Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual

E90-DTU(400SL33)

Contents

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1、 Product introduction

1.1. Product introduction

E90-DTU (400SL33) is a wireless data transmission radio using military-grade LoRa modulation technology, with a variety of transmission methods, working in the (410.125~493.125MHz) frequency band (default 433.125MHz), the radio provides transparent RS232/RS485 interface, support 8~28V voltage input. LoRa direct sequence spread spectrum technology will bring longer communication distance, and has the advantages of concentrated power density and strong anti-interference ability. The module has a software FEC forward error correction algorithm, which has high coding efficiency and strong error correction ability, and can actively correct the jammed packets in the case of sudden interference, greatly improving the reliability and transmission distance. In the absence of FEC, such packets can only be dropped. The radio station has a data encryption function, and the data transmitted by the radio in the air has randomness, and the data interception is meaningless through strict encryption and decryption algorithms; Support subpacket length setting, support different real-time and data packets.

As a communication medium, wireless data transmission radio has a certain scope of application like optical fiber, microwave and open wire: it provides real-time and reliable data transmission of monitoring signals in the private network under certain special conditions, with low cost, convenient installation and maintenance, strong diffraction ability, flexible networking structure, long coverage characteristics, suitable for many points and scattered, complex geographical environment and other occasions, can be connected with PLC, RTU, rain gauge, level meter and other data terminals.

1.2. Certifications

E90-DTU has obtained the "Radio Transmitting Equipment Type Approval Certificate" with the following approval code**: CMIIT ID: 2017FP5780**.

E90-DTU has obtained the "explosion-proof certificate", its number: test word **No. 201711000975.**

E90-DTU has obtained the "Electrostatic Surge Test Report" issued by the Chinese Testing Institute, its number: **CNEx18.1461.**

E90-DTU has obtained the "Design Patent Certificate" with patent number: **ZL 2016 3 0501980.3.**

E90-DTU has obtained "Utility Model Patent Certificate", its patent number is: **ZL 2016 2 1410691.3 .**

E90-DTU has obtained "CE Certificate" (EU Compulsory Certification), its verification number is: **CCISE180514601V**.

The E90-DTU has obtained the "FCC Certificate" (Federal Communications Commission Certification) with the ID: 2ALPH-E90-DTU.

E90-DTU has obtained "RoHS Certificate" (EU Environmental Protection Compulsory Certification), its report number is: **DTI201807025245**.

1.3. Features

1. Using the latest generation of LoRa technology, it is farther away and more powerful than traditional LoRa data transmission stations;
2. It adopts military-grade LoRa modulation technology, with data encryption, and the subcontract length can be set;
3. Super large single packet, single packet support up to 240 bytes, adapt to Modbus protocol;
4. Simple high-efficiency power supply design, support power supply configuration or crimping mode, support 8~28V power supply;

5. The transmission power can reach up to 2W, and support multi-level adjustment, and all technical indicators meet European industrial standards;
6. Support LBT function, the station automatically waits for transmission according to the current ambient noise intensity. Greatly improve the communication success rate of the module in harsh environments;
7. Support wireless sending command packets, remote configuration or reading of wireless module parameters;
8. Support communication key function to effectively prevent data from being intercepted;
9. It can realize multi-level relay networking, effectively expand the communication distance, and realize ultra-long-distance communication;
10. The temperature compensation circuit is adopted, and the frequency stability is better than ±1.5PPM;
11. Operating temperature range: -40°C~+85°C, adapt to a variety of harsh working environment, real industrial grade products;
12. All aluminum alloy shell, compact size, easy installation, good heat dissipation; Perfect shielding design, good electromagnetic compatibility, strong anti-interference ability;
13. Multiple protection functions such as power reverse connection protection, over-connection protection, and antenna surge protection greatly increase the reliability of the station;
14. Powerful software functions, all parameters can be programmed to set: such as power, frequency, air rate, address ID, etc.;
15. With a built-in watchdog and precise time layout, the module will automatically restart in the event of an exception and continue to work according to the previous parameter settings

2、 Quick start

You need to prepare

E90-DTU

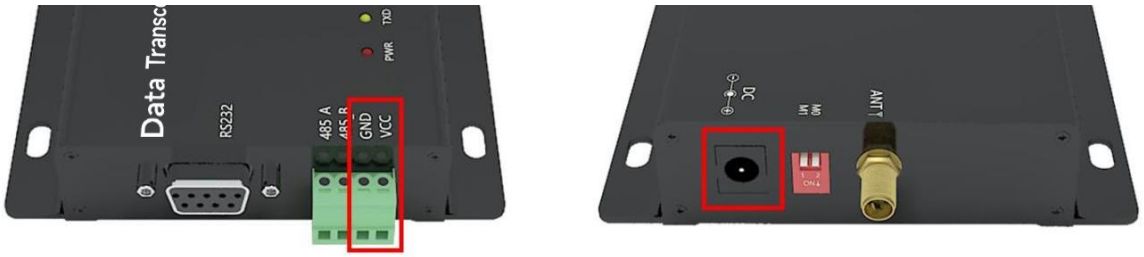

电源适配器


天线

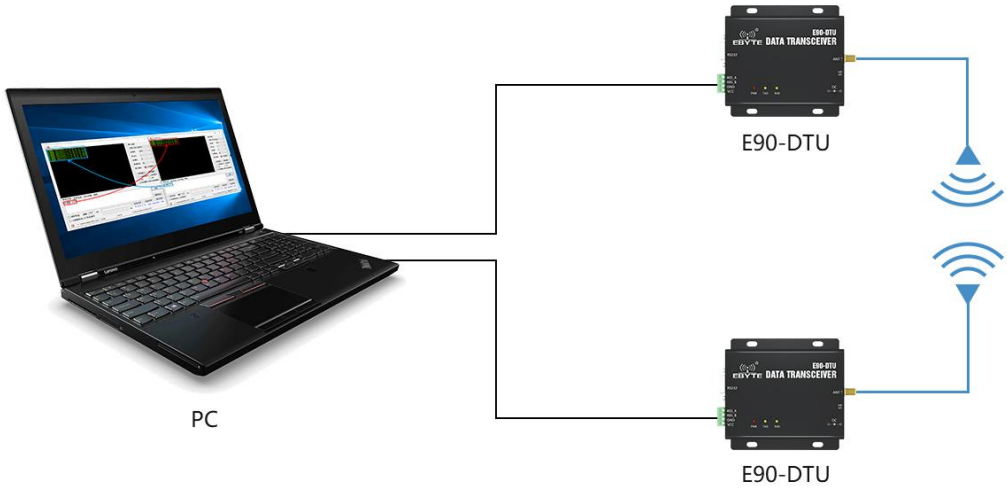

连接线

Note: When using this equipment, an external 50 ohm impedance antenna must be connected, and the two devices and antennas must be used more than 6 meters apart, otherwise there is a risk of damage to the equipment!!

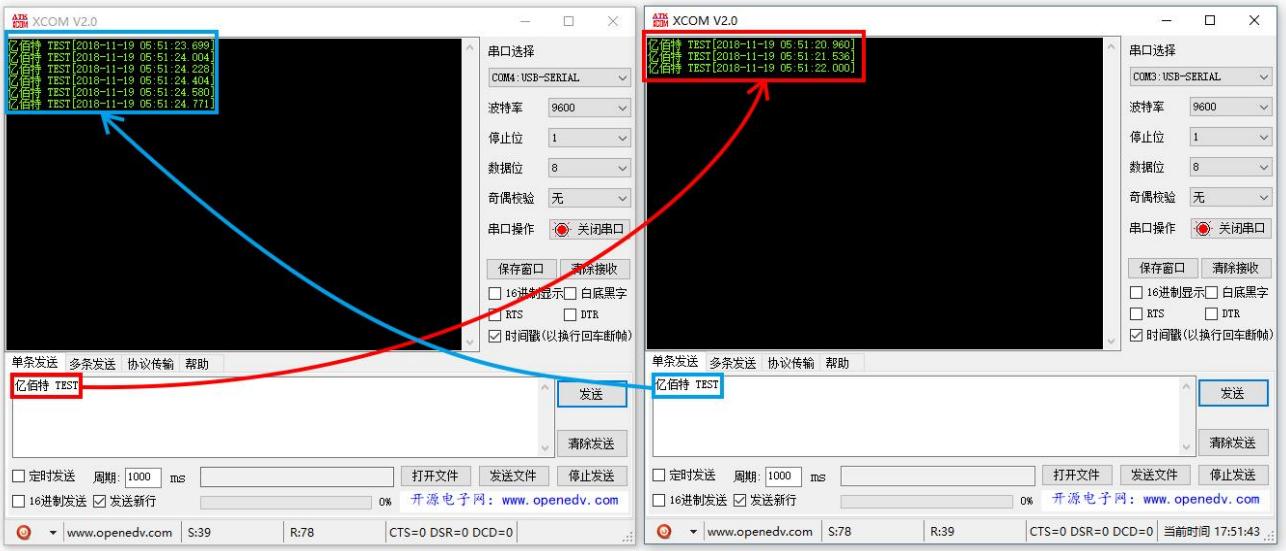
1、 First install an antenna for the data transmission station, then install the power supply, and ensure that the DIP switch state is correct, and the user can choose the crimping method or power adapter power supply according to the needs, and choose one of the two;



2、 Use USB to RS-232, USB to RS-485 or other methods to connect the computer to the data radio station;



3、 Start two serial port debugging assistants, select the serial port baud rate of 9600bps and the verification mode of 8N1 to achieve serial port transparent transmission;



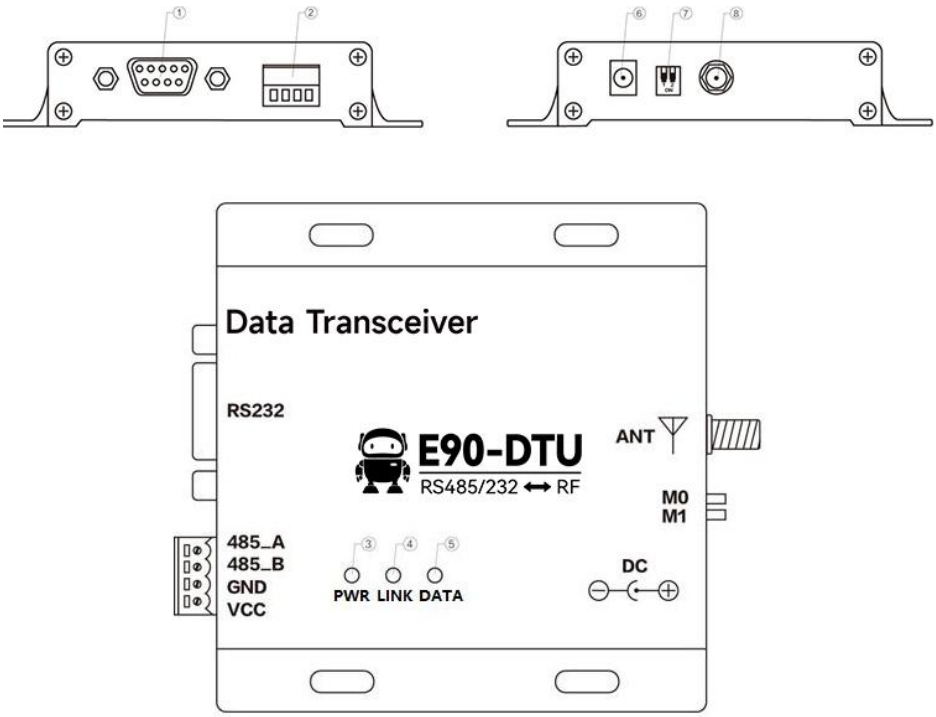
4、 If the customer needs to modify the parameters, please dial the data transmission station in the configuration mode and connect it to the computer, download the E90-DTU SL data transmission radio configuration software on the official website of Ebaite, you can modify the relevant parameters, and be sure to restore the DIP switch state after completing the configuration before communication.

Mode 0 factory default state

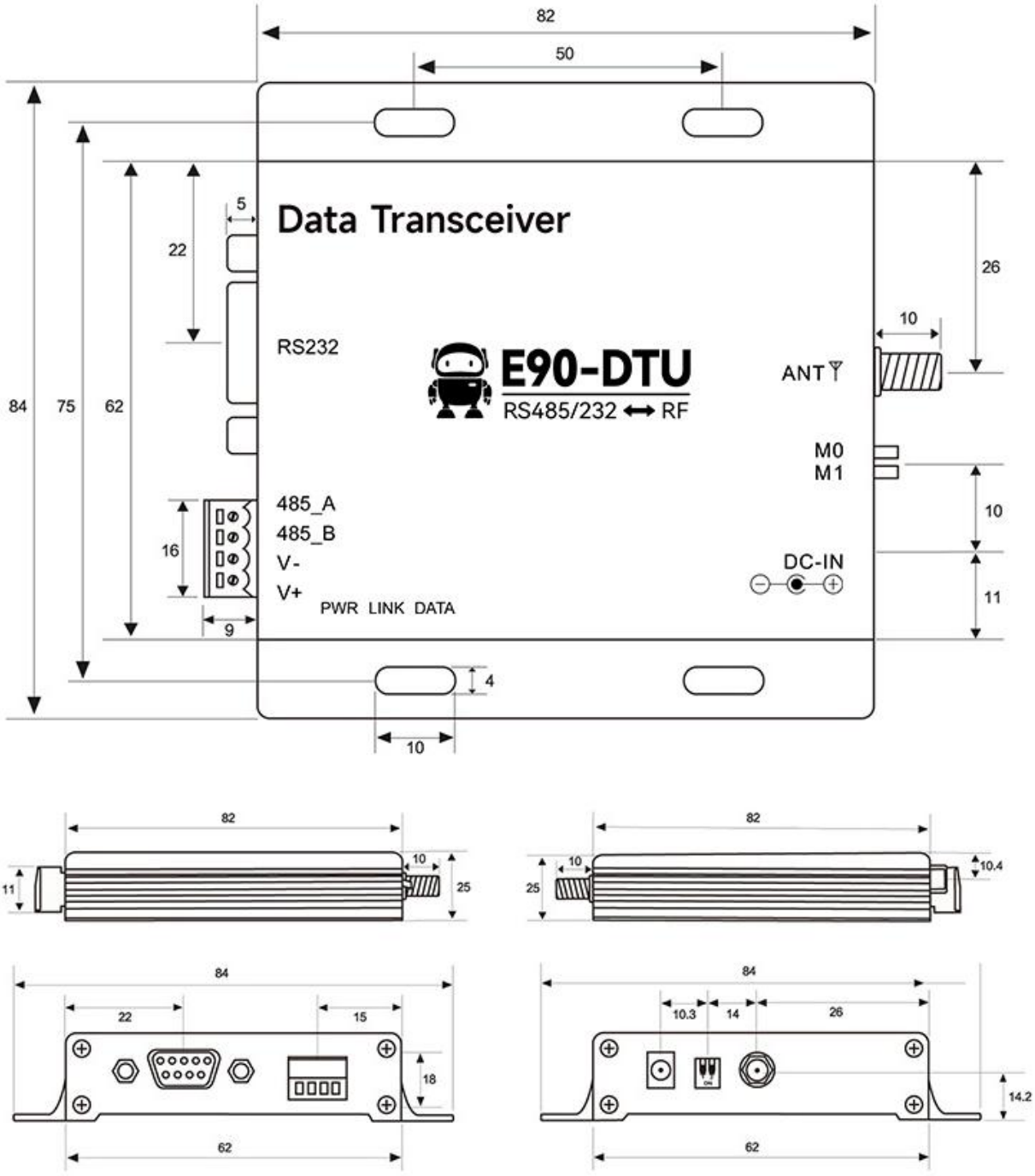
Mode 2 for parameter configuration

3、 Installation size

3.1 Description of each department



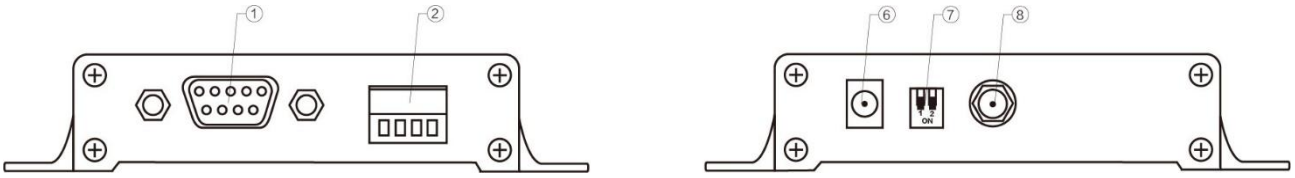
Pin	name	function	illustrate
1	DB-9 female socket	RS-232 interface	Standard RS-232 interface
2	3.81 terminal blocks	RS-485、Power connector	Standard RS-485 interface and crimp power interface
3	PWR-LED	Power LED	Red, lit when power is turned on
4	TXD-LED	Send LED	Yellow, flashing when sending data
5	RXD-LED	Receive LED	Yellow, flashing when 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	Inner hole of external thread, length 10mm, characteristic impedance 50Ω



单位：mm

4、 Interface definition

4.1 Power Interface Description



Users can choose (6) DC power supply interface, using the interface to power the 5.5mm outer diameter and 2.5mm inner diameter power adapter;

It can also be supplied to the VCC terminal and the GND terminal in (2), just choose any one of the power supply methods;

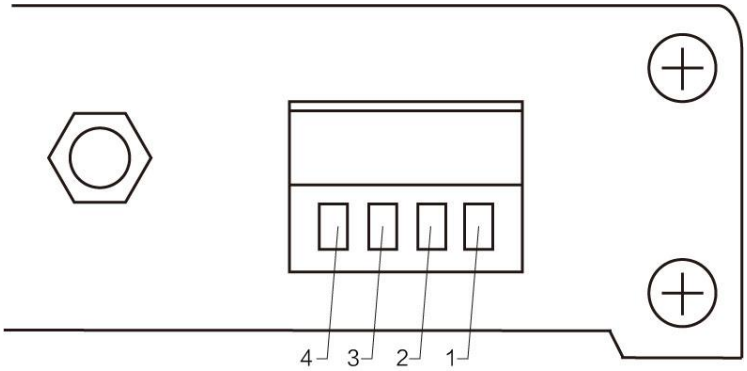
E90-DTU can be powered by 8~28V DC power supply, 12V or 24V DC power supply is recommended.

4.2 RS232 interface definition

The E90-DTU can be connected to the device via RS-232 using a standard DB-9 interface.

4.3 RS485 interface definition

The E90-DTU can be connected to the A terminal and B terminal of RS-485 of the device using the 485_A terminal and 485_B terminal in (2).



number	Standard definitions	function	illustrate
1	VCC	Crimp power connector, positive terminal	DC 8~28V, 12V or 24V is recommended
2	GND	Crimp power connector, negative terminal	The negative terminal of the power supply is connected to the system ground and housing
3	485_B	RS-485 interface, B interface	RS-485 interface B interface is connected to device B interface

4	485_A	RS-485 interface, A interface	RS-485 interface A interface is connected to device A interface

★ Note: If communication is poor when connecting the radio to multiple devices, but not with a single device, try connecting a 120Ω resistor in parallel between the 485_A terminal and the 485_B terminal.

5、 Technical indicators

5.1 Model Specifications

Model specifications	Operating frequency	Transmit power	Reference distance	Specification characteristics	Recommended application scenarios
	Hz	W	km		
E90-DTU(400SL33)	433.125M	2	16	LoRa spread spectrum immunity	Suitable for long distances and easily disturbed environments

★ Note: Sunny weather, open environment unobstructed, 12V/2A power supply, 5dBi suction cup antenna, antenna 2 meters above the ground, using factory default parameters.

5.2 General Specifications

serial number	project	specification	illustrate
1	Product size	82*62*25 mm	See installation dimensions for details
2	Product weight	150g	Weight tolerance 4.5g
3	Operating temperature	-40℃～+85℃	Meet the needs of industrial-grade use
4	Antenna impedance	50Ω	Standard 50Ω characteristic impedance
5	Voltage range	8～28V DC	12V or 24V is recommended
6	Communication interface	RS232/RS485	Standard DB9-pin/3.81 terminal blocks
7	baud rate	Factory default 9600	Baud rate range 1200~115200
8	Address code	The factory default is 0	A total of 65536 address codes can be set

5.3 Frequency range and number of channels

Model specifications	Default	Band range	Channel	Number of channels

	frequency		spacing	
	Hz	Hz	Hz	
E90-DTU(400SL33)	433.125M	410.125～493.125M	1M	84，半双工

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

5.4 transmit power level

Model specifications	2W（33dBm）	1W（30dBm）	500mW（27dBm）	250mW（24dBm）
E90-DTU(400SL33)	Factory default	√	√	√

★ Note: The lower the transmit power, the closer the transmission distance, but the operating current will not decrease in proportion, it is recommended to use the maximum transmit power.

5.5 Air Speed Class

Model specifications	Default air rate	Number of levels	Air velocity rating
	bps		bps
E90-DTU(400SL33)	2.4k	6	2.4、4.8、9.6、19.2、38.4、62.5k

★ Note: The higher the air rate setting, the faster the transmission rate and the closer the transmission distance; therefore, if the rate meets the requirements of use, it is recommended that the airspeed be as low as possible.

5.6 Current parameter

Model specifications	Transmit current mA		Guard current mA	
	12V	24V	12V	24V
E90-DTU(400SL33)	560	300	10	6

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

5.7 Send and receive length and subpackage method

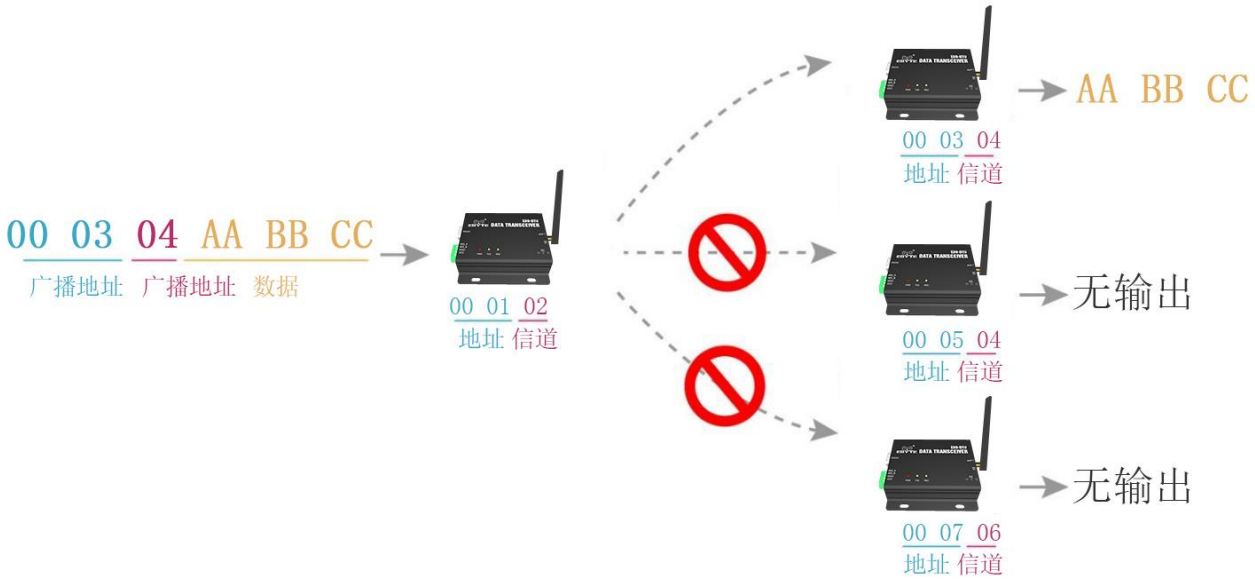
Model specifications	Cache size	Subcontracting method
E90-DTU(400SL33)	1000 字节	Subpacket 32/64/128/240 byte sending can be set via instructions

★ Note: 1. If the single-time received data of the radio station is greater than the capacity of the single packet, the excess data will be automatically allocated to the second transmission until the transmission is completed;

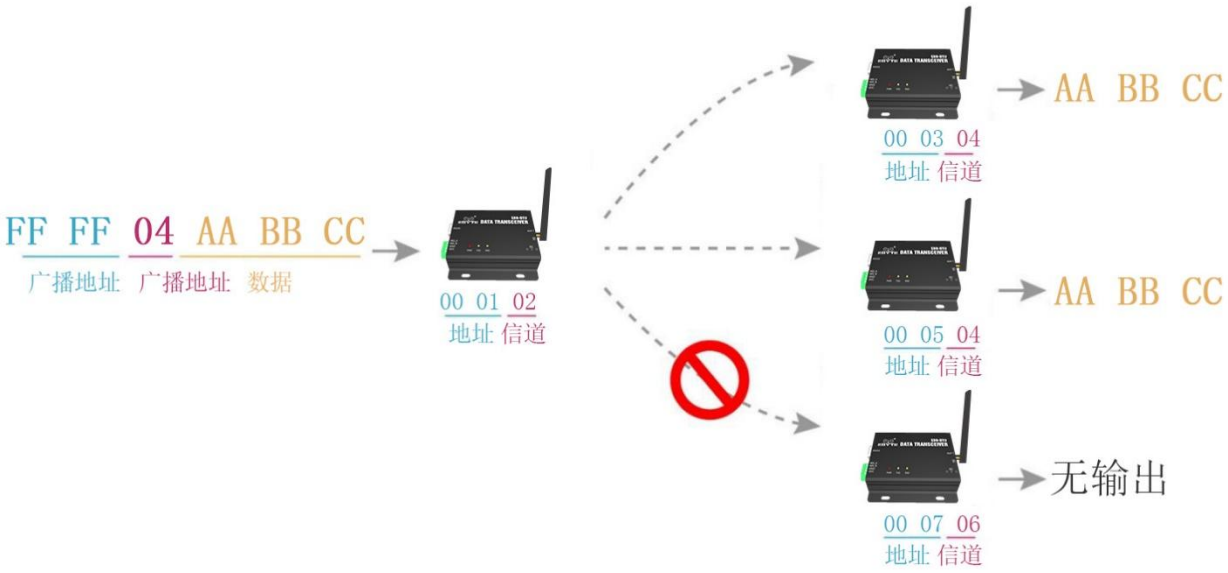
2、The data received by the station at a time cannot be greater than the cache capacity.

6、 Detailed function

6.1 Fixed-point emission (hexadecimal)



6.2 broadcast transmission (hexadecimal)



6.3 broadcast address

- Example: Set the address of module A to 0xFFFF and the channel to 0x04.
- When module A is used as a transmission (the same mode, transparent transmission mode), all receiving modules under the 0x04 channel can receive data to achieve the purpose of broadcasting.

6.4 listening address

- Example: Set the address of module A to 0xFFFF and the channel to 0x04.
- When module A is used as a reception, it can receive all the data under the 0x04 channel to achieve the purpose of monitoring.

7、 Operating mode

E90-DTU has four operating modes, and it is recommended to configure the station to normal mode (mode 0) when there is no demanding low power consumption requirement, and normal communication is required;

The station is factory set to normal mode by default (mode 0).

	category	M1	M0	exegesis
Mode 0	mode	ON	ON	Serial port open, wireless open, transparent transmission (factory default mode), support special command air configuration.
Mode 1	WOR mode	ON	OFF	It can be defined as a WOR sender and a WOR receiver, supporting over-the-air wake-up

Mode 2	Configuration mode	OFF	ON	The user accesses the registers through the serial port to control the working status of the radio, and the user can configure the module through the host computer configuration software.
Mode 3	Deep sleep mode	OFF	OFF	The station goes into hibernation

模式0

模式1

模式2

模式3

★ Note: If there is no need for low power consumption, there is no need to care about the WOR mode (mode 1)。

7.1 General Mode (Mode 0)

type	When M0 = ON, M1 = ON, the module operates in mode 0
transmit	The user can enter data through the serial port, and the module will start wireless transmission.
reception	The wireless receiving function of the module is turned on, and after receiving wireless data, it will be output through the TXD pin of the serial port.

7.2 WOR mode (mode 1)

type	When M0 = OFF and M1 = ON, the module operates in mode 1
transmit	When defined as a transmitter, the wake-up code is automatically incremented for a certain period of time before launching
reception	Data can be received normally, and the receiving function is equivalent to mode 0

7.3 Configuration Mode (Mode 2)

type	When M0 = ON, M1 = OFF, the module operates in mode 2
transmit	Wireless transmission is off

reception	Wireless reception is off
disposition	The user can access registers to configure the module operating state

7.4 Deep Sleep Mode (Mode 3)

type	When M0 = OFF and M1 = OFF, the module operates in mode 3
transmit	Wireless data cannot be transmitted.
reception	Unable to receive wireless data.
note	When entering another mode from sleep mode, the module will reconfigure the parameters, and the AUX will remain low during the configuration process; When finished, the output is high, so it is recommended that the user detect the rising edge of the T_BUSY.

8、 Register read and write control

8.1 Command format

In the configuration mode (mode 2: M1=OFF, M0=ON), the list of supported instructions is as follows (**when set, only 9600, 8N1 formats are supported**).:

serial number	Instruction format	Detailed description
1	Set the registers	Instructions: C0 + start address + length + parameter Response: C1 + start address + length + parameter Example 1: Configure the channel to 0x09 Directive Start Address Length parameter Send: C0 05 01 09 Return: C1 05 01 09 Example 2: Simultaneous configuration of module address (0x1234), network address (0x00), serial port (9600 8N1), airspeed (1.2K) Send: C0 00 04 12 34 00 61 Return: C1 00 04 12 34 00 61
2	Read registers	Instructions: C1 + start address + length Response: C1 + start address + length + parameter Example 1: Read the channel Directive Start Address Length parameter Send: C1 05 01 Return: C1 05 01 09 Example 2: Read the module address, network address, serial port, and airspeed at the same time Send: C1 00 04 Return: C1 00 04 12 34 00 61
3	Set temporary registers	Instructions: C2 + start address + length + parameters Response: C1 + start address + length + parameter Example 1: Configure the channel to 0x09

		Directive Start Address Length parameter Send: C2 05 01 09 Return: C1 05 01 09 Example 2: Simultaneous configuration of module address (0x1234), network address (0x00), serial port (9600 8N1), airspeed (1.2K) Send: C2 00 04 12 34 00 61 Return: C1 00 04 12 34 00 61
5	Wireless configuration	Instructions: CF CF + general instructions Response: CF CF + regular response Example 1: The wireless configuration channel is 0x09 Wireless Instruction Header Instruction Start Address Length parameter Send: CF CF C0 05 01 09 Return: CF CF C1 05 01 09 Example 2: Wireless simultaneous configuration module address (0x1234), network address (0x00), serial port (9600 8N1), airspeed (1.2K) Send: CF CF C0 00 04 12 34 00 61 Return: CF CF C1 00 04 12 34 00 61
6	Format error	Format error response FF FF FF

8.2 Register description

serial number	Read and write	name	description				remark
00H	Read/Write	ADDH	ADDH（default0）				Module address high byte and low byte; Note: When the module address is equal to FFFF, it can be used as a broadcast and listening address, that is, the module will not perform address filtering
01H	Read/Write	ADDL	ADDL（default0）				
02H	Read/Write	NETID	NETID（default0）				network address, which is used to distinguish the network; When communicating with each other, it should be set to the same.
03H	Read/Write	REG0	7	6	5	UART baud rate（bps）	The two modules that communicate with each other, the serial port baud rate can be different, and the verification method can also be different; When transmitting large packets continuously, users need to consider data blocking caused by the same baud rate, and may even lose it. It is generally recommended that the baud rate be the same on both sides of the communication.
			0	0	0	baud rate is 1200	
			0	0	1	baud rate is 2400	
			0	1	0	baud rate is 4800	
			0	1	1	baud rate is 9600（default）	
			1	0	0	baud rate is 19200	
			1	0	1	baud rate is 38400	
			1	1	0	baud rate is 57600	
			1	1	1	baud rate is 115200	
			4	3	Serial check bit		The serial port mode of the communication two sides can be different;
			0	0	8N1（default）		
			0	1	8O1		
			1	0	8E1		
			1	1	8N1（equate 00）		
			2	1	0	Air speed（bps）	The air speed on both sides of the communication

			0	1	0	Air speed 2.4k（default）	must be the same; The higher the air rate, the smaller the delay and the shorter the transmission distance.
			0	1	1	Air speed 4.8k	
			1	0	0	Air speed 9.6k	
			1	0	1	Air speed 19.2k	
			1	1	0	Air speed 38.4k	
			1	1	1	Air speed 62.5k	
04H	Read/Write	REG1	7	6	subcontract settings		The data sent by the user is less than the length of the packet, and the output of the serial port at the receiving end is presented as uninterrupted continuous output; If the data sent by the user is larger than the length of the packet, the serial port at the receiving end will output the packet.
			0	0	240 bytes（default）		
			0	1	128 bytes		
			1	0	64 bytes		
			1	1	32 bytes		
			5	RSSI Ambient noise enable			After enabling, the command C0 C1 C2 C3 can be sent in the transmission mode or WOR transmission mode to read the register; Register 0x00: current ambient noise RSSI; Register 0X01: RSSI at Last Data Received (The current channel noise is: dBm =-RSSI/2); Instruction format: C0 C1 C2 C3 + start address + read length; Return: C1 + address address + read length + read effective value; such as: send C0 C1 C2 C3 00 01 return C1 00 01 RSSI
			0	disabled（default）			
			1	enabled			
			4	3	2	reserve	
			1	0	transmit power		Transmission power Power and current have a nonlinear relationship, and the power supply efficiency is the highest at maximum power; Current does not decrease proportionally with power reduction.
			0	0	2W（33dBm，default）		
			0	1	1W（30dBm）		
			1	0	500mW（27dBm）		
			1	1	250mW（24dBm）		
05H	Read/Write	REG2	channel control（CH） 0-83 represent a total of 84 channels				actual frequency = 410.125 + CH * 1M
06H	Read/Write	REG3	7	enable rssi byte			When enabled, the module receives wireless data and outputs it through the serial port TXD, followed by an RSSI strength byte.
			0	disabled（default）			
			1	enabled			
			6	transfer method			During fixed-point transmission, the module will recognize the first three bytes of serial port data as: address high + address low + channel, and use it as the wireless transmission target.
			0	transparent transmission (default)			
			1	Fixed-point transmission			
			5	relay function			After the relay function is enabled, if the target address is not the module itself, the module will start a forwarding; In order to prevent data return, it is recommended to use it in conjunction with the fixed-point mode; that is, the destination address is different from the source address.
			0	Disable relay function (default)			
			1	Enable relay function			
			4	LBT enable			After enabled, wireless data will be monitored before transmission, which can avoid interference to a certain extent, but may cause data delay; The maximum stay time of LBT is 2 seconds, and it will be issued forcibly when it reaches 2 seconds.
			0	disabled (default)			
			1	enable			

<table>
<tr><td rowspan="12"></td><td rowspan="12"></td><td rowspan="12"></td><td>3</td><td colspan="3">WOR mode transceiver control</td><td rowspan="3">Only valid for mode 1;
After the WOR receiver receives the wireless data and outputs it through the serial port, it will wait for 1000ms before entering WOR again. During this period, the user can input the serial data and return it through the wireless;
Each serial port byte will be refreshed for 1000ms;
The user must initiate the first byte within 1000ms.</td></tr>
<tr><td>0</td><td colspan="3">WOR receiver (default)
The transceiver of the module is turned on, and when transmitting data, a wake-up code for a certain period of time is added.</td></tr>
<tr><td>1</td><td colspan="3">WOR transmitter
The module cannot transmit data and works in WOR monitoring mode. The monitoring cycle is shown below (WOR cycle), which can save a lot of power consumption.</td></tr>
<tr><td>2</td><td>1</td><td>0</td><td>WOR cycle</td><td rowspan="9">Only valid for mode 1;
Period T= (1+WOR)*500ms, maximum 4000ms, minimum 500ms;
The longer the WOR monitoring interval period, the lower the average power consumption, but the greater the data delay;
The sending and receiving parties must be consistent (very important)</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>500ms</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1000ms</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1500ms</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>2000ms（default）</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>2500ms</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>3000ms</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>3500ms</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>4000ms</td></tr>
<tr><td>07H</td><td>Write</td><td>CRYPT_H</td><td colspan="4">key high byte (default 0)</td><td rowspan="2">Write only, read returns 0;
Used for encryption to avoid interception of air wireless data by similar modules;
Inside the module, these two bytes will be used as calculation factors to transform and encrypt the wireless signal in the air.</td></tr>
<tr><td>08H</td><td>Write</td><td>CRYPT_L</td><td colspan="4">Key low byte (default 0)</td></tr>
<tr><td>80H～86H</td><td>Read</td><td>PID</td><td colspan="4">Product information 7 bytes</td><td>Product information 7 bytes</td></tr>
</table>

8.3 Factory Default Parameters

Module model	frequency	address	Channel	Air speed	Baud rate	Serial format	transmit power
E90-DTU (400SL33)	433.125MHz	0x0000	0x23	2.4kbps	9600	8N1	2W（33dBm，default）

9、 Use of relay networking mode

No.	Description of relay mode
1	After setting the relay mode through the configuration mode, switch to the general mode and the relay starts to work.
2	In relay mode, ADDH and ADDL are no longer used as module addresses, but are forwarded and paired corresponding to NETID respectively. If one of the networks is received, it will be forwarded to another network. The repeater's own network ID is invalid.

3	In relay mode, the relay module cannot send and receive data, and cannot operate with low power consumption.
4	When the user enters other modes from mode 3 (sleep mode) or during the reset process, the module will reset the user parameters, during which AUX outputs low level.

Description of trunk networking rules：

1、Forwarding rules, the relay can forward data in both directions between two NETIDs.

2、In relay mode, ADDH\ADDL is no longer used as a module address, but as a NETID forwarding pair.。

As shown in the picture:

1. Level 1 relay

"Node 1" has a NETID of 08.

"Node 2" has a NETID of 33.

The ADDH\ADDL of trunk 1 are 08 and 33 respectively.

So the signal sent by node 1 (08) can be forwarded to node 2 (33)

At the same time, node 1 and node 2 have the same address, so the data sent by node 1 can be received by node 2.

2. Secondary relay

The ADDH\ADDL of relay 2 are 33 and 05 respectively.

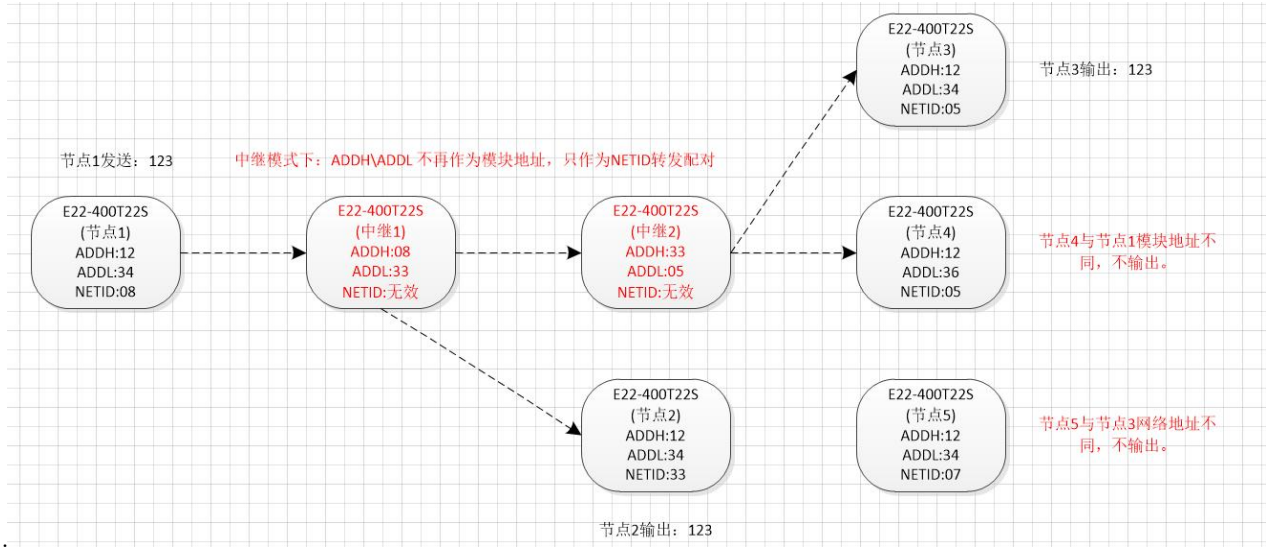
So relay 2 can forward the data of relay 1 to network NETID:05.

Thus node 3 and node 4 can receive node 1 data. Node 4 outputs data normally, and node 3 has a different address from node 1, so no data is output.

3. two-way relay

Configuration as shown in the figure: the data sent by node 1 can be received by nodes 2 and 4, and the data sent by nodes 2 and 4 can also be received by node

1.



10、 PC Configuration Instructions

- The figure below shows the display interface of the E90-DTU SL configuration host computer. The user can switch to the command mode through M0M1, and quickly configure and read parameters on the host computer.

- In the configuration host computer, the module address, frequency channel, network ID, and key are all in decimal display mode, and the value range of each parameter is:
  website address: 0～65535
  Frequency channel: 0～83
  Network ID: 0～255
  key: 0～65535
- When using the host computer to configure the relay mode, the user needs to pay special attention. Since the parameters in the host computer are in decimal display mode, the module address and network ID need to be converted when filling in. For example, if the network ID input by transmitter A is 02, and the network ID input by receiver B is 10, then when the relay terminal R sets the module address, convert the hexadecimal value 0X020A to the decimal value 522 and fill it in as the relay terminal R module address. That is, the module address value that needs to be filled in at the relay terminal R at this time is 522.

11、 Program the radio

1.1. Schematic diagram

Operating mode	M1	M0	note
configuration mode	OFF	ON	The radio can only be programmed in the current mode using the configuration software

1、Programming can only be performed in a specific working mode (see the table above). If programming fails, please confirm whether the working mode of the radio is correct.

2、If there is no need for complicated programming, open the E90-DTU SL digital radio configuration software on the official website of Ebyte, and then modify the relevant parameters.

12、 Schematic diagram of connection in test and practical application

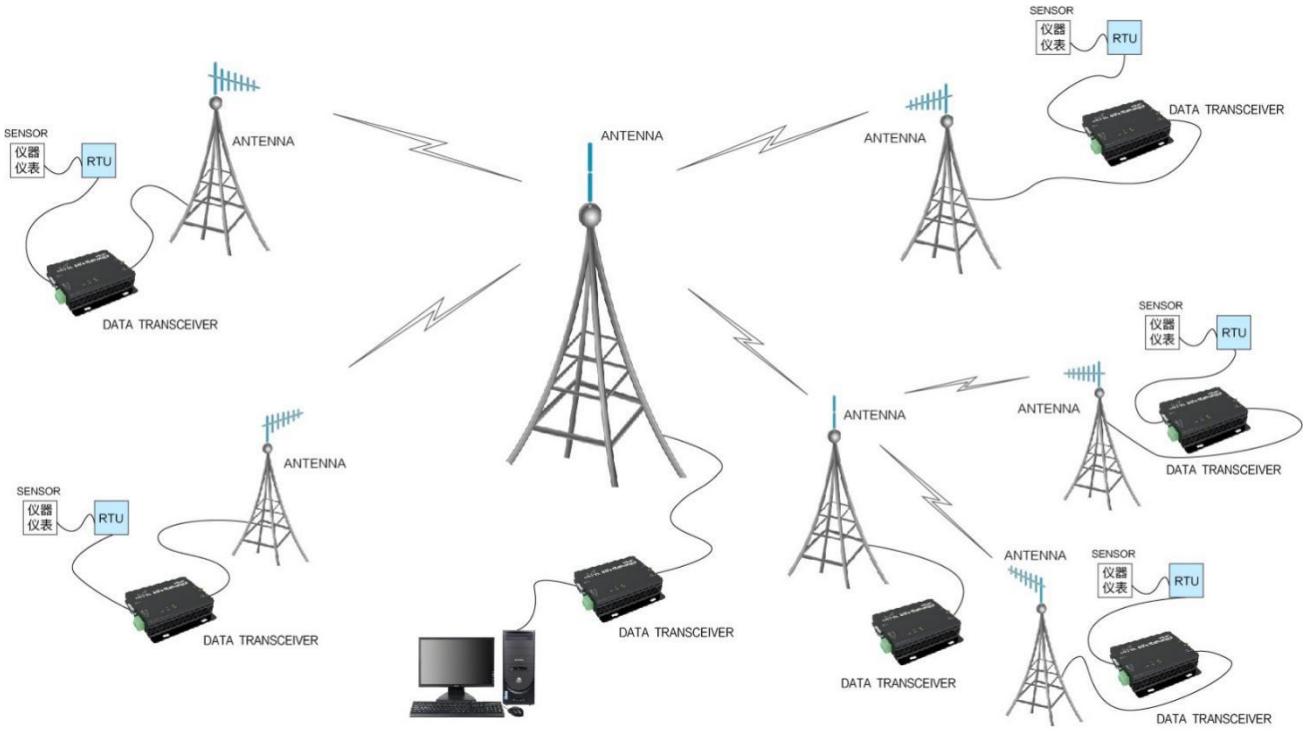
13、 Related Products

Product number	Interface Type	working frequency Hz	transmit power W	communication distance km	Features
E90-DTU(230SL22)	RS232 RS485	230M	0.16	5	LoRa spread spectrum, wireless configuration, networking transmission, suitable for complex environments
E90-DTU(230SL30)	RS232 RS485	230M	1	10	LoRa spread spectrum, wireless configuration, networking transmission, suitable for complex environments
E90-DTU(400SL22)	RS232 RS485	433\470M	0.16	5	LoRa spread spectrum, wireless configuration, networking transmission, suitable for complex environments
E90-DTU(400SL33)	RS232 RS485	433\470M	1	10	LoRa spread spectrum, wireless configuration, networking transmission, suitable for complex environments
E90-DTU(900SL22)	RS232 RS485	868\915M	0.16	5	LoRa spread spectrum, wireless configuration, networking transmission, suitable for complex environments
E90-DTU(900SL30)	RS232 RS485	868\915M	1	10	LoRa spread spectrum, wireless configuration,

					networking transmission, suitable for complex environments
E90-DTU(170L30)	RS232 RS485	170M	1	8	LoRa spread spectrum, super penetrating diffraction
E90-DTU(433L30)	RS232 RS485	433M	1	8	LoRa spread spectrum, long-distance anti-jamming
E90-DTU(433L37)	RS232 RS485	433M	5	20	LoRa spread spectrum, 20km ultra-long distance, anti-jamming
E90-DTU(433C30)	RS232 RS485	433M	1	3	High-speed continuous transmission, support ModBus protocol
E90-DTU(433C33)	RS232 RS485	433M	2	4	High-speed continuous transmission, support ModBus protocol
E90-DTU(433C37)	RS232 RS485	433M	5	10	High-speed continuous transmission, support ModBus protocol
E90-DTU(230N27)	RS232 RS485	230M	0.5	5	Low frequency narrowband, suitable for complex environments
E90-DTU(230N33)	RS232 RS485	230M	2	8	Low frequency narrowband, suitable for complex environments
E90-DTU(230N37)	RS232 RS485	230M	5	15	Low-frequency narrow-band, suitable for complex environments, super strong diffraction

14、 Practical application field

Ebyte digital radio is suitable for all kinds of point-to-point and one-to-multipoint wireless data transmission systems, such as smart home, Internet of Things transformation, power load monitoring, distribution network automation, hydrology and water regime monitoring, tap water pipe network monitoring, urban street lights Monitoring, air defense alarm control, railway signal monitoring, centralized control of railway water supply, oil and gas supply pipeline network monitoring, GPS positioning system, remote meter reading, electronic crane scale, automatic target reporting, earthquake forecasting, fire prevention and anti-theft, environmental monitoring and other industrial automation system, as shown below：



15、 Precautions for use

1. Please keep the warranty card of this device properly. The warranty card contains the factory number (and important technical parameters) of the device, which is of great reference value for the user's future maintenance and new equipment.
2. During the warranty period, if the radio station is damaged due to the quality of the product itself rather than man-made damage or natural disasters such as lightning strikes, it will enjoy free warranty; users are requested not to repair it by themselves, and contact our company if there is a problem. Ebyte provides First-class after-sales service.
3. Do not operate this radio 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; it is best to have over-current, over-voltage protection and lightning protection functions to ensure data transmission. radio is working.
5. Do not use it in a working environment that exceeds the environmental characteristics of the data transmission station, such as high temperature, humidity, low temperature, strong electromagnetic field or dusty environment.
6. Don't let the digital radio continuously transmit at full capacity, otherwise it may burn out the transmitter.
7. The ground wire of the data transmission station 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 it is easy to burn out the communication interface, etc.;.
8. When testing the digital radio station, it must be connected with a matching antenna or a 50Ω dummy load, otherwise the transmitter will be easily damaged; Do not touch the antenna when transmitting. When using a suction cup antenna, the suction cup must be adsorbed on the metal surface.

9. Wireless data transmission stations often have different communication distances in different environments, and 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 50 More than % communication distance margin.
10. If the measured communication distance is not ideal, it is recommended to analyze and improve the communication distance from the quality of the antenna and the installation method of the antenna. You can also get in touch with support@cdebyte.com for help.
11. When choosing a power supply, in addition to keeping 50% of the current margin as recommended, you should also pay attention to its ripple not exceeding 100mV.
12. Wireless communication products need to be connected with an impedance-matched antenna to work properly. Even a short-term test cannot be omitted. If the product is damaged due to this reason, it will not be covered by the warranty.

16、 Important statement

1. Ebyte reserves the right of final interpretation and modification of all contents in this manual.
2. Due to the continuous improvement of the hardware and software of the product, this manual may be changed without prior notice, and the latest version of the manual shall prevail in the end.
3. Everyone is responsible for protecting the environment: In order to reduce the use of paper, only the Chinese part of this manual is printed, and the English manual only provides electronic documents. If necessary, please go to our official website to download; in addition, unless the user specifically requires it, the user can place an order in bulk When ordering, we only provide product manuals according to a certain proportion of the order quantity, not every digital radio station is matched one by one, please understand.

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