Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual

E32-DTU (868L20)

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1.Introduction

1.1. Brief Introduction

E32-DTU (868L20) is wireless data transceiver of 868M with standard RS232/RS485 connectors. They are half-duplex. TX & RX modems with LoRa technology and transparent transmission mode. Voltage supply ranges from 8V to 28V, Working frequency: 862~893MHz (Default:868MHz).

The LoRa direct sequence spread spectrum technology enables the longer communication distance and better power density concentration as well as superior anti-interference ability. The FEC algorism enables higher coding efficiency and correction ability. The interfered data packets will be corrected proactively upon sudden interference, which significantly improves reliability and communication distance. Without FEC, the interfered data packet will be dropped. The transceivers feature data encryption and compression. The data transmitted in air features randomness, the rigorous algorism makes data interception meaningless. The data compression function has possibility to reduce the data transmission time, which in turn reduces the possibility of being interfered, thus improves the reliability and communication efficiency.

1.2. Features

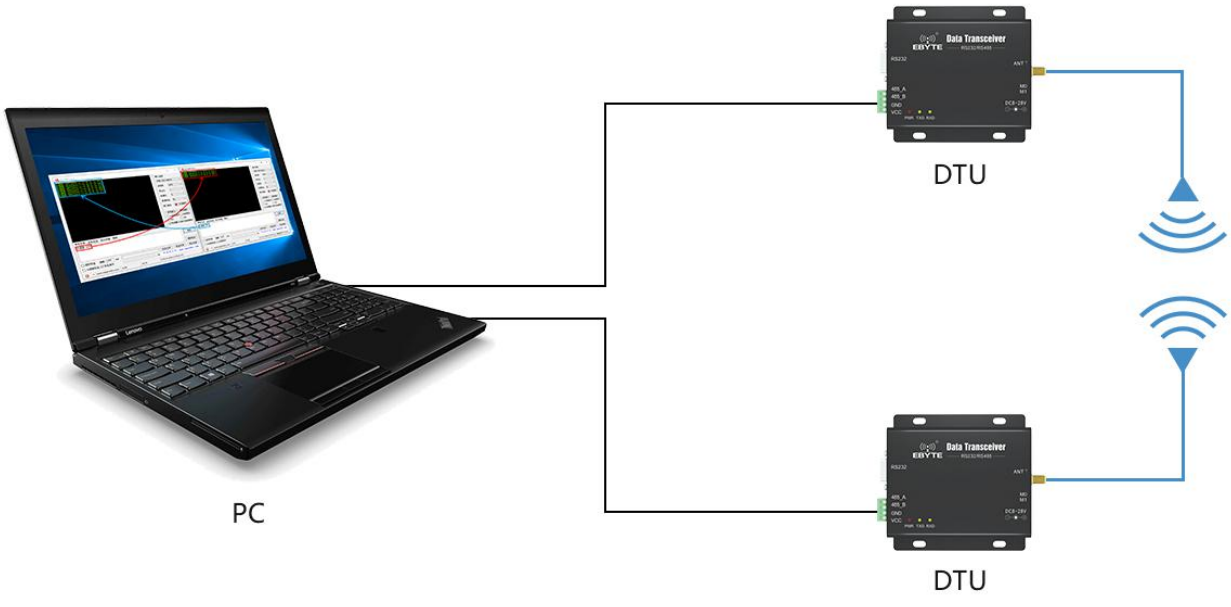
★ All core components are originally imported, our transceiver modems have much advanced functions with smaller size and lower cost.
★ The top TX power is 100mW, all technical parameters meet European industrial standards.
★ Temperature compensators are adopted to make the frequency stability better than ±1.5PPM.
★ Operation temperature range: -40℃ ~ +85℃, applicable for various harsh environment, it is real industrial grade products.
★ Aluminum alloy case, compact size, great heat dispersion; good shielding, prime electromagnetic compatibility and strong anti-interference.
★ Power reverse & overload protection and antenna surge protection functions significantly improve the reliability.
★ Parameters can be configured by programming, such as TX power, frequency point, air data rate, address and so on.
★ Ultra-low power consumption, standby current is only 28mA (even lower under power-saving and sleep modes), TX current ≤0.2A .
★ Embedded watch-dog and precise time layout, modem will restart automatically upon abnormal situation and work with previous parameters.
★ The transceivers adopt original SEMTECH SX1276 chip, customers highly comment the products because of the super reliability.

2. Operation

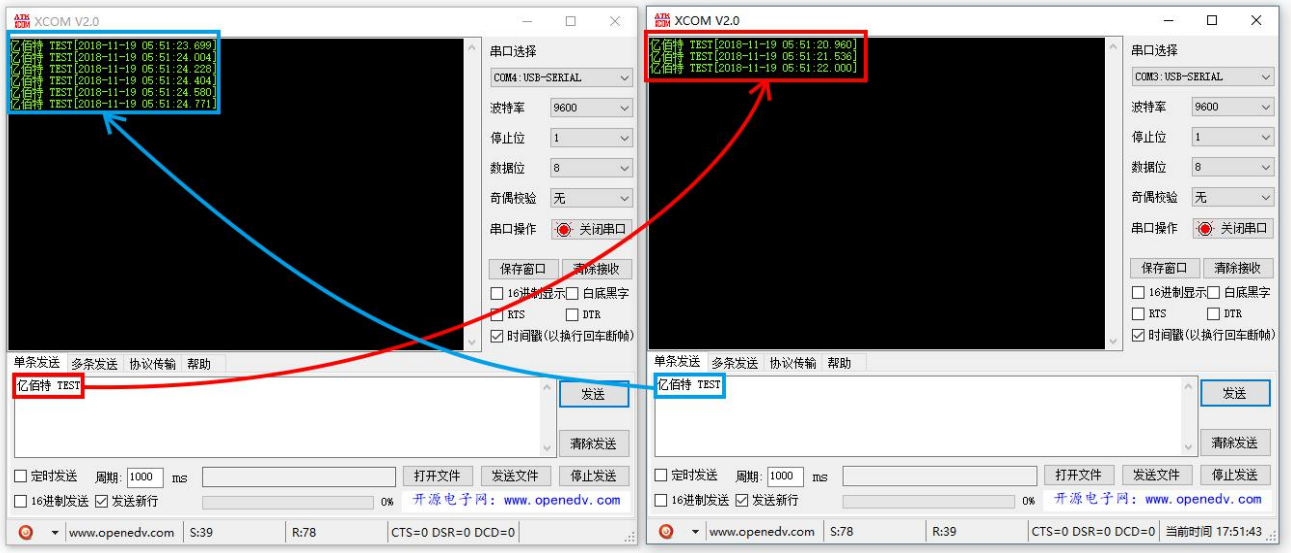
Main parts

1、 First step is to mount antenna, then battery, making sure the dial switch is on its right status. User gets on the power by choosing either VCC/GND or power adapter.

2、 Using USB-(RS232) converter or USB-RS(485) converter or other way to link computer and DTU.



3、 Firing up two XCOMs, choosing Baud rate 9600bps, 8N1, the setting which serial port transmission can be achieved.



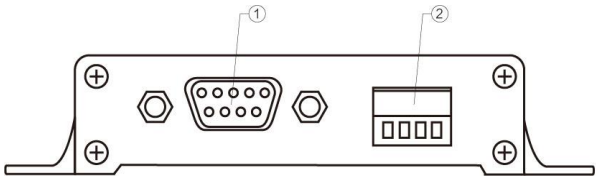
4、 User needs to open the mode switch first before link DTU with computer if the user want to modify parameters. Firing up E32-DTU 数传电台配置软件(E32-DTU parameter configuration application) to modify related parameters. The mode switch must be reopened to achieve transmission after the configuration.

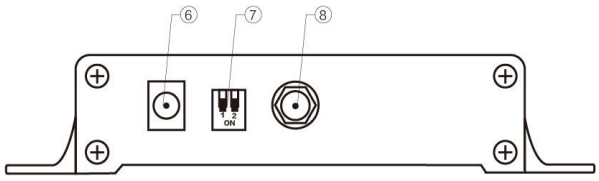
Mode 0 Default

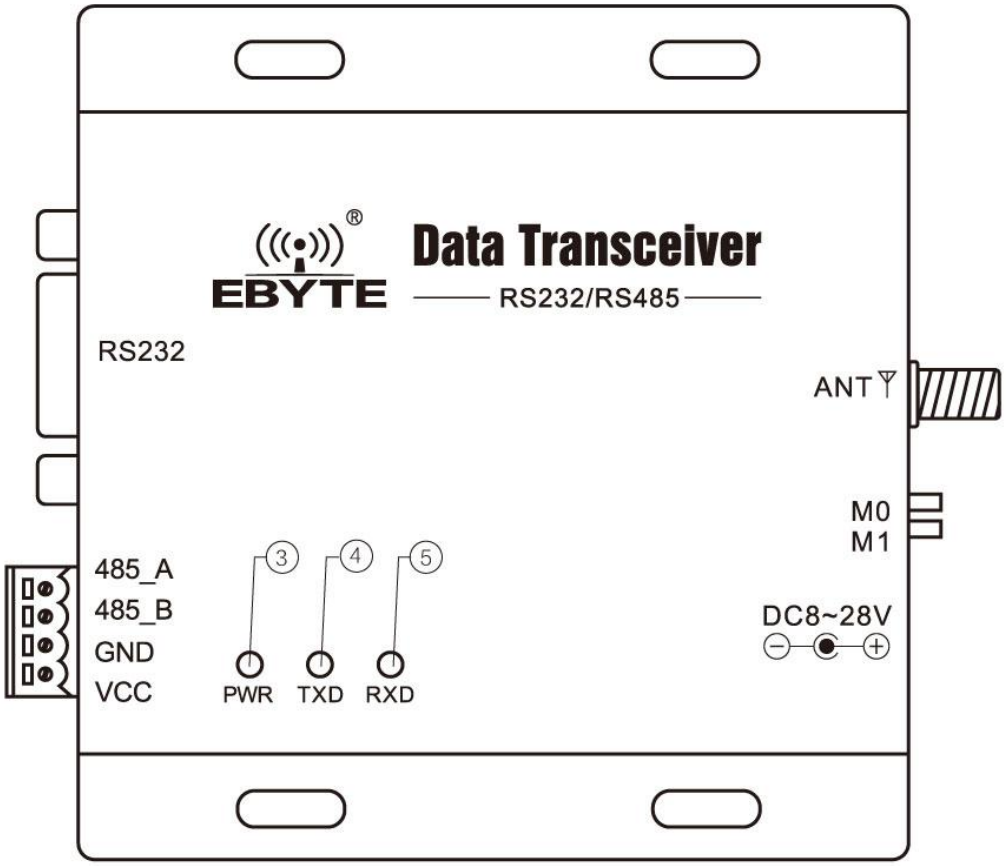
Mode 3 Parameter setting

3.Installation Specifications

3.1. Structure

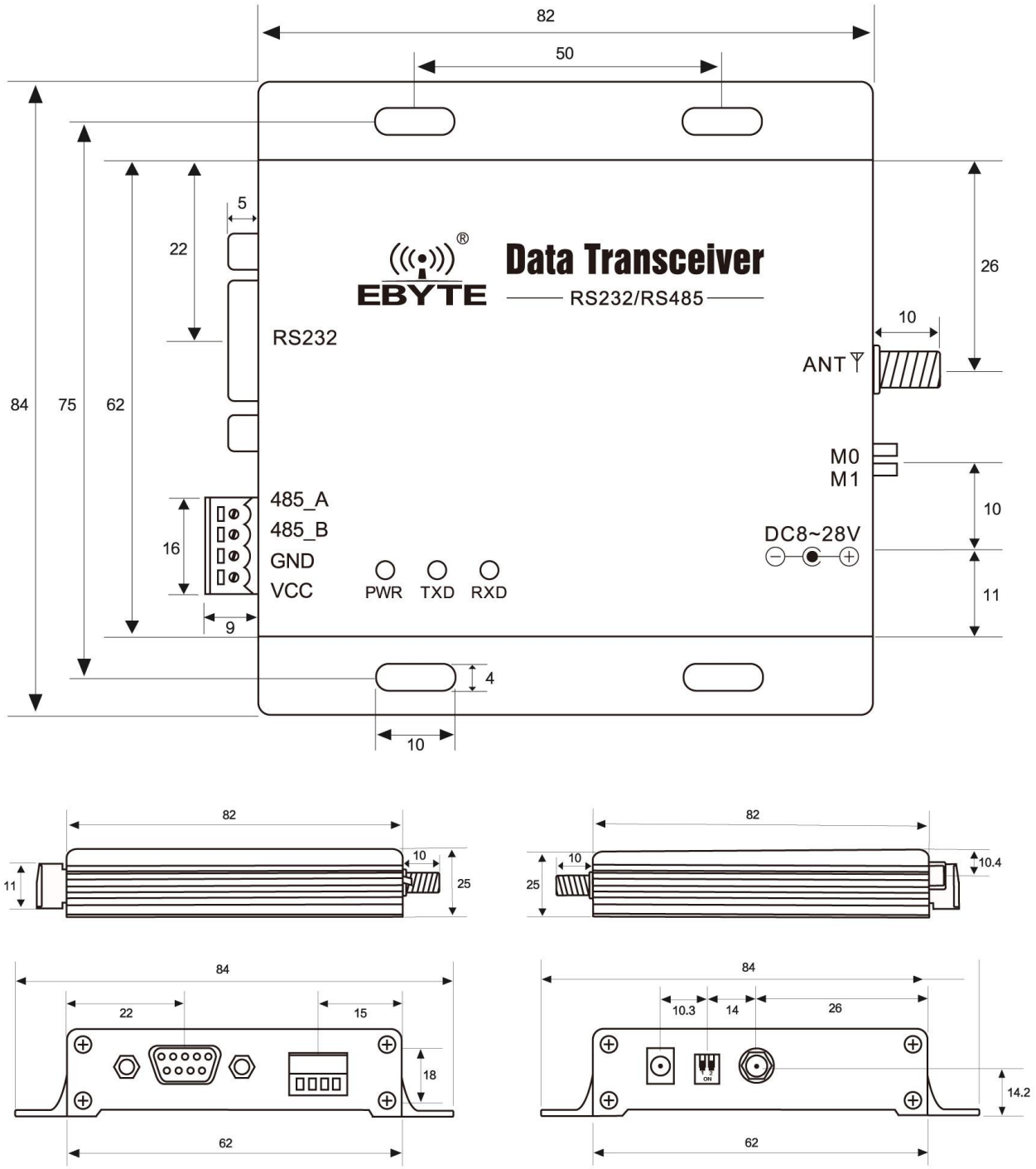






Pin NO.	Name	Function	Description
1	DB-9 female socket	RS-232 interface	Standard RS-232 interface
2	3.81 terminal block	RS-485, power interface	Standard RS-485 interface and pressure line power interface
3	PWR-LED	Power LED	Red, lit when the power is on
4	TXD-LED	Transmit LED	Yellow, blinks when sending data
5	RXD-LED	Receive LED	Yellow, blinks when receiving data
6	DC power interface	Power interface	In-line round hole, outer diameter 5.5mm, diameter 2.5mm
7	DIP switch	DIP switch	Controlled by working mode
8	Antenna interface	SMA-K interface	external thread, 10mm, 50Ωcharacteristic impedance

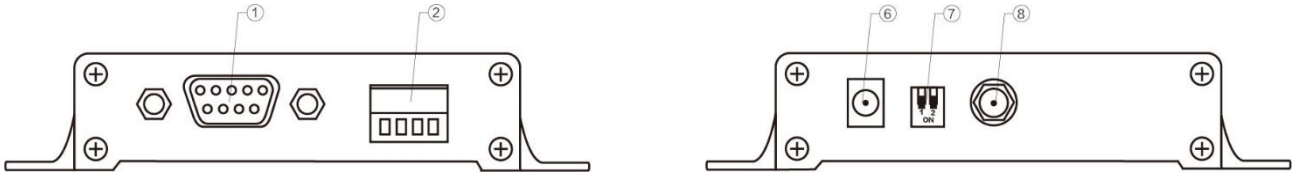
3.2. Dimension



Unit: mm

4.Interface Defination

4.1. Power interface definition



Users can choose ⑥ DC power interface,using the power adapter supply with the interface of the 5.5mm outer diameter , 2.5mm diameter ;

Also choose the VCC and GND terminal power supply, only choose any one of the power supply is OK;

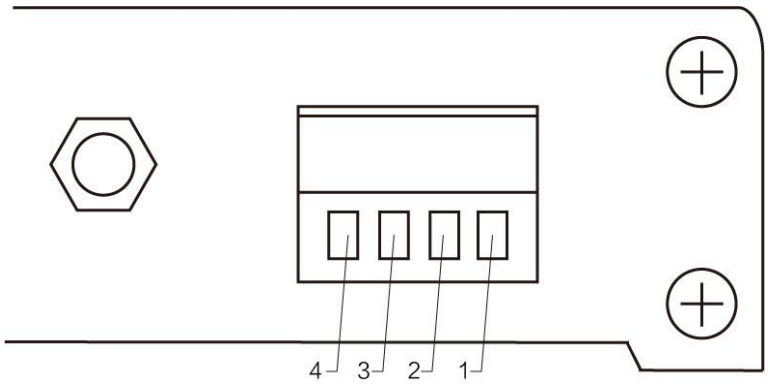
E32-DTU can use 8~ 28V DC power supply, but it is recommended to use 12V or 24V DC power supply.

4.2. RS232 Interface definition

The E32-DTU can be connected to the device via RS-232 using the standard DB-9 interface.

4.3. RS485 Interface definition

E32-DTU can connect the 485_A terminal and 485_B terminal with the device RS-485 A terminal and B terminal.



Pin NO.	Definition	Function	Description
1	VCC	Crimping power interface, positive	8 ~ 28V DC, recommended 12V or 24V
2	GND	Crimping power interface, negative	The power supply negative pole is connected to the system ground and the housing
3	485_B	RS-485 interface, interface B	The RS-485 interface B is connected to the device interface B
4	485_A	RS-485 interface, interface A	The RS-485 interface A is connected to the device interface A

★ Note: The transceiver will be in poor communication when connected to multiple devices , it is recommended to be connected to a single device, please try to use parallel 120Ω resistor between 485_A terminal and 485_B.

5.Technical indicators

5.1. Model specifications

Model	Frequency	Transmit power	Distance	Specifications	Application
	Hz	W	km		
E32-DTU (868L20)	868	0.1	3	Strong penetration, anti - interference	To the environment with small data, long distance, many obstacles

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

5.2. General specification parameters

NO.	Model	Specification	Description
1	Size（H*W*D）	82 * 62 * 25mm	See more at 3.2 Dimension
2	Weight	131g	Tolerance: 4.5g
3	Temperature	-40℃ ~ 85℃	Meet industrial level
4	Antenna impedance	50 Ω	Standard 50 Ω characteristic impedance
5	Supply voltage	+8~ +28V DC	It is recommended to use 12V or 24V
6	Communication interface	RS232/RS485	Standard DB9 hole / 3.81 terminal block
7	Baud rate	Default 9600	from 1200 to 115200 bps
8	Address	Default 0	65536 configurable addresses

5.3. Frequency range and channels

Model	Default frequency	Frequency range	Channel spacing	Channels
	Hz	Hz	Hz	
E32-DTU (868L20)	868	862 ~ 893	1	32，half duplex

★ Note: In the same area when multiple data transceivers are communicating one to one at the same time, it is recommended to set the channel spacing between each group of data transceivers at 2MHz or more.

5.4. Transmit power level

Model	10mW	25mW	50mW	100mW
E32-DTU (868L20)	√	√	√	√

★ Note: The lower the transmit power, the closer the transmission distance, but the working current won't be declined in exact proportion, it is recommended to use the maximum transmit power.

5.5. Air data rate

Model	Default air data rate	Levels	Air data rate(bps)
	bps		bps
E32-DTU (868L20)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2

★ Note: The higher the air data rate, the faster the transmission rate, the transmission distance is also closer; when the rate meets the requirements, the lower air data rate, the better quality.

5.6. Current parameters

Model	Transmitting current mA		Standby current mA	
	12V	24V	12V	24V
E32-DTU (868L20)	134	81	28	28

★ Note: It is recommended to retain more than 50% of the current margin when selecting the power supply, which will help the data transceiver to work steadily for a long time.

5.7. Transceiver Length and Sub-packing Mode

Model	Buffer	Sub-package
E32-DTU (868L20)	512Byte	Automatically send 58 bytes per package

★ Note:

1. When the receiving data is more than a single packet capacity, 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;

6.Operating mode

E32-DTU (433L37) has four operating modes, if low power consumption is not required, normal communication is recommended to configure the data transceiver for the normal mode (mode 0);
The factory default is normal mode (mode 0).

	Categories	M1	M0	Description
Mode 0	Normal Mode	ON	ON	Open UART and RF，transparent transmission is on
Mode 1	Wake-up Mode	ON	OFF	Air wake-up mode, the packet comes with a wake-up code,
Mode 2	Power-saving Mode	OFF	ON	The air wake-up receive mode, saving receive power, the mode can not be transmitted
Mode 3	Sleep Mode	OFF	OFF	Parameter setting using the configuration software

模式 0

模式 1

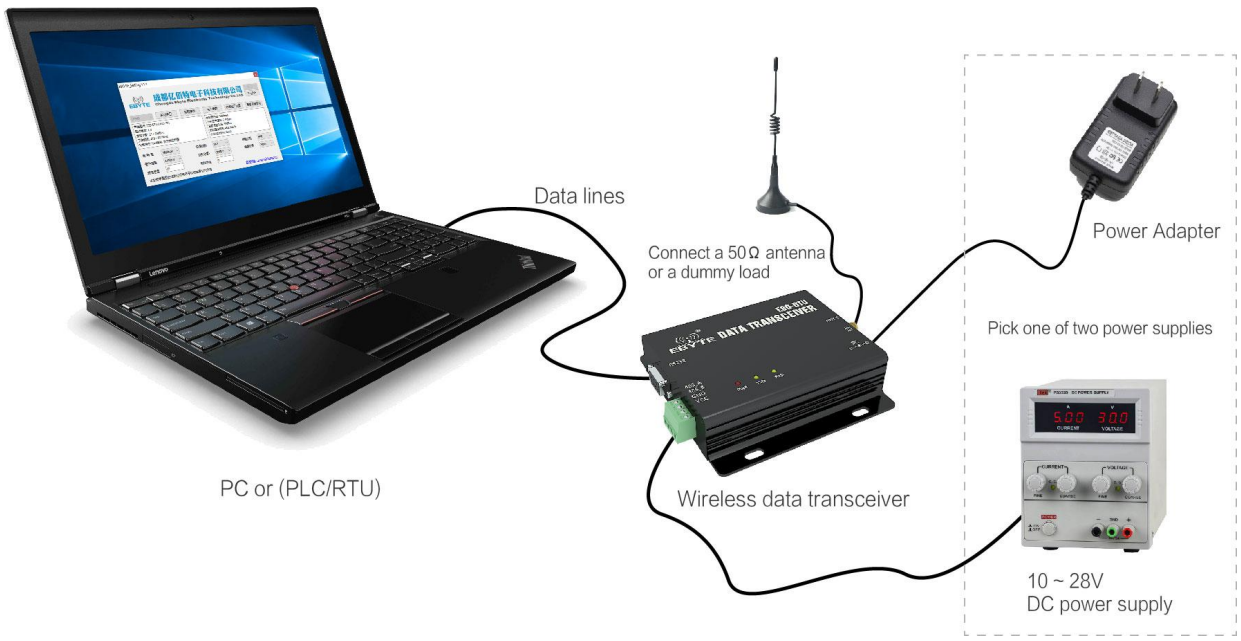
模式 2

模式 3

★ Note: no need to care about the wake-up mode (mode 1) and power saving mode (mode 2) if it doesn’t request low power consumption.

7.Connection diagram when programming

7.1. diagrammatic drawing



	Mode	M1	M0	Description
Mode 3	Sleep Mode	Off	Off	Only be programmed using the configuration software in the current mode

★ Note:

1.programming can only be carried on in a specific mode(see above), if fails, please confirm the work mode.

2.If there's no complicated programming, opening the E32-DTU 数传电台配置软件(E32-DTU parameter configuration application) to modify parameters.

7.2. Parameter setting instruction

Parameter	Description
Baud rate	The serial port baud rate of a wireless data station at work， 1200bps ~ 115200bps。
Odd-even check	Support 8N1:no check ; 8E1:even-check; 8O1:odd-check; Both are 8-bit data bits and 1-bit stop bits.
Air data rate （bps）	Wireless communication rate, also known as air baud rate air rate high, data transmission speed, transmission of the same data time delay is small, but the transmission distance will become shorter.
Transmitting power	In order to ensure the working efficiency, it is recommended to use the maximum power. If the transmitted power is reduced, the communication distance will become shorter and the required current will be reduced
FEC	The lost or interfered data can be partially corrected by complex encoding, which can improve the equivalent receiving sensitivity by about 3dBm. Turning off this function can reduce the communication delay.
Transmission mode	Transparent transmission, and send-as-received fixed points: data is sent at fixed points according to the format
Wake Up Time	There is no direct relationship with the communication delay. If the customer needs low-power applications, this option shall be adjusted as required. In the power-saving mode, the longer the wake-up time, the lower the power consumption of the receiving end, and the greater the communication delay.
IO driven	By default, select the internal TTL signal drive mode。
Station Address	Internal address of wireless data station, stations with the same address as those independent of Modbus address can communicate with each other. This feature can be used to realize software filtering grouping input range :0~65535, decimal number.
Frequency Channel	It is equivalent to the working frequency of the wireless data transmission station. Each channel corresponds to its different working frequency. Theoretically, different frequency channels cannot communicate with each other. If there are multiple groups of wireless data stations in the same area, the communication frequency interval is suggested to be 2~5MHz.

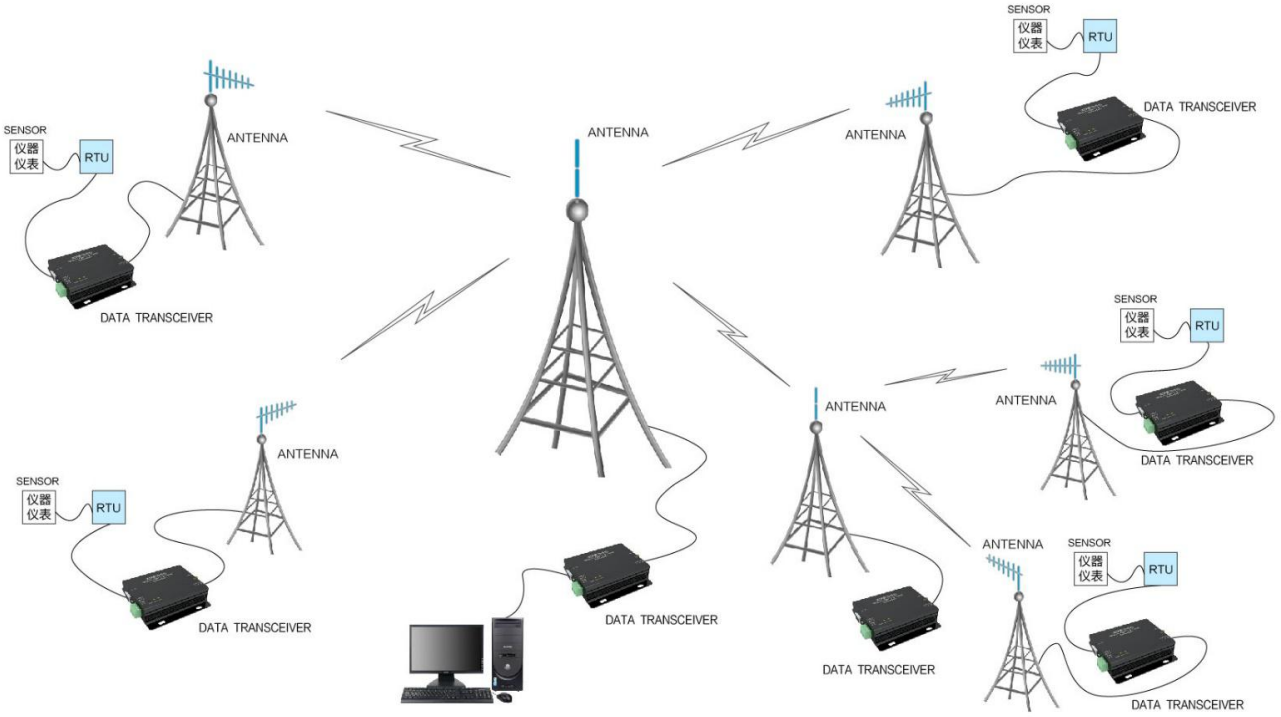
8. Connection diagram in test and application

9. E32-DTU series

Mode No.	Interface	Frequency Hz	Tx power dBm	Distance km	Function feature
E32-DTU (433L37)	RS232 RS485	433M	37	20	LoRa spread spectrum, long distance, anti - interference
E32-DTU (868L30)	RS232 RS485	868M	30	8	LoRa spread spectrum, long distance, anti - interference
E32-DTU (915L30)	RS232 RS485	915M	30	8	LoRa spread spectrum, long distance, anti - interference
E32-DTU (170L30)	RS232 RS485	170M	30	8	Strong Penetration, LoRa spread spectrum, anti - interference
E32-DTU (868L20)	RS232 RS485	868M	20	3	LoRa spread spectrum, long distance, anti - interference
E32-DTU (915L20)	RS232 RS485	915M	20	3	LoRa spread spectrum, long distance, anti - interference
E32-DTU (433L30)	RS232 RS485	433M	30	8	LoRa spread spectrum, long distance, anti - interference
E32-DTU (433L27)	RS232 RS485	433M	27	5	LoRa spread spectrum, long distance, anti - interference
E32-DTU (433L20)	RS232 RS485	433M	20	3	LoRa spread spectrum, long distance, anti - interference

10. Practical application

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:



11.Note

1. Please keep the warranty card of the equipment which includes the factory number (and important technical parameters) and is important for user's future maintenance and new equipment.

2. Transceiver during the warranty period, if the quality of the product itself rather than man-made damage or lightning and other natural disasters caused by damage, enjoys free warranty; please do not repair by yourself, the problem and please contact with our company when problem occurring, we offer the first-class after-sales service.

3. Please do not operate the transceiver in some flammable places such as coal mines or near explosive atmospheres (such as detonators).

4. Please use the appropriate DC power supply, high frequency interference ability, small ripple, and enough load capacity are required; it’s better to have over current, over voltage protection and lightning protection and other functions to ensure that transceiver working properly.

5. Please do not use it in the working environment beyond the transceiver environmental characteristics , such as high temperature, humidity, low temperature, strong electromagnetic fields or dust larger environment.

6. Please do not continuously keep transceiver to transmit in full capacity, or the transmitter might be damaged.

7. Please connect the ground with the external ground of the power supply (such as PC, PLC, etc.) , otherwise it is easy to burn out the communication interface; do not plug the interface with power supplying.

8. When testing, please connect the antenna or 50 Ω load, otherwise transceiver will be damaged easily ;the distance from the antenna is better than 2 meters, so as to avoid harm, please do not touch the antenna when transmitting.

9. Wireless data transceiver has different communication distance in different environments, communication distance is influenced by temperature, humidity, obstacle density, obstacle volume and electromagnetic environment; in order to ensure stable communication, it is recommended to reserve at least 50 % of the communication distance.

10. When communication distance is not perfect, it is recommended to improve the antenna quality and the installation mode of the antenna. You can send mail to support@cdebyte.com for support.

11. When choosing power supply, it is recommended to keep at least 50% current left and the ripple must not exceed 100mV.

12.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; In addition, for special requirements, we agree to offer certain amount of documents according to order quantity, not every data transceiver are supplied with one manual, please understand;

13.Revision history

Version	Date	Description	Issued by
1.00	2016/9/5	Initial version	huaa
1.10	2019/4/2	Model No. split	molly

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