



Industrial grade wireless digital radios
E610-DTU 20/30dBm
User Manual



Content

| | |
|--|----|
| DISCLAIMER | 3 |
| 1. OVERVIEW | 4 |
| 1.1 INTRODUCTION | 4 |
| 1.2 FEATURES | 4 |
| 2. QUICK START | 5 |
| 3. MOUNTING DIMENSIONS | 7 |
| 3.1 DESCRIPTION OF EACH DEPARTMENT | 7 |
| 3.2 MOUNTING DIMENSIONS | 8 |
| 4. INTERFACE DEFINITIONS | 9 |
| 4.1 DESCRIPTION OF THE POWER SUPPLY INTERFACE | 9 |
| 4.2 DEFINITION OF THE RS232 INTERFACE | 9 |
| 4.3 RS485 INTERFACE DEFINITION | 9 |
| 5. TECHNICAL SPECIFICATIONS | 10 |
| 5.1 MODEL SPECIFICATIONS | 10 |
| 5.2 GENERAL SPECIFICATION PARAMETERS | 10 |
| 5.3 FREQUENCY RANGE AND NUMBER OF CHANNELS | 11 |
| 5.4 TRANSMITTING POWER LEVELS | 11 |
| 5.5 AIR RATE | 11 |
| 5.6 CURRENT PARAMETERS | 11 |
| 5.7 RECEIVING AND DISPATCHING LENGTHS AND SUBCONTRACTING METHODS | 12 |
| 6. WORKING MODE | 12 |
| 6.1 CONTINUOUS TRANSMISSION MODE (MODE 0) | 12 |
| 6.2 GENERAL TRANSMISSION MODE (MODE 1) | 13 |
| 6.3 USER CONFIGURATION MODE (MODE 2) | 14 |
| 6.3 RESERVED MODE (MODE 3) | 14 |
| 7. REGISTER READ/WRITE CONTROL | 14 |
| 7.1 COMMAND FORMAT | 14 |
| 7.2 REGISTER DESCRIPTION | 15 |
| 7.3 FACTORY DEFAULT PARAMETERS | 18 |
| 8. TRUNKING MODE USE | 19 |
| 9. PROGRAMMING THE RADIO | 20 |
| 9.1 SCHEMATIC | 20 |
| 9.2 CONFIGURATION SOFTWARE DETAILS | 20 |
| 10. FIRMWARE UPGRADE | 22 |
| 11. CONNECTION SCHEMATIC IN TESTING AND PRACTICAL APPLICATIONS | 22 |
| 12. RELATED PRODUCTS | 23 |
| 13. PRACTICAL APPLICATION AREAS | 24 |
| 14. PRECAUTIONS FOR USE | 24 |
| REVISION HISTORY | 24 |
| ABOUT US | 26 |

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1. Overview

1.1 Introduction

The E610-DTU (433C30) and E610-DTU (433C20) are continuous transmission type 433M wireless data transmission modules with built-in high performance microcontroller and wireless transceiver chip. The E610-DTU and E610-DTU (433C20) are continuous transmission modules that can transmit continuously at different serial port baud rates and have low data output delay at the receiving end, making them suitable for fast transmission of large data volumes.

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

1.2 Features

- support for automatic relay networking in general mode, multi-level relay for ultra-long distance communication, multiple networks running simultaneously in the same area;
- simple and efficient power supply design, supporting power supply setter or crimping method, supporting 8 to 28V power supply;
- Using temperature compensation circuit, frequency stability better than $\pm 1.5\text{PPM}$;
- All aluminum alloy housing, compact size, easy installation, good heat dissipation; perfect shielding design, good electromagnetic compatibility, strong anti-interference ability;
- Multiple protection functions such as power reverse protection, over-connection protection and antenna surge protection, which greatly increase 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, the 12V supply watchdog current is only 16mA, the transmit current $\leq 0.4\text{A}$;
- Built-in watchdog with precise time layout, in case of abnormality, the radio will restart automatically and can continue to work according to the previous parameter settings;
- Supporting data transmission rates from 0.5k to 470kbps;
- E610-DTU (433C30) with built-in PA+LNA+SAW, communication distance up to 10km under ideal conditions;
- E610-DTU (433C20) with built-in LNA+SAW, communication distance up to 6km under ideal conditions;
- Support RSSI signal strength indication function for evaluating signal quality, improving communication network and ranging;
- supporting user-set communication key, and cannot be read, which greatly improves the confidentiality of user data;

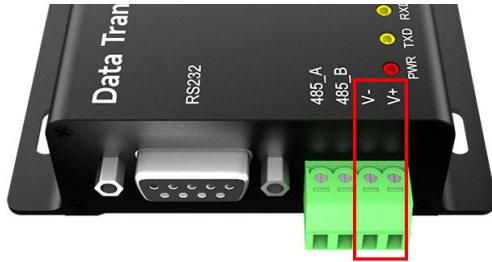
- Parameters are saved at power-down, and the radio will work according to the set parameters after power-up again;
- Working temperature range: $-40\text{ }^{\circ}\text{C} \sim +85\text{ }^{\circ}\text{C}$, adapt to various harsh working environment, real industrial grade product;
- industrial-standard design, supporting extended use at -40 to $+85\text{ }^{\circ}\text{C}$.

2. Quick start

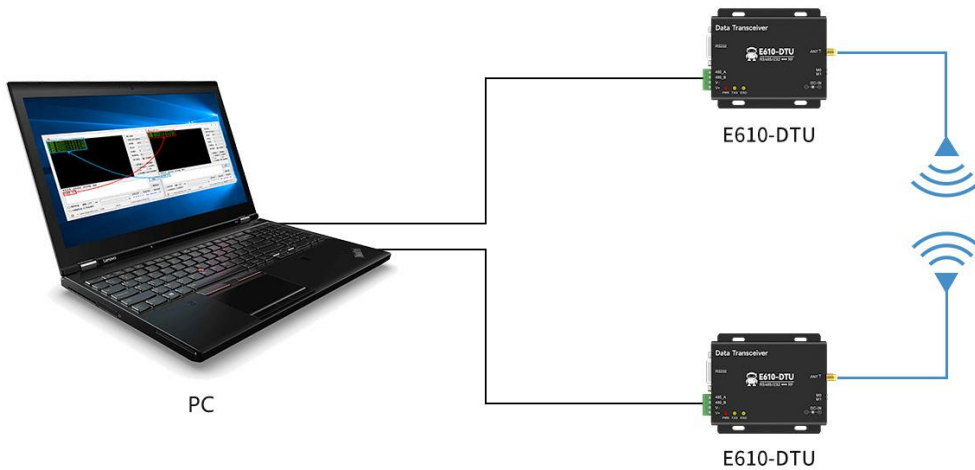
You will need to prepare



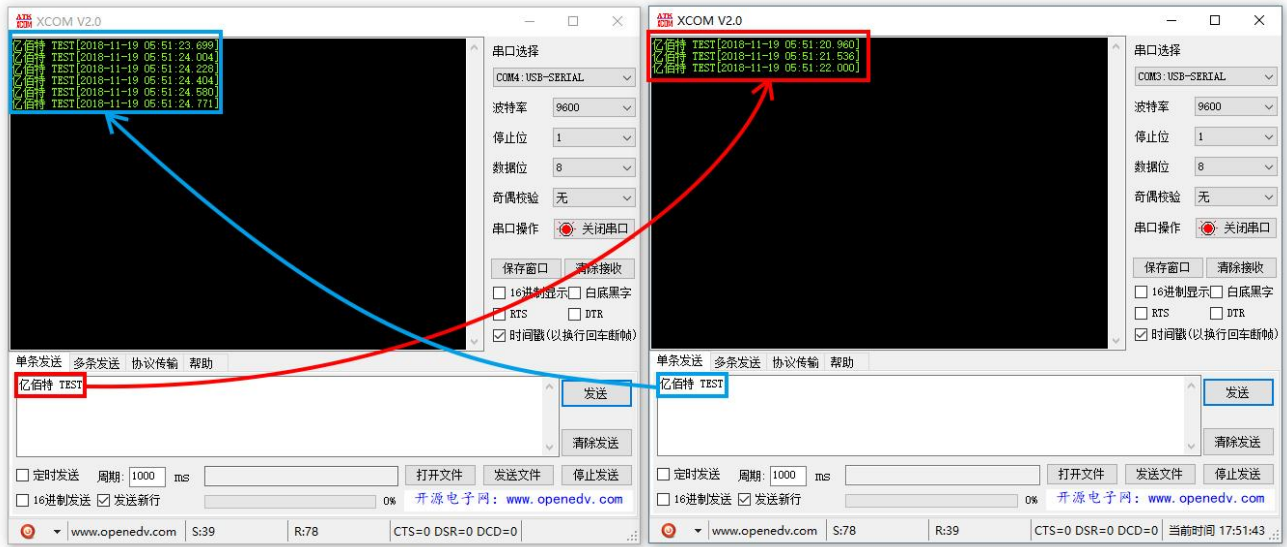
1, first install the antenna to the digital transmission, then install the power supply, and ensure that the dip switch status is correct, the user according to demand to choose the pressure line method or power adapter power supply, either one can be;



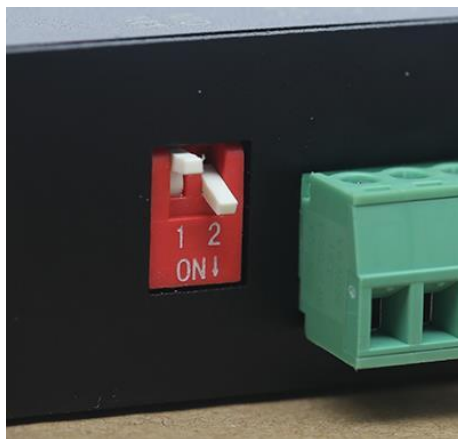
2. Use USB to RS-232, USB to RS-485 or other means to connect the PC to the digital radio;



3, start the two serial debugging assistant, select the serial port baud rate of 9600bps, parity for 8N1, you can realize the serial port pass-through;

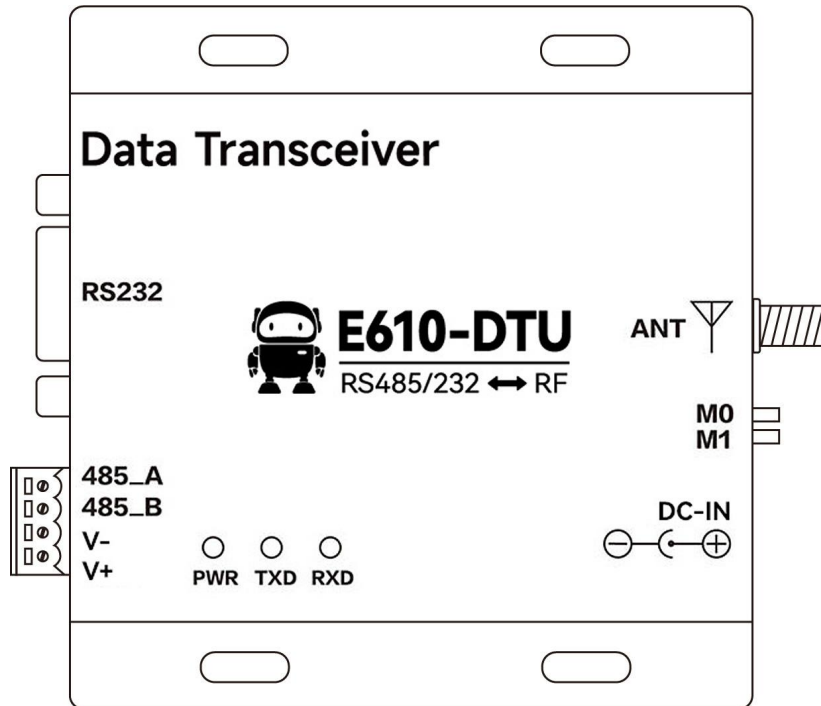


4, If the customer needs to modify the parameters, please set the digital radio in the configuration mode and connect it to the computer, open the E610-DTU digital radio configuration software, you can modify the relevant parameters, after completing the configuration, make sure to restore the dip switch state before communication.



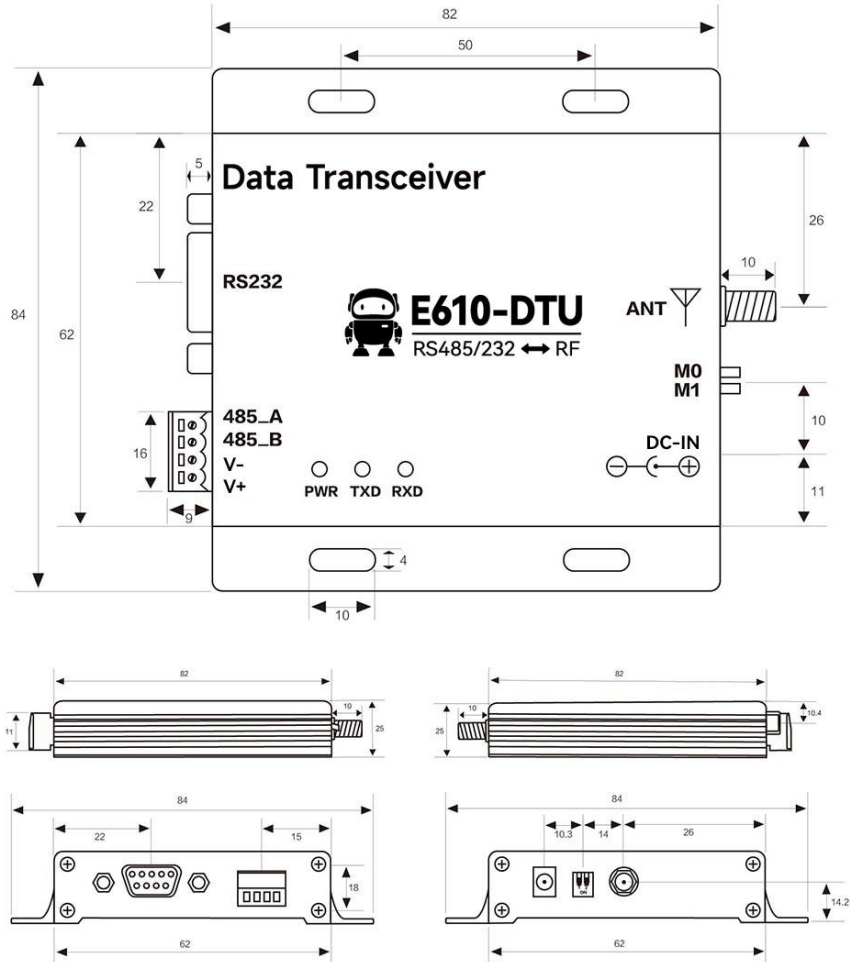
3. Mounting dimensions

3.1 Description of each department



| No. | Name | Function | Description |
|-----|----------------------|------------------------|---|
| 1 | DB-9 female socket | RS232 interface | Standard RS232 interface |
| 2 | 3.81 Terminal blocks | RS485, power interface | Standard RS485 interface with crimped power supply interface |
| 3 | PWR-LED | Power Indicator | Red, illuminated when power is on |
| 4 | TXD-LED | Sending indicator | Yellow, blinks when data is sent |
| 5 | RXD-LED | Receive indicator | Yellow, flashes when receiving data |
| 6 | DC power connector | Power connector | Straight round hole, outer diameter 5.5mm, inner diameter 2.5mm |
| 7 | Dipswitch | Dipswitch | Operating mode control |
| 8 | Antenna connector | SMA-K interface | Male threaded bore, 10mm long, characteristic impedance 50Ω |

3.2 Mounting dimensions



4. Interface definitions

4.1 Description of the power supply interface



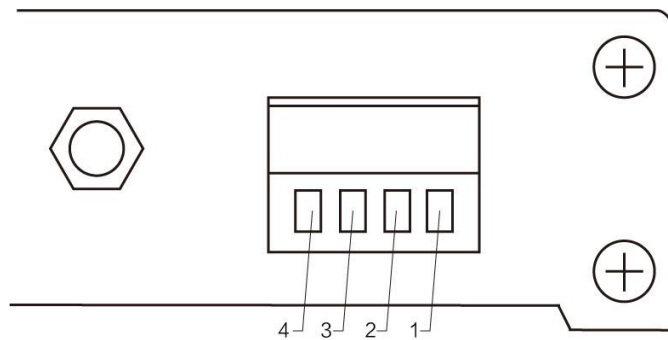
- can be powered by the DC power connector of your choice, using a 5.5mm outer diameter and 2.5mm inner diameter power adapter;
- can also be powered by the VCC terminal and the GND terminal in ②, simply by selecting either power supply method;
- E610-DTU can be powered from 10 to 28V DC power supply, 12V or 24V DC power supply is recommended.

4.2 Definition of the RS232 interface

The E610-DTU can be connected to the device via RS232 using a standard DB-9 interface.

4.3 RS485 interface definition

The E610-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 | Standard definitions | Function | Description |
|----|----------------------|-----------------------------------|--|
| 1 | VCC | Crimped Power Connector, Positive | DC 8 to 28V, 12V or 24V recommended |
| 2 | GND | Crimped power connector, negative | Negative side of power supply connected to system ground and housing |
| 3 | 485_B | RS-485 Interface, B Port | RS-485 interface B interface to device B interface |
| 4 | 485_A | RS-485 Interface, A Interface | RS-485 interface A to device A |

Note: If you experience poor communication when connecting the radio to multiple units but not when connecting a single unit, try connecting a 120Ω resistor in parallel between the 485_A and 485_B terminals.

5. Technical specifications

5.1 Model specifications

| Model specifications | Operating frequency | Transmitting power | Reference distance | Specification features | Recommended Application Scenarios |
|----------------------|---------------------|--------------------|--------------------|------------------------------------|---|
| | Hz | dBm | km | | |
| E610-DTU(433C20) | 410M-441 M | 20 | 1 | High-speed continuous transmission | Suitable for applications with high data volumes and support for customer Modbus protocols. |
| | | 20 | 6 | General transmission mode | Suitable for small data volumes and remote application environments. |
| E610-DTU(433C30) | 410M-441 M | 30 | 2 | High-speed continuous transmission | For applications with large data volumes, supporting the customer's Modbus protocol. |
| | | 30 | 10 | General transmission mode | For small data volumes and long distance applications. |

Conditions: clear weather, unobstructed open environment, 12V/1A power supply, 5dBi suction cup antenna, antenna height 2m from ground, factory default parameters used

5.2 General specification parameters

| No. | Projects | Specification | Description |
|-----|-------------------------|----------------------|--|
| 1 | Product Size | 82*62*25mm | See mounting dimensions for details |
| 2 | Product Weight | 128g | Weight tolerance 4.5g |
| 3 | Operating Temperature | -40°C ~ +85°C | For industrial grade use |
| 4 | Antenna Impedance | 50Ω | Standard 50Ω characteristic impedance |
| 5 | Voltage range | 10 ~ 28V DC | 12V or 24V recommended |
| 6 | Communication Interface | RS232/RS485 | Standard DB9 hole type / 3.81 terminal block |
| 7 | Baud rate | Factory default 9600 | Baud rate range 2400 to 230400 |
| 8 | Address Code | Factory default 0 | Total of 65536 address codes can be set |

5.3 Frequency range and number of channels

★Note: When using multiple sets of digital radios to communicate one-to-one in the same area at the same time, it is recommended that each set of digital radios set a channel interval of 0.5MHz or more.

| Model specifications | Factory default frequency | Frequency band range | Channel spacing | Number of channels |
|----------------------|---------------------------|----------------------|-----------------|--------------------|
| | Hz | Hz | Hz | |
| E610-DTU(433C20) | 433M | 410 ~ 441M | 500K | 256, Half Duplex |
| E610-DTU(433C30) | | | | |

5.4 Transmitting power levels

| Model specifications | Factory default | Grading | | |
|----------------------|-----------------|---------|-------|-------|
| E610-DTU(433C20) | 20dBm | 17dBm | 14dBm | 11dBm |
| E610-DTU(433C30) | 30dBm | 27dBm | 24dBm | 21dBm |

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

5.5 Air rate

| Model specifications | Default air speed | Number of levels | Airspeed class |
|----------------------|-------------------|------------------|--|
| | bps | | bps |
| E610-DTU(433C20) | 0.5k | 17 | 0.5K、1.5k、3.5k、5.5k、6.5k、11k、13k、21k、26k、42k、51k、82k、76k、125k、160k、410k、470k |
| E610-DTU(433C30) | | | |

★Note: The higher the air speed, the faster the transmission rate, but the closer the transmission distance; therefore, it is recommended that the lower the air speed is, the better, provided that the rate meets the usage requirements;

★The default airspeed is 0.5k in general mode, and the airspeed is automatically adapted in continuous transmission mode.

5.6 Current parameters

| Model specifications | Emission current mA | | Watching the current mA | |
|----------------------|---------------------|-----|-------------------------|-----|
| | 12V | 28V | 12V | 28V |
| E610-DTU(433C20) | 38 | 20 | 16 | 7.5 |
| E610-DTU(433C30) | 350 | 150 | 16 | 7.5 |

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

5.7 Receiving and dispatching lengths and subcontracting methods

| Model specifications | Cache size | Subcontracting method |
|----------------------|------------|------------------------------|
| E610-DTU(433C20) | 4096 Byte | Default sub-package 55 bytes |
| E610-DTU(433C30) | | |

- ★Note: 1. If the data received by the radio at a single time is larger than the single packet capacity, the excess data will be automatically allocated to the second transmission until the transmission is completed;
2. the radio must not receive data in a single transmission larger than the cache capacity;
3. The subcontract transmission of the above stations can only be carried out in the general transparent transmission mode and continuous transmission in the continuous transmission mode;

6. Working mode

★E610-DTU all have four working modes, which are configured by dip switches M0 and M1.

| Mode (0-3) | M1 | M0 | Mode Introduction | Remarks |
|-------------------------|----|----|---|--|
| 0 Continuous mode | 0 | 0 | The radio will automatically calculate the over-the-air transmission rate required for continuous uninterrupted transmission based on the user-configured serial port baud rate, and the user can transmit data without interruption. | Supports continuous uninterrupted transmission |
| 1 General mode | 0 | 1 | The radio will internally execute the user-configured over-the-air transmission rate. The data will be transmitted in packets according to 55 bytes per packet. | General transparent transmission |
| 2 Configuration mode | 1 | 0 | The user has access to the registers via the serial port to control the radio's operating status. | Requires configuration at baud rate 9600 |
| 3 Reserved mode | 1 | 1 | The radio does not perform any transceiver work in this mode | |



模式 0



模式 1



模式 2

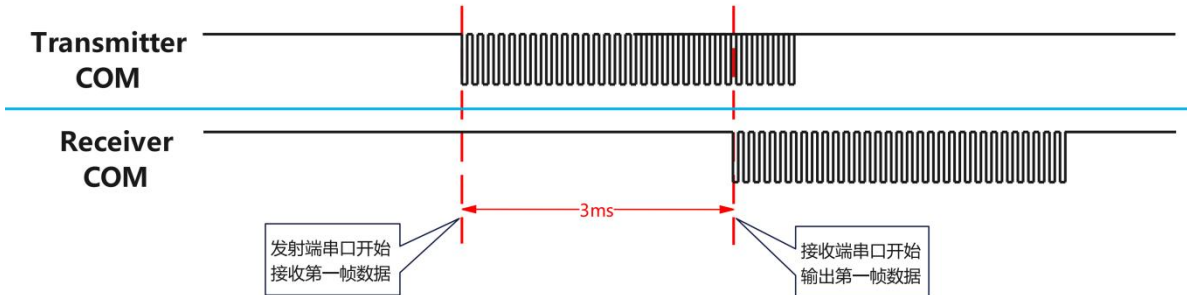


模式 3

6.1 Continuous transmission mode (mode 0)

| Type | When M0 = 0 and M1 = 0, the module operates in mode 0 |
|---------|--|
| Send | Automatic calculation of the air rate required for continuous transmission based on the user-configured serial port baud rate; The user can input data through the serial port and the module will start the wireless transmission. |
| Receive | In the non-transmitting state, data can be received normally. |

In continuous transmission mode, the intuitive experience is that instead of waiting for all the data to be packaged before the user can transmit the data out, the module starts transmitting from the first frame of data until it completes the data that the user needs to transmit. This saves the time of data packing and packetizing, and greatly reduces the data latency time.



Data delay diagram (at serial port baud rate of 115200, sending 22 bytes)

The continuous transmission mode is divided into "distance first" and "speed first" strategies for users to choose from (see Chapter 7 for details). As we can see from the reference data in the table below, the difference in data delay time between the two strategies is not significant when the baud rate of the serial port is higher and the amount of data sent is smaller. However, once the data reaches thousands of bytes, the problem of data latency comes to the fore.

| Serial Port Baud rate | Continuous Passing Strategy | Data Delay(ms) | | |
|-----------------------|-----------------------------|----------------|---------|---------|
| | | 1 byte | 22 byte | 55 byte |
| 2400 | Distance first | 77.634 | 213.094 | 417.224 |
| | Speed Priority | 57.267 | 161.193 | 161.233 |
| 4800 | Distance first | 41.396 | 111.040 | 216.195 |
| | Speed first | 29.028 | 81.043 | 81.043 |
| 9600 | Distance first | 21.024 | 55.926 | 108.611 |
| | Speed first | 15.274 | 41.675 | 41.651 |
| 19200 | Distance first | 10.853 | 28.355 | 54.736 |
| | Speed first | 7.973 | 21.199 | 21.211 |
| 38400 | Distance first | 6.160 | 15.031 | 28.083 |
| | Speed first | 4.701 | 11.085 | 11.080 |
| 57600 | Distance first | 4.392 | 10.352 | 19.101 |
| | Speed first | 3.373 | 7.569 | 7.583 |
| 115200 | Distance first | 2.478 | 5.364 | 9.890 |
| | Speed first | 1.867 | 3.874 | 3.890 |

*** The experimental test data will have a slight error, please subject to the actual physical test ***

6.2 General transmission mode (mode 1)

| | |
|------|--|
| Type | When M0 = 1 and M1 = 0, the module operates in mode 1 |
|------|--|

| | |
|--------------|---|
| Transmitting | Packetized transmission at 55 bytes per packet, using a user-configured over-the-air rate; The user can enter data through the serial port and the module will initiate the wireless transmission. |
| Receiving | In the non-transmitting state, data can be received normally. |

6.3 User Configuration Mode (Mode 2)

| Type | When M0 = 0 and M1 = 1, the module operates in mode 2 |
|---------------|---|
| Transmitting | Only remote configuration commands can be fired. |
| Receive | Receive only remote configuration command answers. |
| Configuration | The user can access the registers and thus configure the module operating status. |

6.3 Reserved mode (mode 3)

| Type | When M0 = 1 and M1 = 1, the module operates in mode 3 |
|--------------|---|
| Transmitting | Unable to transmit wireless data. |
| Receiving | Unable to receive wireless data. |

7. Register read/write control

7.1 Command Format

The list of supported commands in configuration mode (mode 2: M1=1, M0=0) is as follows (when set, only 9600, 8N1 format is supported):

| No | Command Format | Detailed description |
|----|----------------|---|
| 1 | Set register | Instruction: C0+start address+length+parameter Response: C1+start address+length+parameters Example 1: Configure the channel as 0x09 Command Start address Length Parameter Send: C0 05 01 09 Return: C1 05 01 09 Example 2: Configure radio address (0x1234), network address (0x00), serial port (9600 8N1), airspeed (1.2K) at the same time Send: C0 00 04 12 34 00 61 Return: C1 00 04 12 34 00 61 |

| | | |
|---|---|---|
| 2 | Read register | <p>Instruction: C1+start address+length Response: C1+start address+length+parameters</p> <p>Example 1: Read channel Command Start address Length Parameter Send: C1 05 01 Return: C1 05 01 09</p> <p>Example 2: Read radio address, network address, serial port and airspeed at the same time Send: C1 00 04 Return: C1 00 04 12 34 00 61</p> |
| 3 | Set temporary register | <p>Instruction: C2 + start address + length + parameters Response: C1 + start address + length + parameters</p> <p>Example 1: Configure the channel as 0x09 Command Start address Length Parameter Send: C2 05 01 09 Return: C1 05 01 09</p> <p>Example 2: Configure radio address (0x1234), network address (0x00), serial port (9600 8N1), airspeed (1.2K) at the same time Send: C2 00 04 12 34 00 61 Return: C1 00 04 12 34 00 61</p> |
| 5 | Wireless Configuration (remote target device must be in general mode) | <p>Command: CF CF + General command Response: CF CF + general response</p> <p>Example 1: Wireless configuration channel is 0x09 Wireless Command Header Command Start Address Length Parameter Send: CF CF C0 05 01 09 Return: CF CF C1 05 01 09</p> <p>Example 2: Wireless simultaneously configure radio address (0x1234), network address (0x00), serial port (9600), air speed (1.5K) Send: CF CF C0 00 04 12 34 00 61 Return: CF CF C1 00 04 12 34 00 61</p> |
| 6 | Format error | <p>Format Error Response FF FF FF</p> |

7.2 Register Description

| No | Reading and writing | Name | Description | Remarks |
|-----|----------------------|------|-----------------|---|
| 00H | Read/WriteRead/Write | ADDH | ADDH (Default0) | * Radio address high byte and low byte; * Note: When the radio address is equal to FFFF, it can be used as a broadcast and listening address, i.e.: the radio will not be address filtered at this time. |
| 01H | Read/WriteRead/Write | ADDL | ADDL (Default0) | |

| 02H | Read/WriteRead/Write | NETID | NETID (Default0) | | | | | * Network address, which is used to distinguish networks; * Should be set to the same when communicating with each other. |
|-----|----------------------|-------|---------------------|---|-------------------------|---|--|---|
| 03H | Read/WriteRead/Write | REG0 | 7 | 6 | 5 | UART serial port rate (bps) | | * Two radios communicating with each other in general transmission mode can have different serial port baud rates and different checksums, and it is generally recommended that both communicating parties have the same baud rate; * The serial baud rate of two radios communicating with each other in continuous transmission mode must be the same. |
| | | | 0 | 0 | 0 | Serial port baud rate of 2400 | | |
| | | | 0 | 0 | 1 | Serial port baud rate of 4800 | | |
| | | | 0 | 1 | 0 | Serial port baud rate of 9600 (Default) | | |
| | | | 0 | 1 | 1 | Serial port baud rate of 19200 | | |
| | | | 1 | 0 | 0 | Serial port baud rate of 38400 | | |
| | | | 1 | 0 | 1 | Serial port baud rate is 57600 | | |
| | | | 1 | 1 | 0 | Serial port baud rate is 115200 | | |
| | | | 1 | 1 | 1 | Serial port baud rate is 230400 | | |
| | | | 4 | 3 | 2 | 1 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0.5K (Default) | |
| | | 0 | 0 | 0 | 0 | 1 | 1.5K | |
| | | 0 | 0 | 0 | 1 | 0 | 3.5K | |
| | | 0 | 0 | 0 | 1 | 1 | 5.5K | |
| | | 0 | 0 | 1 | 0 | 0 | 6.5K | |
| | | 0 | 0 | 1 | 0 | 1 | 11K | |
| | | 0 | 0 | 1 | 1 | 0 | 13K | |
| | | 0 | 0 | 1 | 1 | 1 | 21K | |
| | | 0 | 1 | 0 | 0 | 0 | 26K | |
| | | 0 | 1 | 0 | 0 | 1 | 42K | |
| 0 | 1 | 0 | 1 | 0 | 51K | | | |
| 0 | 1 | 0 | 1 | 1 | 82K | | | |
| 0 | 1 | 1 | 0 | 0 | 76K | | | |
| 0 | 1 | 1 | 0 | 1 | 125K | | | |
| 0 | 1 | 1 | 1 | 0 | 160K | | | |
| 0 | 1 | 1 | 1 | 1 | 410K | | | |
| 1 | 0 | 0 | 0 | 0 | 470K | | | |
| 1 | X | X | X | X | 470K | | | |
| 04H | Read/WriteRead/Write | REG1 | 7 | 6 | Serial port parity bits | | * Radio station serial port calibration type | |
| | | | 0 | 0 | 8N1 (Default) | | | |
| | | | 0 | 1 | 8O1 | | | |
| | | | 1 | 0 | 8E1 | | | |
| | | | 1 | 1 | 8N1 (Equivalent 00) | | | |
| | | 5 | Channel RSSI Enable | | | | | * Only for general transmission |

| | | | | | | |
|-----|------------|------|--|--|---|---|
| | | | 0 | Close(Default) | <p>mode;</p> <p>* When enabled, the command "C0 C1 C2 C3" can be sent in general transmission mode to read the register: register [0x00]: current ambient noise RSSI [0]; register [0x01]: RSSI [1] of the last received data;</p> <p>* Conversion formula: dBm = RSSI/2 - 146;</p> <p>* Command format analysis: Send: C0 C1 C2 C3 + start address + read length; Return: C1 + address + read length + read valid value; [Example 1]: Send C0 C1 C2 C3 00 01, return C1 00 01 RSSI[0]; [Example 2]: Send C0 C1 C2 C3 00 02, return C1 00 02 RSSI[0] RSSI[1]; [Example 2]: Send C0 C1 C2 C3 00 02, return C1 00 02 RSSI[0] RSSI[1]; [Special Note] The address can only start from 0x00, if you need to read RSSI[1], you can only refer to [Example 2] to perform; if the radio never receives data, the RSSI[1] Default value is 0x00.</p> | |
| | | | 1 | Open | | |
| | | | 4 | 3 | Reserved | |
| | | | 2 | Policy types in continuous transmission mode | | <p>* When speed priority is turned on, the data output delay at the receiver side is reduced by about 60%, but it affects the reception distance. For example, in 115200 baud rate continuous transmission mode, the first frame of data from the transmitting end can be output after 3ms at the receiving end.</p> <p>* At 230400 baud rate, only distance priority is supported.</p> <p>* Power and current are non-linearly related, with the power supply being most efficient at maximum power;</p> <p>* Current does not decrease in the same proportion as power decreases.</p> |
| | | | 0 | Distance priority (Default) | | |
| | | | 1 | Speed Priority | | |
| | | | 1 | 0 | Transmitting power | |
| | | | 0 | 0 | 20/30dBm (Default) | |
| | | | 0 | 1 | 17/27dBm | |
| | | | 1 | 0 | 14/24dBm | |
| | | | 1 | 1 | 11/21dBm | |
| 05H | Read/Write | REG2 | Channel Control (CH) 0-62 represent a total of 62 channels respectively | | | <p>* Actual frequency = 410MHz + CH * 0.5MHz, Default 433MHz = [0x2E].</p> <p>* Value range: 410MHz ~ 441MHz, [0x00] ~ [0x3E].</p> |
| 06H | Read/Write | REG3 | 7 | Receive packet RSSI | | <p>* For general transmission mode only;</p> <p>* When enabled, wireless data</p> |
| | | | 0 | Off(Default) | | |

| | | | | | | | | | |
|-----|---------------|---------|--------------------------|------------------------------------|----------|--|--|---|--|
| | ead/Wr ite | | 1 | Enabled | | | | | received by the radio, when output through the serial TXD port, will be followed by an RSSI strength byte to indicate the signal strength at the time the data was received; * Conversion formula: $\text{dBm} = \text{RSSI}/2 - 146$. |
| | | | 6 | Transmission method | | | | | * For general transmission mode only; * For fixed-point transmission, the radio identifies the first three bytes of the serial data as: address high + address low + channel, and uses them as the wireless transmitting target. |
| | | | 0 | Transparent transmission (Default) | | | | | |
| | | | 1 | Fixed-point transmission | | | | | * For general transmission mode only; * When the relay function is enabled, the radio will initiate a forwarding if the target address is not the radio itself; * To prevent data retransmission, it is recommended to use with fixed-point mode; i.e., the target address is different from the source address. |
| | | | 5 | Relay function | | | | | |
| | | | 0 | Off (Default) | | | | | |
| | | | 1 | Enabled | | | | | |
| 4 | 3 | 2 | 1 | 0 | Reserved | | | | |
| 07H | Write | CRYPT_H | Key High Byte (Default0) | | | | | * Write only, read returns 0; used for encryption to avoid interception of over-the-air radio data by similar stations; * These two bytes will be used internally by the radio as a calculation factor to transform the encryption of the over-the-air radio signal. | |
| 08H | Write | CRYPT_L | Key low byte (Default0) | | | | | | |

7.3 Factory default parameters

| Model | Restore factory default parameters command: C0 00 09 00 00 00 00 40 00 2E 00 00 00 00 | | | | | | |
|-------------------|---|---------|---------|----------|-----------|---------------|----------------|
| Radio Model | Frequency | Address | Channel | Air Rate | Baud rate | Serial format | Transmit power |
| E610-DTU (433C20) | 433MHz | 0x0000 | 0x2E | 0.5kbps | 9600 | 8N1 | 30dbm |

8. Trunking mode use

| No | Relay mode description |
|----|--|
| 1 | After setting the trunk mode through the configuration mode, switch to the general mode and the trunk starts to work. |
| 2 | The ADDH and ADDL are no longer used as radio addresses in trunking mode, but are forwarded to the pair corresponding to the NETID respectively, and if one of the networks is received, it is forwarded to the other; the repeater's own network ID is invalid. |
| 3 | In trunking mode, the trunked radio cannot send and receive data for low-power operation. |
| 4 | Entering from mode 3 (sleep mode) to other modes or during reset, the radio resets the user parameters, during which the AUX output goes low. |

Trunking networking rules description:

- Forwarding rules, trunking can forward data in both directions between two NETIDs.
- In trunk mode, ADDH\ADDL is no longer used as radio address and forwarding pair as NETID.

As shown in the figure:

① Level 1 trunking

"Node 1" NETID is 08.

"Node 2" NETID is 33.

The ADDH/ADDL of trunk 1 is 08 and 33 respectively.

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

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

②Secondary Relay

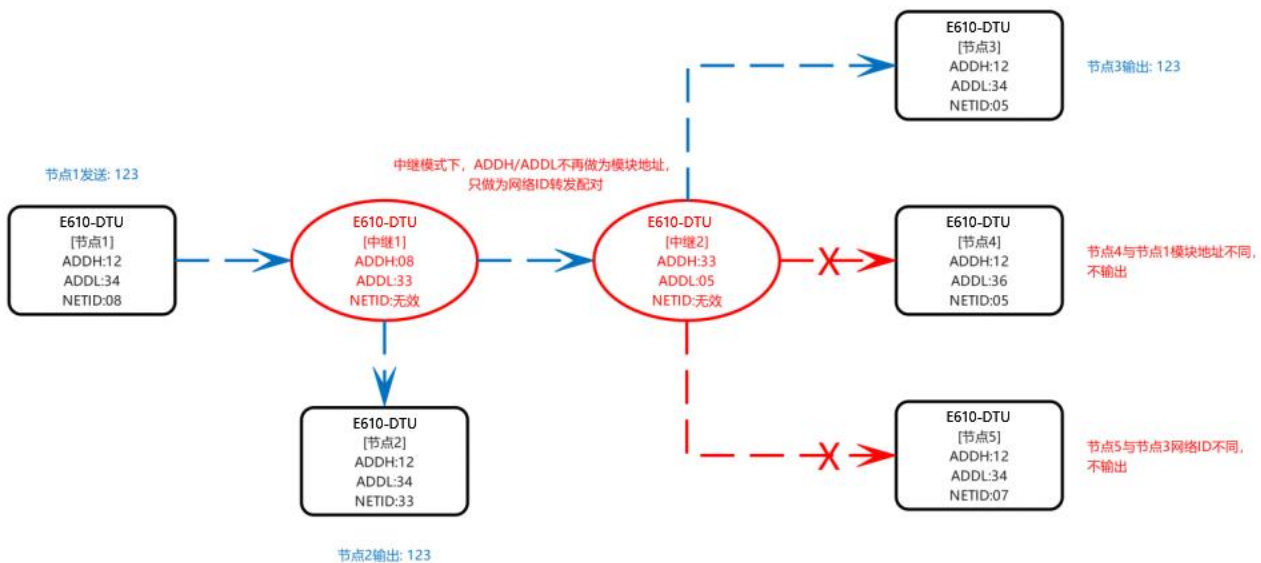
The ADDH\ADDL of relay 2 is 33, 05 respectively.

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

Thus, node 3 and node 4 can receive node 1 data. Node 4 outputs data normally, while node 3 has a different address from node 1, so it does not output data.

③Two-way relay

As configured 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 be received by node 1.



9. Programming the radio

9.1 Schematic



| Working Mode | M1 | M0 | Note |
|--------------------|-----|----|---|
| Configuration mode | OFF | ON | The radio can only be programmed in the current mode using the configuration software |

Note: 1、 Programming can only be done in a specific working mode (see table above), please check if the working mode of the radio is correct when programming fails.

2、 If you don't need complicated programming, open E610-DTU digital transmission radio configuration software, you can modify the relevant parameters.



9.2 Configuration software details

The following figure shows the E610-DTU configuration upper display interface, the user can switch to the configuration mode through M0, M1, in the upper computer for fast configuration and reading of parameters.



| Parameters | Parameter details |
|---------------------|--|
| Baud Rate | The baud rate of the serial port when the wireless digital radio is operating, 1200bps to 115200bps. |
| Parity Check | Support 8N1:no parity; 8E1:even parity; 8O1:odd parity; both are 8-bit data bits and 1-bit stop bit. |
| Air Rate | Wireless communication rate, also called the over-the-air baud rate. High air rate, data transmission speed is fast, the time delay of transmitting the same data is small, but the transmission distance will become shorter. |
| Frequency channel | The wireless digital radio works at a frequency where each channel corresponds to its different working frequency. Theoretically, different frequency channels cannot communicate with each other. If there are multiple groups of wireless digital radios in the same area, it is recommended that the communication frequency interval is 2 to 5MHz. |
| Transmit power | The output power, i.e. the power radiated to the outside world. To ensure efficiency, it is recommended to use the maximum power. If the transmitting power is reduced, the communication distance will become shorter and the current consumption will be reduced. |
| Station address | The internal address of the wireless digital radio is independent of the Modbus address. Only stations with the same radio address can communicate with each other. Software filtering and grouping can be implemented using this feature. Input range: 0 to 65535, decimal numbers. |
| Transmission method | Transparent transmission, what you send is what you get. Fixed point:send data at fixed point according to the format. |

Note: 1. In the configuration of the upper computer, radio address, frequency channel, network ID, key are decimal display mode; where each parameter takes the following value range:

Network address: 0 ~ 65535

Frequency channel: 0 ~ 83

Network ID: 0 ~ 255

Key: 0 ~ 65535

2. When users use the upper computer to configure the relay mode, they need to pay special attention to the fact that the parameters are displayed in decimal mode in the upper computer, so the radio address and network ID need to be filled in by converting the decimal; for example, if the network ID inputted by the transmitter A is 02 and the network ID inputted by the receiver B is 10, the hexadecimal value 0X020A will be converted to the decimal value 522 when the relay R sets the radio address. The decimal value 522 is used as the radio address to be filled in by R at the relay end; that is, the radio address value to be filled in by R at the relay end is 522.

10. Firmware upgrade

- E610-DTU supports serial port firmware upgrade, when special after-sales support is needed, contact us to get the corresponding firmware for upgrade processing.
- uses USB to RS485 or RS232 tool to connect to the corresponding port of the radio. It is recommended to use RS232 port for upgrade operation first

11. Connection schematic in testing and practical applications



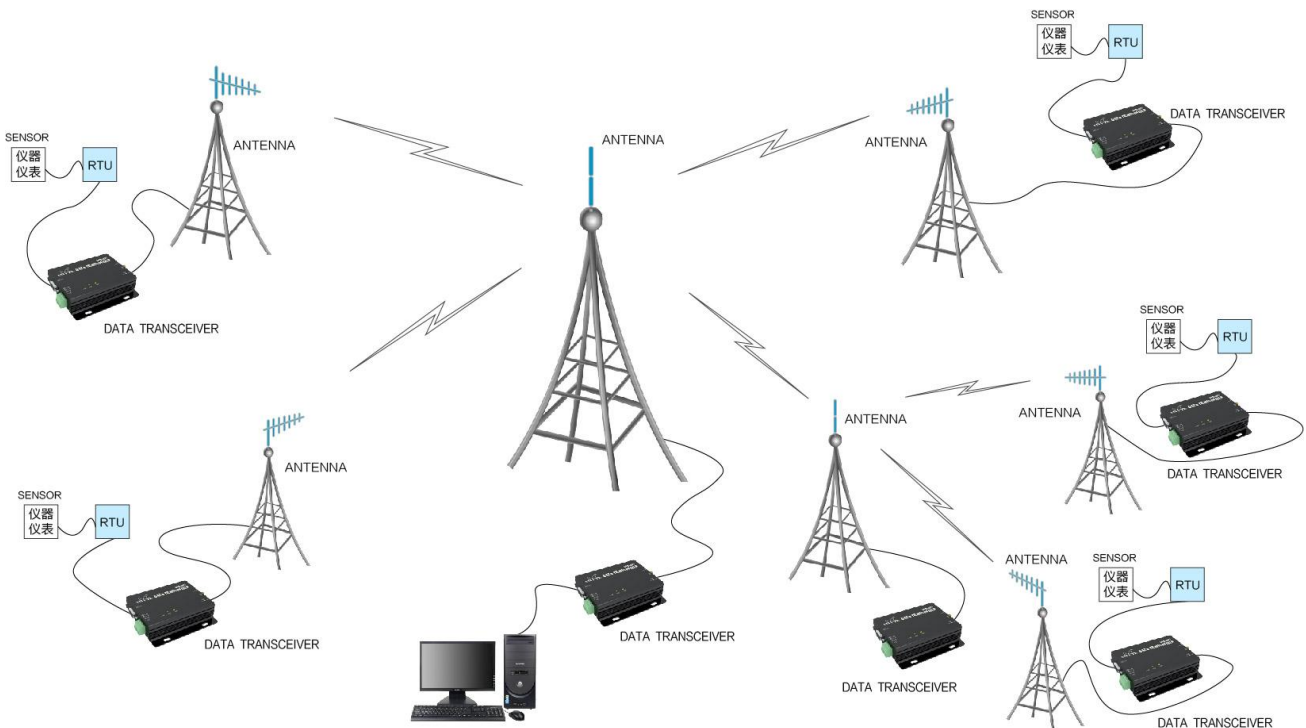
12. Related products

| Product Model | Interface Type | Operating frequency Hz | Transmitting power W | Communication distance km | Functional Features |
|----------------------------------|----------------|------------------------|----------------------|---------------------------|--|
| E90-DTU(170L30) | RS232/RS485 | 170M | 1 | 8 | LoRa spread spectrum technology, low frequency penetration bypass |
| E90-DTU(433L30) | RS232/RS485 | 433M | 1 | 8 | LoRa spread spectrum technology, long-range anti-interference |
| E90-DTU(433L37) | RS232/RS485 | 433M | 5 | 20 | LoRa spread spectrum technology, long-distance anti-interference |
| 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 narrow band, penetrating and bypassing, suitable for complex environment |
| E90-DTU(230N33) | RS232/RS485 | 230M | 2 | 8 | Low frequency narrow band, penetrating and bypassing, suitable for complex environment |
| E90-DTU(230N37) | RS232/RS485 | 230M | 5 | 15 | Low frequency narrow band, penetrating and bypassing, suitable for complex environment |
| E90-DTU(230SL22) | RS232/RS485 | 230M | 0.16 | 5 | New LoRa Spread Spectrum Interference Resistant, Auto Relay, Communication Key |
| E90-DTU(230SL30) | RS232/RS485 | 230M | 1 | 10 | New LoRa spread spectrum anti-interference, automatic relay, communication key |
| E90-DTU(400SL22) | RS232/RS485 | 433/470M | 0.16 | 5 | New LoRa spread spectrum anti-interference, automatic relay, communication key |
| E90-DTU(400SL30) | RS232/RS485 | 433/470M | 1 | 10 | New LoRa spread spectrum anti-interference, auto-relay, communication key |
| E90-DTU(900SL22) | RS232/RS485 | 868/915M | 0.16 | 5 | New LoRa spread spectrum anti-interference, auto-relay, |

| | | | | | |
|----------------------------------|-------------|----------|---|----|---|
| | | | | | communication key |
| E90-DTU(900SL30) | RS232/RS485 | 868/915M | 1 | 10 | New LoRa Spread Spectrum Interference Resistant, Automatic Relay, Communication Key |

13. Practical application areas

EBYTE digital radio is suitable for all kinds of point-to-point and point-to-multipoint wireless data transmission systems, such as intelligent families, Internet of Things transformation, electric load monitoring, distribution network automation, hydrological water measurement and reporting, water pipeline network monitoring, urban street light monitoring, air defense alarm control, railroad signal monitoring, railroad water supply centralized control, oil and gas pipeline network monitoring, GPS positioning system, remote meter reading, electronic crane weighing, automatic target reporting, earthquake measurement and reporting, fire and theft prevention, environmental monitoring and other industrial automation systems, as follows:



14. Precautions for use

1. Please keep the warranty card of this device properly. The warranty card contains the factory (and important technical parameters) of the device, which is of great reference value for users to maintain and add new devices in the future.
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; please do not repair it

yourself, and contact our company if there is a problem. Ebyte provides first-class After sales service.

3. Do not operate this radio near 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 the normal operation of the digital transmission station. Work.
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 digital 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 the communication interface will be easily burned out; do not plug or unplug the serial port while the power is on.
8. When testing the digital radio station, it must be connected with a matching antenna or a 50 Ω dummy load, otherwise the transmitter will be easily damaged; if the antenna is connected, the distance between the human body and the antenna should preferably exceed 2 meters to avoid injury Touch the antenna while transmitting.
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 more than 50% 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 contact support@cdebyte.com for help .
11. When choosing a power supply, in addition to keeping a 50% current margin as recommended, you should also pay attention to its ripple not exceeding 100mV.

Revision history

| Version | Revision Date | Revision Notes | Maintaining people |
|---------|---------------|--------------------|--------------------|
| 1.0 | 2023-3-21 | Manual Release | Hao |
| 1.1 | 2023-7-17 | Content correction | Hao |
| 1.2 | 2023-9-11 | Content correction | Hao |

About us



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