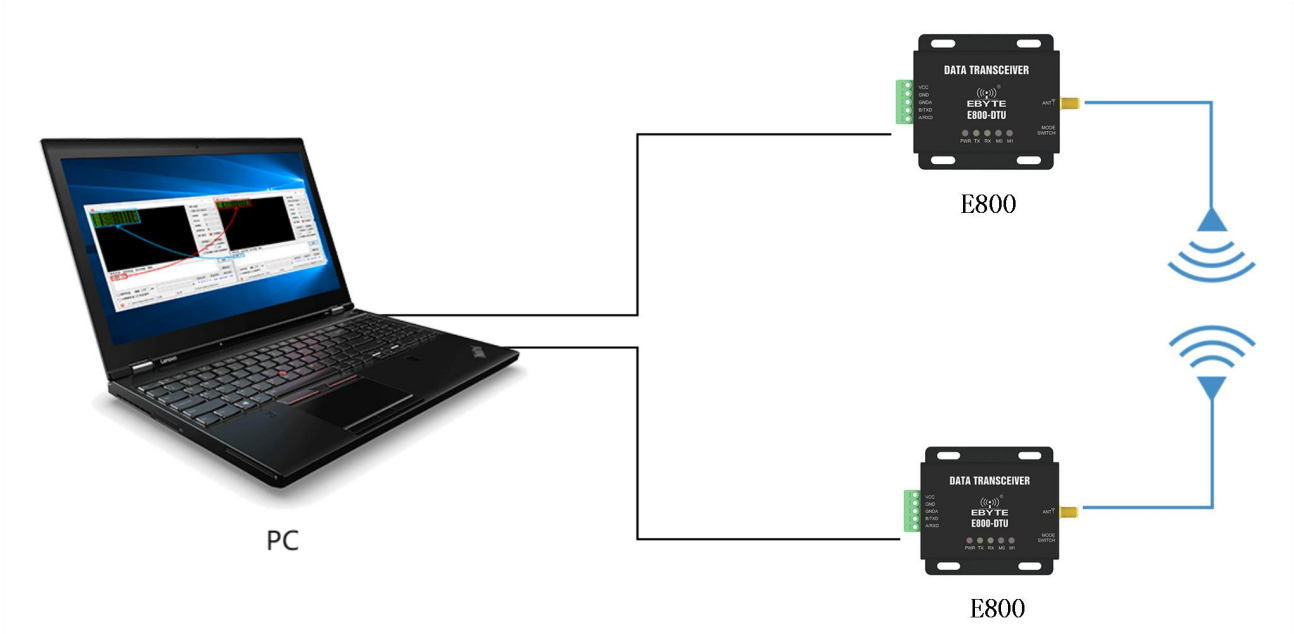
We need devices below,



Step 1: First install the antenna for the data transmission, then turn on the power, and connect the USB to serial cable (USB to RS485);



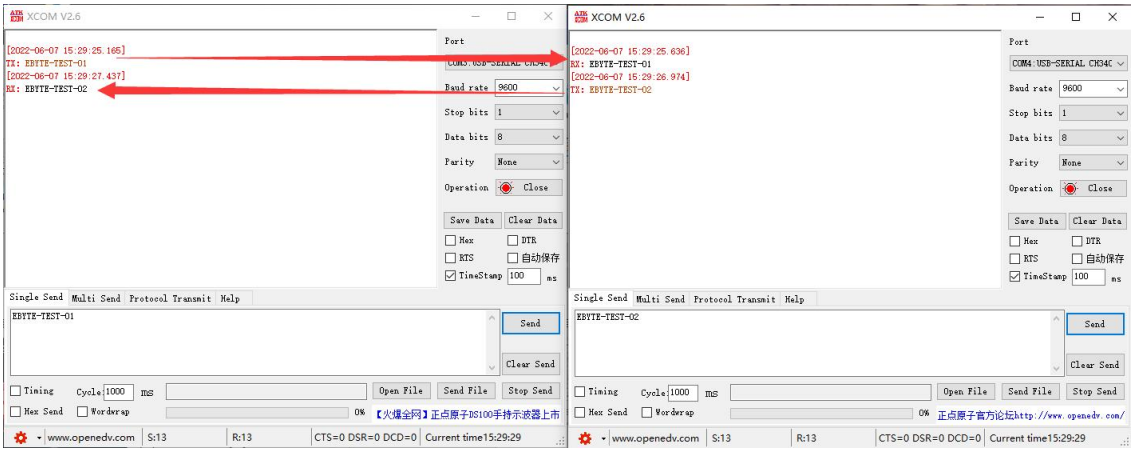
Step 2: Use USB to RS-232,USB to RS-485 or other methods to connect the computer to the digital radio;



Step 3: Start two serial port debugging assistants, select the serial port baud rate as 9600bps and the verification method as 8N1, then the serial port transparent transmission can be realized;

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Step 4: If the customer needs to switch the working mode, it can be controlled by the Mode button to switch between different working modes (M0 indicator light, M1 indicator light). Press and hold the Mode button for 1 second and then release it to switch the mode once. The details of the mode switch are shown in the following table:

	Categories	M0	M1	Description
Mode 0	Normal Mode	OFF	OFF	Open UART and RF，transparent transmission is on (factory default)
Mode 1	Wake-up Mode	ON	OFF	Transmitting WOR mode, the packet comes with a preamble code
Mode 2	Power-saving Mode	OFF	ON	Receiving WOR mode, saving receive power, the mode can not be transmitted
Mode 3	Sleep Mode	ON	ON	Parameter setting using the configuration software

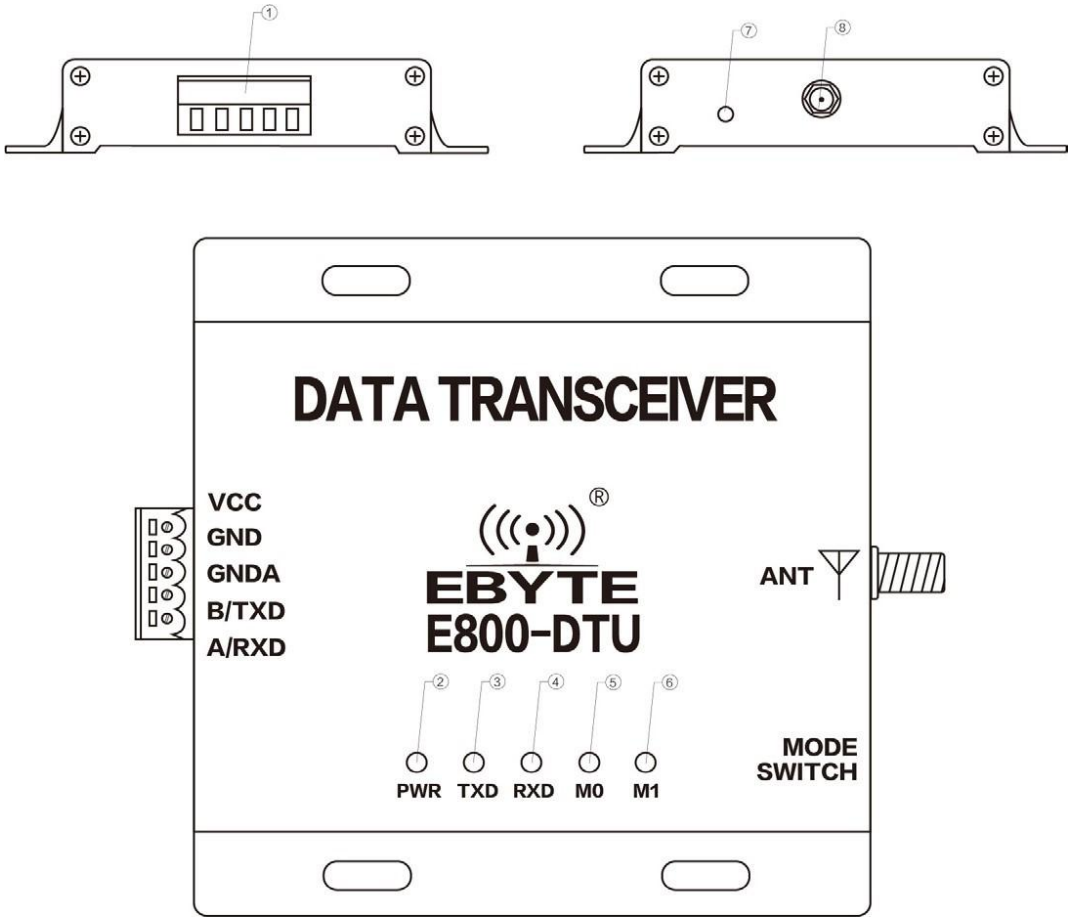
Note: The DTU has the function of power-down saving mode (the factory default setting is transparent transmission mode), the user needs to switch the corresponding mode according to the M1 and M0 indicators (effective immediately).

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3. Installation Dimension

3.1. Pin description

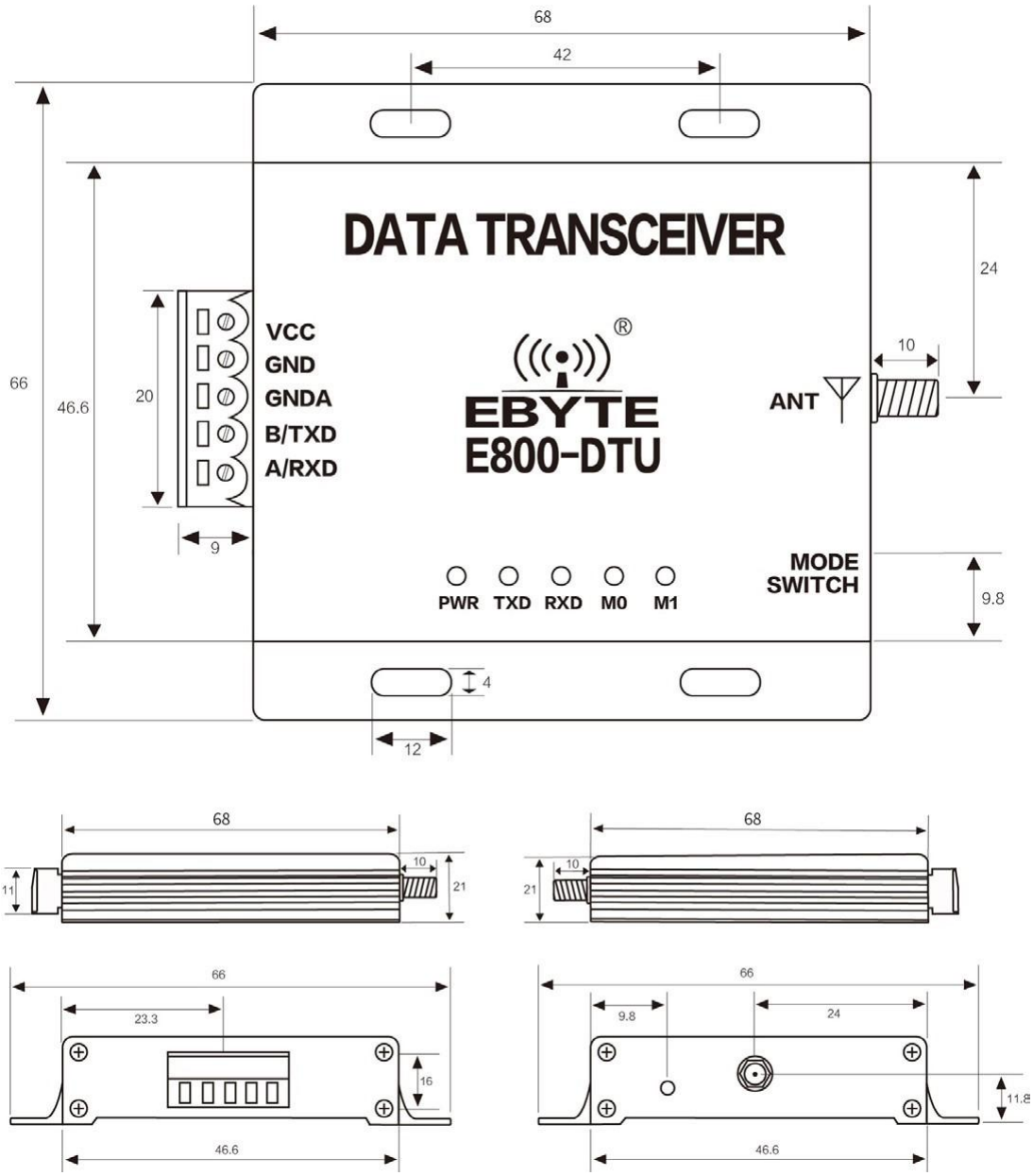


Pin NO.	Name	Function	Description
1	3.81mm terminal block	UART interface/ Power supply interface	Standard RS-232&485 interface/ Screwing power supply interface
2	PWR-LED	Power LED	Red, lit when the power is on
3	TXD-LED	Transmit LED	Yellow, blinks when sending data
4	RXD-LED	Receive LED	Yellow, blinks when sending data
5	M0-LED	Mode LED	Red,M0 M1 indicate the Operating mode together
6	M1-LED	Mode LED	Red,M0 M1 indicate the Operating mode together
7	Mode switch	Tact switch	Control the Operating mode
8	Antenna interface	SMA-K interface	External thread, 10mm, 50Ωcharacteristic impedance

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3.2. **Dimension**



Unit: mm

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4. Interface definition

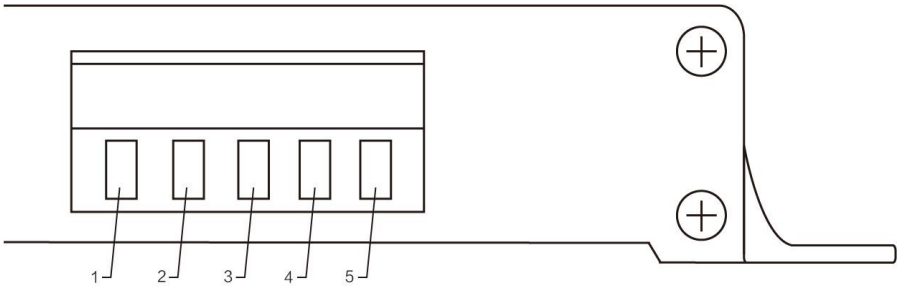
4.1. Power supply



Users can choose ① the VCC and GND terminal power supply, E800-DTU can use 8~ 28V DC power supply, but it is recommended to use 12V or 24V DC power supply.

4.2. RS485 interface

E800-DTU can use the 485_A terminal and the 485_B terminal in ② to connect the A terminal and the B terminal of the RS-485 of the device respectively.



Pin NO.	Definition	Function	Description
1	VCC	Screwing power interface, positive	8 ~ 28V DC, 12V or 24V(recommended)
2	GND	Screwing power interface, negative	The power supply negative pole is connected to the system ground and the housing
3	GNDA	RS232 common terminal	Connected to RS 232 device GND
4	B/TXD	Serial port terminal	RS-485: Connected to RS 485 device interface B RS-232: Output terminal,connected to RS 232 device RXD
5	A/RXD	Serial port terminal	RS-485: Connected to RS 485 device interface A RS-232: Input terminal, connected to RS 232 device TXD

Note: The DTU will be in poor communication when connecting multiple devices , while connecting a single

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device is not, please try to parallel connect a 120Ω resistor between 485_A terminal and 485_B terminal.

5. Technical indicator

5.1. Model specification

Model	Frequency	TX power	Distance	Feature	Application
	Hz	**W**	**km**		
E800-DTU(433LXX-485)-V8	433M	1	8	LoRa anti-interference	To the environment with small data, far distance

★ Note: Test condition: in clear and open air without shelters, 12V /1A power supply, 5dBi gain sucker antenna over 2 meters height from the ground, with the factory default parameters.

5.2. General specification parameters

NO.	Parameter	Specification	Description
1	Size	68*66*21mm	
2	Weight	79g	+/- 4.5g
3	Operating temperature	-40℃～+85℃	For industrial application
4	Antenna impedance	50Ω	Standard 50 Ω characteristic impedance
5	Supply voltage	10～28V DC	It is recommended to use 12V or 24V
6	Communication interface	RS485	Standard DB9 hole / 3.81 terminal block
7	Baud rate	Default 9600	1200 to 115200 bps
8	Address	Default 0	65536 configurable addresses

5.3. Frequency range and channels

Model	**Frequency**	**Band range**	**Channel gap**	**Channel numbers**
	Hz	**Hz**	**Hz**	
E800-DTU(433LXX-485)-V8	433M	410～441M	1M	32，half-duplex

★ Note: In the same area, multiple groups of DTU are used for one-to-one communication at the same time. It is recommended that each group of devices should be set with a channel interval of more than 2MHz.

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5.4. Transmit power level

Model	20dBm / 30dBm	17dBm / 27dBm	13dBm / 24dBm	10dBm / 21dBm
E800-DTU(433LXX-485)-V8	Factory default	√	√	√

★ Note: The lower the transmit power, the closer the transmission distance, but the working current will not decrease proportionally. It is recommended to use the maximum transmit power.

5.5. Air data rate

Model	Default air data rate	Levels	Air data rate levels
	bps		bps
E800-DTU(433LXX-485)-V8	2.4k	6	0.3k、1.2k、2.4k、4.8k、9.6k、19.2k

★ Note: The higher the air rate, the faster the transmission rate, but the shorter the transmission distance; therefore, if the rate meets the requirements for use, it is recommended that the lower the airspeed, the better.

5.6. Current parameter

Model	Tx current mA		Stand-by current mA	
	12V	24V	12V	24V
E800-DTU(433LXX-485)-V8	306	150	22	12

★ Note: It is recommended to reserve more than 50% of the current margin when selecting the power supply, which is conducive to the long-term stable operation of the radio.

5.7. Transceiver Length and Sub-packing Mode

Model	Buffer	Sub-packing mode
E800-DTU(433LXX-485)-V8	512 bytes	Automatically send 58 bytes per package

Note: 1. When the receiving data is more than a single packet capacity (100 bytes), the beyond part will be automatically assigned to the second transmission until it is completed;

2. The data transceiver can not receive data which is more than the buffer capacity;

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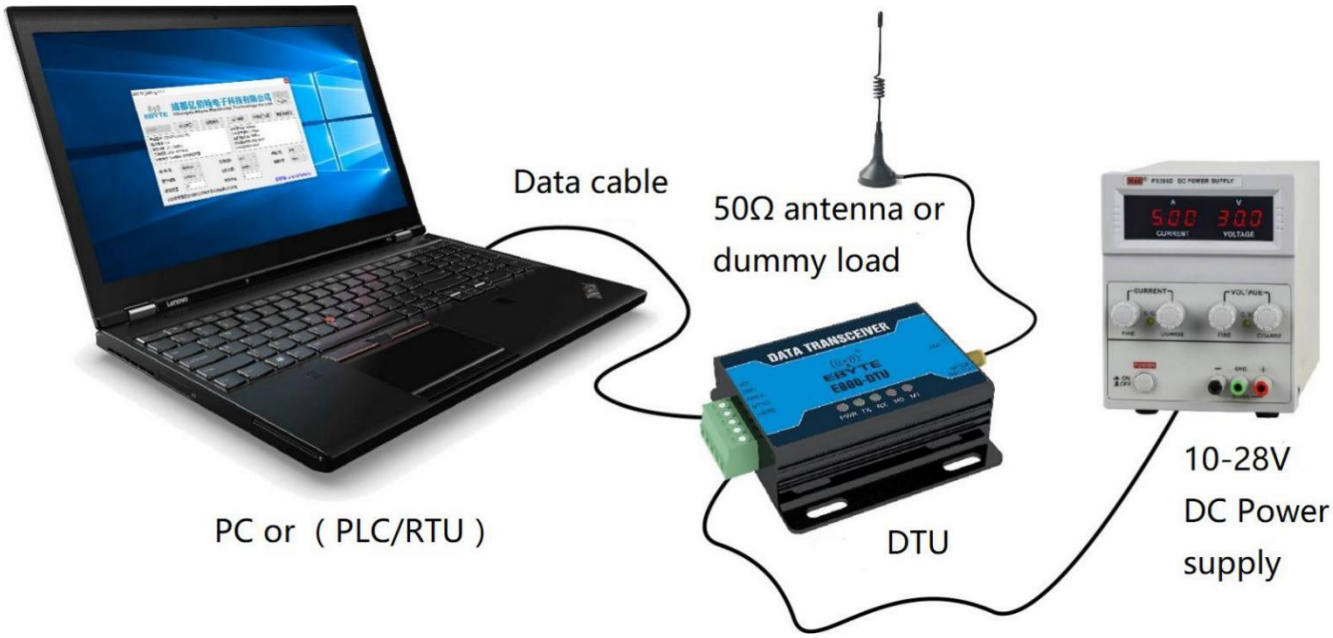
6. Operating mode

There are four operating modes, if low power consumption is not required, it is recommended to configure the data transceiver for the normal mode (mode 0). The factory default is normal mode (mode 0).

No.	Categories	M0	M1	Description
Mode 0	Normal Mode	OFF	OFF	Open UART and RF， transparent transmission is on (factory default)
Mode 1	Wake-up Mode	ON	OFF	Transmitting WOR mode, the packet comes with a preamble code
Mode 2	Power-saving Mode	OFF	ON	Receiving WOR mode, saving receive power, the mode can not be transmitted
Mode 3	Sleep Mode	ON	ON	Parameter setting using the configuration software

★ Note: no need to care about the wake-up mode (mode 1) and power saving mode (mode 2) if power consumption is not a problem.

7. Connection diagram when programming



Operating mode	M1	M0	Description
Configuration mode	Light on	Light on	The DTU can only be programmed using the configuration software in the current mode

★Note: 1. Programming can only be done in a specific working mode (see the table above). If the programming

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fails, please confirm whether the working mode of the DTU is correct.

2. If you don't need complex programming to open the E90-DTU configuration software, you can modify the relevant parameters.

7.1. Parameter setting details



Parameter	Details
Baud rate	Baud rate when operating 1200bps～115200bps
Parity	8N1:none；8E1: odd；8O1:even；8 data bit，1 stop bit
Air data rate	Wireless communication rate, also called air baud rate. The air rate is high, the data transmission speed is fast, and the time delay for transmitting the same data is small, but the transmission distance will be shortened.
Frequency channel	The working frequency of the DTU, each channel corresponds to its different working frequency, in theory, different frequency channels cannot communicate with each other. If there are multiple groups of wireless data transmission stations in the same area, it is recommended that the communication frequency be separated by 2~5MHz.
TX power	The output power is the power radiated to the outside. In order to ensure the working efficiency, it is recommended to use the maximum power. If the transmit power is reduced, the communication distance will be shortened, and the current consumed will be reduced.
DTU address	The internal address of the DTU has nothing to do with the Modbus address. Only DTU with the same radio address can communicate with each other. This feature can be used to realize software filtering and grouping. Input range: 0～65535, decimal number.
TX method	Transparent transmission；Fixed point: send data to fixed point in Hex format
Wake-up time	It is not directly related to the communication delay. If customers need low-power applications, they need to adjust this option as required. In the power saving mode, the longer the wake-up time, the lower the power consumption of the receiver, and the greater the communication delay.

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8. Related products

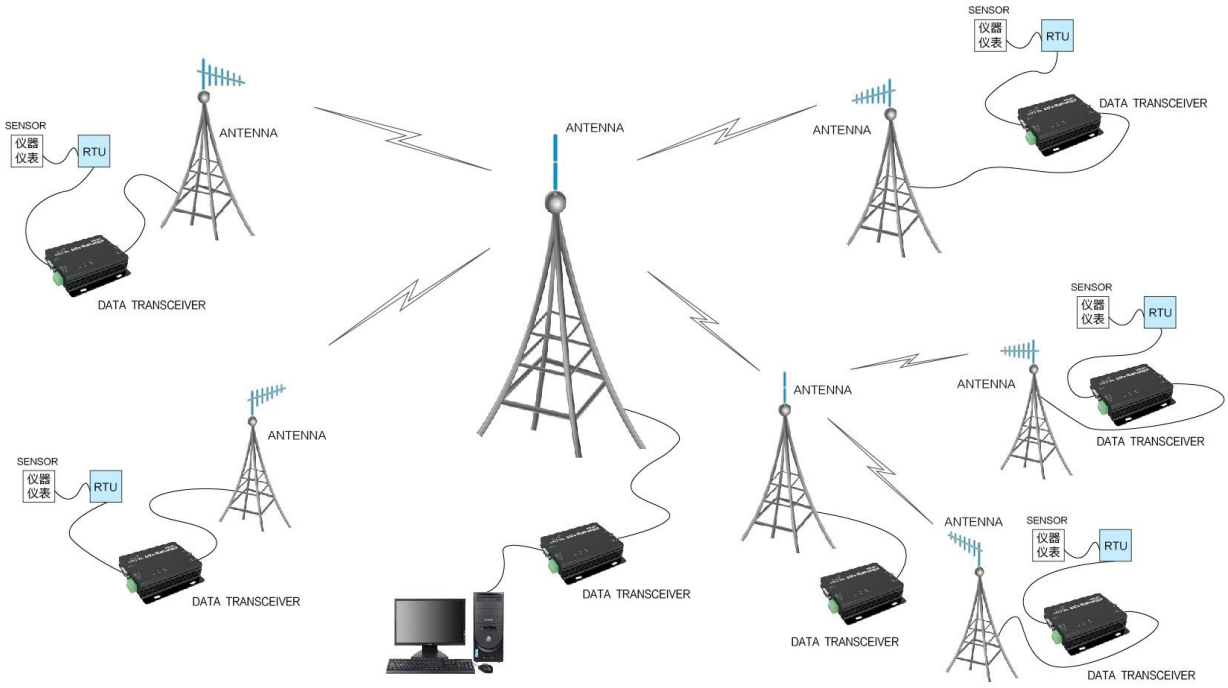
Model	Interface	Frequency Hz	TX power dBm	Test distance km	Features
E32-DTU (433L37) -V8	RS232 RS485	410-441M	37	20	LoRa, Anti-interference
E32-DTU (900L30) -V8	RS232 RS485	862-930M	30	8	LoRa, Anti-interference
E32-DTU (900L20)-V8	RS232 RS485	862-930M	20	3	LoRa, Anti-interference
E32-DTU (433L30) -V8	RS232 RS485	410-441M	30	8	LoRa, Anti-interference
E32-DTU (433L20) -V8	RS232 RS485	410-441M	20	3	LoRa, Anti-interference
E90-DTU (433L37) -V8	RS232 RS485	410-441M	37	20	LoRa, Anti-interference
E90-DTU (433L20) -V8	RS232 RS485	410-441M	20	3	LoRa, Anti-interference
E90-DTU (433L30) -V8	RS232 RS485	410-441M	30	8	LoRa, Anti-interference
E95-DTU (433L20-485)-V8	RS485	410-441M	20	3	LoRa, Anti-interference
E95-DTU (433L30-485)-V8	RS485	410-441M	30	8	LoRa, Anti-interference
E96-DTU (433L20-485)-V8	RS485	410-441M	20	3	LoRa, Anti-interference
E96-DTU (433L30-485)-V8	RS485	410-441M	30	8	LoRa, Anti-interference
E800-DTU (400SL20-485)-V8	RS485	410-441M	20	3	LoRa, Anti-interference
E800-DTU (400SL30-485)-V8	RS485	410-441M	30	8	LoRa, Anti-interference

9. Practical application Fields

The data transceiver of CDEBYTE is applied for all kinds of point to point, one point to multiple points wireless data transmission system, such as smart home, Internet of things transformation, power load monitoring, distribution network automation, hydrological and hydrological forecasting, water pipe network monitoring, urban street lamps Monitoring, air defense alarm control, railway signal monitoring, centralized control of railway water supply, oil supply pipe network monitoring, GPS system, remote meter reading, electronic crane, automatic reporting, seismic forecasting, fire prevention, environmental monitoring and other industrial automation system, as shown below:

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10. Precautions for Use

1. Please take good care of the warranty card of the device. The warranty card contains the factory number (and important technical parameters) of the device, which has important reference value for the user's future maintenance and new equipment.
2. During the warranty period, if the DTU is damaged due to the quality of the product itself rather than man-made damage or natural disasters such as lightning strikes, it enjoys free warranty; please do not repair by yourself, and contact our company if there is a problem. Ebyte provides first-class After-sales service.
3. Do not operate this DTU in the vicinity of some flammable places (such as coal mines) or explosive dangerous objects (such as detonators for detonation).
4. A suitable DC stabilized power supply should be selected, which requires strong anti-high frequency interference, small ripple, and sufficient load capacity; preferably, it should also have over-current, over-voltage protection and lightning protection functions to ensure that the DTU is normal jobs.
5. Do not use it in a working environment that exceeds the environmental characteristics of the DTU, such as high temperature, humidity, low temperature, strong electromagnetic field or dusty environment.
6. Don't let the DTU continuously be in full load transmitting state, otherwise the transmitter may be burnt out.
7. The ground wire of the DTU should be well connected with the ground wire of the external equipment (such as PC, PLC, etc.) and the ground wire of the power supply, otherwise the communication interface will be burnt easily; do not plug or unplug the serial port with power on.
8. When testing a DTU, you must connect a matching antenna or a 50Ω dummy load, otherwise the transmitter will be easily damaged; if the antenna is connected, the distance between the human body and the antenna should be more than 2 meters to avoid injury. Touch the antenna when transmitting.
9. Wireless data transmission stations often have different communication distances in different environments. The communication distance is often affected by temperature, humidity, obstacle density, obstacle volume, and electromagnetic environment; in order to ensure stable communication, it is recommended to reserve more than 50% 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 method. You can also contact support@cdebyte.com for help.
11. When selecting the power supply, in addition to keeping 50% of the current margin as recommended, it should also be noted that its ripple must not exceed 100mV.
12. Wireless communication products need to be connected to an impedance-matched antenna to work normally. Even short-term tests cannot be omitted. Product damage caused by this reason will not be covered by the warranty.

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Revision History

Version	Date	Description	Issued By
1.0	2022-06-07	Original Version	LC
1.1	2023-03-06	error correction	Bin

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