Wireless Modem

用户使用手册

E95-DTU(433Cxx-485)-V2.0

Catalogs

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Ⅰ Product Overview

1.1 Product Description

E95-DTU(433Cxx-485)-V2.0 is a continuous transmission type 433M wireless digital transmission module, built-in high-performance microcontroller and wireless transceiver chip, working in 410 to 441MHz band (default 433MHz), transmitting power 20/30dBm. It works in 410-441MHz frequency band (default 433MHz), with 20/30dBm transmit power, the main function is that when the module is in continuous transmission mode, it can perform continuous uninterrupted transmission under different serial port baud rates, and the data output delay at the receiving end is low, which is suitable for the need of rapid transmission of large data volume scenarios.

Wireless digital transmission radio as a communication medium, and optical fiber, microwave, open-wire, has a certain scope of application: it provides some special conditions in the dedicated network of real-time monitoring signals, reliable data transmission, has a low cost, easy installation and maintenance, strong ability to bypass the shot, the network structure is flexible, the coverage range of the characteristics of the long distance, suitable for the point of much more dispersed, geographically complex and other occasions, can be combined with PLC, RTU, rain gauge, liquid level meter, etc., and can be used to transmit the data to and from the network. It can be connected with PLC, RTU, rain gauge, liquid level meter and other data terminals.

1.2 Features

★ General mode to support automatic relay networking, multi-level relay for ultra-long-distance communication, the same area to run multiple networks running at the same time;

★ Simple and efficient power supply design, support for power supply setter or pressure line mode, support for 8 to 28V power supply;

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

★ Full aluminum alloy shell, compact size, easy to install, good heat dissipation;

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

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

★ Ultra-low power consumption, 12V power supply watchdog current is only 16mA;

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

★ Support 0.5k~470kbps data transmission rate;

★ E95-DTU (433C30-485)-V2.0 has built-in PA+LNA+SAW, and the communication distance can reach 10km under ideal conditions;

★ E95-DTU (433C20-485)-V2.0built-in LNA+SAW, communication distance up to 6km under ideal condition;

★ Support RSSI signal strength indication function for assessing signal quality, improving communication network and ranging;

★ Support users to set their own communication key, and can not be read, greatly improving the confidentiality of user data;

★ Parameters are saved after power down, and the radio will work according to the set parameters after power up again;

★ Operating temperature range: -40 ° C ~ +85 ° C, to adapt to a variety of harsh operating environments, true industrial-grade products;

1.3 Quick Start

① You need to prepare two E95-DTU(433Cxx-485)-V2.0

② First install the antenna to the digital radio, then install the power supply, and the user uses the power adapter to supply power

③ Use USB to RS485/RS232 or other means to connect the computer to the digital radio;

④ Start two serial port debugging assistants, select the serial port baud rate of 9600bps (default), the
    parity mode is 8N1, you can realize the serial port transmitting.；
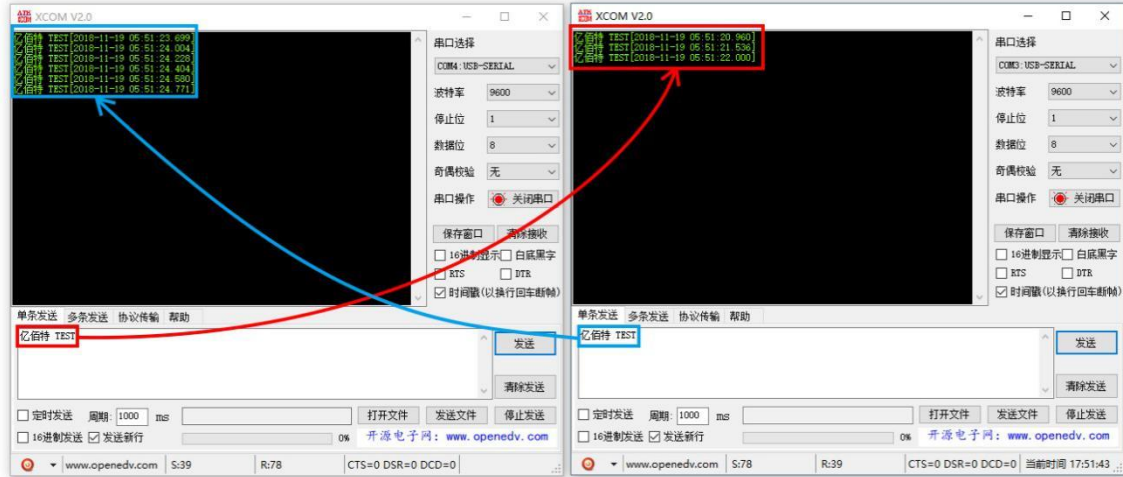
If the customer needs to switch the working mode, it can be controlled by Mode button to switch different
working modes (M0 indicator, M1 indicator). Long press the Mode button once for 1ms and then release it to
switch the mode once, the details of mode switching are shown in the following table.

Mode	Type	M1	M0	Notes	Remarks
Mode 0	Continuous mode	Lights out.	Lights out.	The radio will automatically calculate the required over-the-air transmission rate for continuous uninterrupted transmission according to the user-configured serial port baud rate internally, and the user can just pass in the data uninterruptedly.	Supports continuous uninterrupted transmission
Mode 1	General mode	Lights out.	lights on	The radio internally enforces the user-configured over-the-air transmission rate. It will transmit in packets at 55 bytes per packet.	General Transparent Transmission
Mode 2	Configuration Mode	lights on	Lights out.	The user can access the registers through the serial port to control the working status of the radio.	Requires configuration at baud rate 9600
Mode 3	reserved mode	lights on	lights on	The radio will not do any transmitting or receiving in this mode.	

Note: The radio has the function of power-down saving mode (factory default setting is transmissive mode),
users need to switch the corresponding mode according to M1, M0 indicator (effective immediately).

1.4 Description of each part
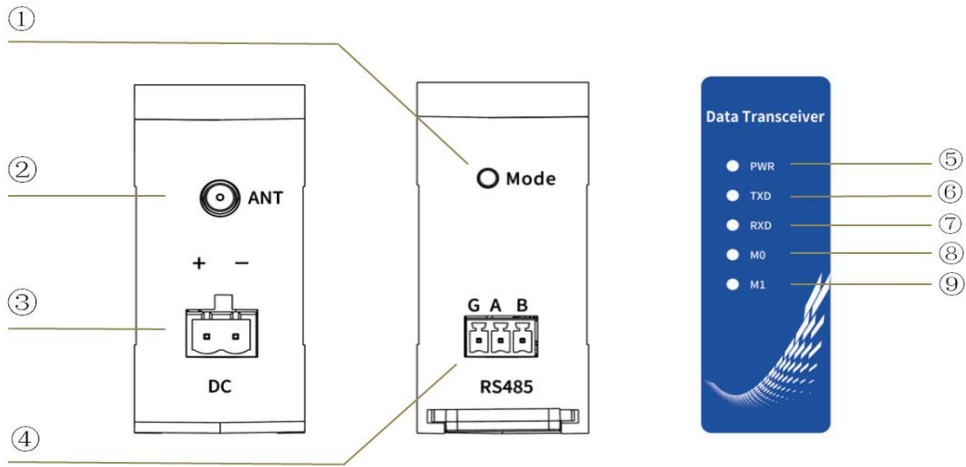
serial number	Name	Function	Instruction
1	Mode	Mode switching button	Operating mode switching control
2	ANT	RF interface	SMA-K, Male Female Bore
3	DC	Power connector	DC Power Input Port, Crimp Style Port
4	RS485	RS485 communication port	Standard RS485 interface
5	PWR	Power indicator	Lights up when power is turned on
6	TXD	Send Indicator	Blinking when sending data
7	RXD	Receiving indicator	Blinking when receiving data
8	M0	Mode Indicator	Operating Mode Indicator
9	M1	Mode Indicator	Operating Mode Indicator

1.5 Mounting Dimensions

尺寸单位：mm
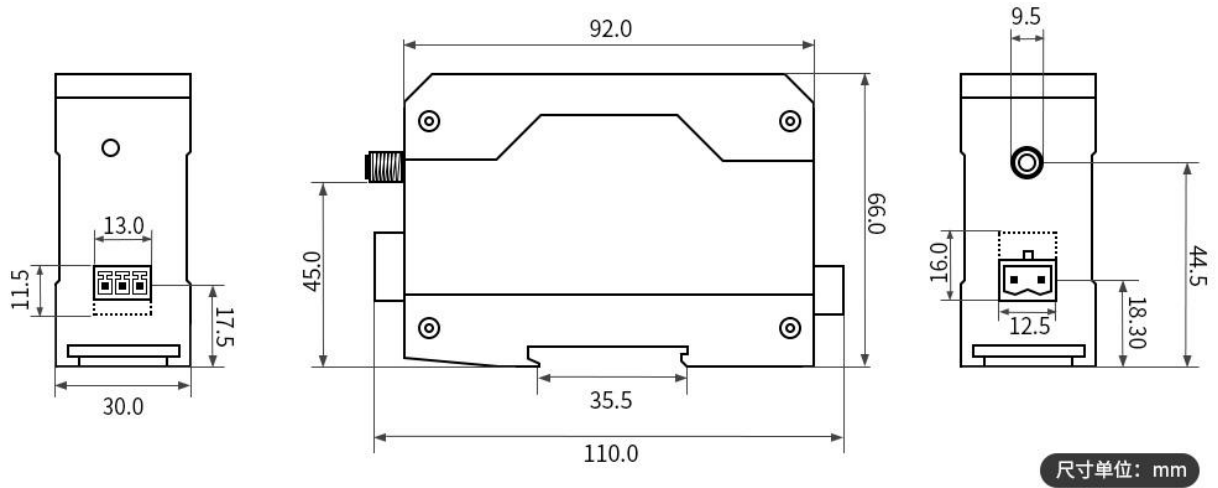
Ⅱ Interface definition

2.1 Power connector description
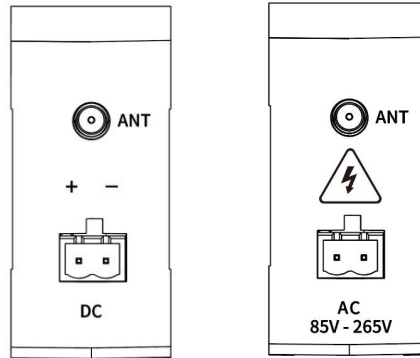
The E95-DTU(433Cxx-485)-V2.0 can be powered by an 8 to 28V (DC) power supply, and the wiring port is connected using a terminal block (2 Pin).

2.2 Communication Interface Description

The E95-DTU(433Cxx-485)-V2.0 can be connected to the device via RS485 using the terminal block.
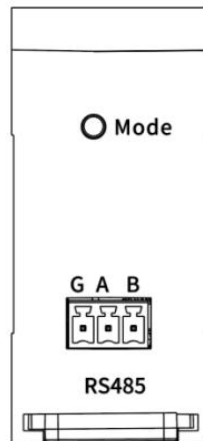
serial number	Standard Definition	Funcion	Instruction
1	G	signal ground	Anti-interference, Grounding
2	A	RS485 bus A interface	RS485 interface A interface connected to device A interface
3	B	RS485 bus B interface	RS485 interface B interface to device B interface

★ Note: Poor communication occurs when connecting the radio to multiple devices, but not when a single device

is connected, try connecting a 120Ω resistor in parallel between the 485_A terminal and the 485_B terminal.

Ⅲ Technical indicators

3.1 Model Specification

Model Specification	Frequency	Transmitting power	Reference distance	Specification Characteristics	Recommended Scenarios
	Hz	dBm	km		
E95-DTU(433C20-485)-V2.0	410M-441M	20	1	High-speed continuous transmission	Suitable for data-heavy applications and supports the customer's Moudbus protocol.
		20	6	General Transfer Mode	Suitable for small data volume, long distance application environment.
E95-DTU(433C30-485)-V2.0	410M-441M	30	2	High-speed continuous transmission	Suitable for data-heavy applications and supports the customer's Moudbus protocol.
		30	10	General Transfer Mode	Suitable for small data volume, long distance application environment.

★ Note: Sunny weather, open environment without shade, 12V/1A power supply, 5dBi suction cup antenna, antenna height of 2 meters from the ground, use factory default parameters.

3.2 General Specification Parameters

Serial number	Item	Specification	Instruction
1	Product Size	92*66*30 mm	See mounting dimensions for details
2	Product weight	95 g	Weight tolerance 5g
3	Operating temperature	-40℃～+85℃	Industrial grade
4	Voltage range	8～28V（DC）	12V or 24V recommended
7	Communication interface	RS485	3.81 Terminal block
8	Baud rate	Factory default 9600	Baud rate range 2400 ~ 230400
9	Address code	Factory default 0	Total 65536 address codes can be set

3.3 Frequency range and number of channels

Model Specification	Default frequency	Frequency range	Channel spacing	Channel count
	Hz	Hz	Hz	
E95-DTU(433C20-485)-V2.0	433M	410~441M	500K	256, half-duplex
E95-DTU(433C30-485)-V2.0	433M	410~441M	500K	256, half-duplex

★ Note: When using multiple sets of digital transmission radios in the same area to communicate one-to-one at the same time, it is recommended that each set of digital transmission radios set a channel interval of 2MHz or more.

3.4 Transmit power level

Model Specification	Factory Default	Grade		
E95-DTU(433C20-485)-V2.0	20dBm	17dBm	14dBm	11dBm
E95-DTU(433C30-485)-V2.0	30dBm	27dBm	24dBm	21dBm

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

3.5 Airspeed rating

Model Specification	Default Air Rate	Level	Airspeed rating
	bps		bps
E95-DTU(433C20-485)-V2.0	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
E95-DTU(433C30-485)-V2.0			

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

3.6 Current parameter

Model Specification	Emitting current mA		Watching the currentmA	
	12V	24V	12V	24V
E95-DTU(433C20-485)-V2.0	`38	20	16	7.5

| E95-DTU(433C30-485)-V2.0 | 350 | 150 | 16 | 7.5 |

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

3.7 Length of delivery and receipt and subcontracting modalities

Model Specification	Cache size	Subcontracting
E95-DTU(433C20-485)-V2.0	4096 bytes	Default packetization 55 bytes
E95-DTU(433C30-485)-V2.0		

★ Note: 1, the above sub-packet transmission situation of the radio is only available in the general transparent transmission mode, and uninterrupted transmission in the continuous transmission mode;

2、If the data received by the radio is larger than the capacity of a single packet, the exceeding part of the data will be automatically assigned to the second transmission until the transmission is completed;

3、The radio can not receive data larger than the cache capacity in a single transmission;

Ⅳ Operating mode

The E95-DTUs all have four operating modes. For normal communication, you need to configure the radio to the pass-through mode (Mode 0) by pressing the key, and the radio is set to the pass-through mode (Mode 0) by default when it is shipped from the factory.

Mode	Type	M1	M0	Notice	Remark
Mode 0	General mode	Lights out	Lights out	The radio will automatically calculate the required over-the-air transmission rate for continuous uninterrupted transmission according to the user-configured serial port baud rate internally, and the user can just pass in the data uninterruptedly.	Supports continuous uninterrupted transmission.
Model 1	reserved mode	Lights out	lights on	The radio internally enforces the user-configured over-the-air transmission rate. It will transmit in packets at 55 bytes per packet.	General Transparent Transmission.
Mode2	command mode	lights on	Lights out	The user can access the registers through the serial port to control the working status of the radio.	Requires configuration at baud rate 9600.
Mode3	sleep mode	lights on	lights on	The radio will not do any transmitting or receiving in this mode.	

4.1 Continuous transmission mode (mode 0)

Type	When M0 = 0 and M1 = 0, the module operates in mode 0
Transmitting	The air rate required for continuous transmission is automatically calculated based on the serial port baud rate configured by the user; The user can input data through the serial port and the module will initiate wireless transmission.
Receiving	In the non-transmitting state, data can be received normally.

In continuous transmission mode, the intuitive experience is that the user does not need to wait for all the data to be packaged to transmit the data out, but the module starts transmitting from the first frame of data until the completion of the data that the user needs to transmit. This saves the time of data packing and packetizing and greatly reduces the data delay time.
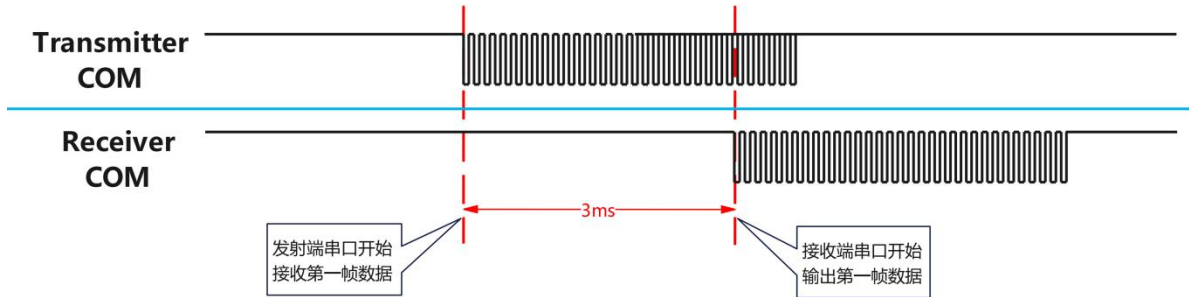
Data delay schematic (at a serial port baud rate of 115200, sending 22 bytes)

Continuous transmission mode is divided into "Distance Priority" and "Speed Priority" two kinds of continuous transmission strategy for users to choose (please refer to Chapter 5 for details). From the reference data in the following table, we can see that the higher the baud rate of the serial port and the smaller the amount of data being sent, the difference in data latency between the two strategies is not significant. However, once the data reaches thousands of bytes, the problem of data latency will be highlighted.

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

* Experimental test data will have a slight error, please refer to the actual test in kind shall prevail *

4.2 General transmission mode (mode 1)

Type	When M0 = 1 and M1 = 0, the module operates in mode 1
Transmitting	Transmission is done in packets at 55 bytes per packet using a user configurable air rate; The user can enter data through the serial port and the module will initiate wireless transmission.
Receiving	In the non-transmitting state, data can be received normally.

4.3 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.
Receiving	Receive only remote configuration command responses.
Configurations	The user can access the registers to configure the module operating state.

4.4 Reserved mode (mode 3)

Type	When M0 = 1 and M1 = 1, the module operates in mode 3
Transmitting	Unable to transmit wireless data。
Receiving	Wireless data cannot be received.

V Register read/write control

5.1 Command format

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

serial number	command format	explanation
1	Setup Registers	Instruction: C0 + start address + length + parameters Response: C1 + start address + length + parameters Example 1: Configure the channel as 0x09 Command Start address Length Parameters 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 registers	Command: C1 + start address + length Response: C1 + start address + length + parameters Example 1: Read channel Command Start address Length Parameters Send: C1 05 01 Return: C1 05 01 09 Example 2: Read radio address, network address, serial port, airspeed at the same time Send: C1 00 04 Return: C1 00 04 12 34 00 61
3	Setting Temporary Registers	Command: C2 + start address + length + parameters Response: C1 + start address + length + parameters Example 1: Configure the channel as 0x09 Command Start address Length Parameters Send: C2 05 01 09 Return: C1 05 01 09 Example 2: Configure radio address (0x1234), network address (0x00), serial port (9600 8N1), airspeed (1.2K) simultaneously Send: C2 00 04 12 34 00 61 Return: C1 00 04 12 34 00 61
5	Wireless Configuration (remote target device must be in general mode)	Command: CF CF + regular command Response: CF CF + regular response Example 1: Wireless configuration channel is 0x09 Wireless Command Header Command Start Address Length Parameters Send: CF CF C0 05 01 09 Return: CF CF C1 05 01 09 Example 2: Wireless configure radio address (0x1234), network address (0x00), serial port (9600), airspeed (1.5K) at the same time. 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 FF

5.2 Register description

serial number	Read/Write	Name	Description	Remark
00H	Read/Write	ADDH	ADDH (default 0)	* High and low byte of the radio station address; * Note: When the radio station address is equal to FFFF, it can be used as a broadcast and listening address, i.e.: the radio station will not be address filtered at this point.
01H	Read/Write	ADDL	ADDL (default 0)	

02H	Read/Write	NETID	NETID (default 0)						* Network address for distinguishing networks; * When communicating with each other, they should be set to the same.
03H	Read/Write	REG0	7	6	5	UART serial port rate (bps)			* For two radios communicating with each other in general transmission mode, the serial port baud rate can be different and the checksum method can be different, and it is generally recommended that the baud rates of the two communicating parties are the same; * The serial port baud rates 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 of 57600			
			1	1	0	Serial port baud rate of 115200			
			1	1	1	Serial port baud rate of 230400			
			4	3	2	1	0	Airspeed（bps）	* For general transmission mode only, the user needs to choose the wireless transmission rate by himself; * In continuous transmission mode, this configuration parameter is invalid and is automatically calculated by the radio internally.
			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/Write	REG1	7	6	serial port parity bit				* Radio serial port calibration type
			0	0	8N1 (default)				
			0	1	8O1				

			1	0	8E1	
			1	1	8N1(Equivalent to 00)	
			5		Channel RSSI Enable	* Only for general transmission mode;
				0	Close (default)	* When enabled, the command "C0 C1 C2 C3" can be sent to read the registers in general transmission mode: register [0x00]: current ambient noise RSSI[0]; register [0x01]: RSSI[1] at the last received data; * Conversion formula: dBm = RSSI/2-146; * Instruction format analysis: Send: C0 C1 C2 C3 + start address + read length; Return: C1 + address + read length + read RMS 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]; []. Special Note] The address can only start from 0x00, if you need to read RSSI[1], you can only refer to [Example 2]; if the radio never receives data, the default value of RSSI[1] is 0x00.
				1	Open	
			4	3	Reserve	
			2		Types of Policies in Continuous Transfer Mode	* Turning on Speed Priority reduces the data output delay at the receiving end by about 60%, but affects the receiving distance. For example, in 115200 baud rate continuous transmission mode, the receiver side can output the first frame data from the transmitter side after 3ms. * At 230400 baud rate, only distance priority is supported.
				0	Distance priority (default)	
				1	Speed Priority	
			1	0	Transmitting power	* Power and current are non-linearly related, and the power supply is most efficient at maximum power; * Current does not decrease in the same proportion as power decreases.
			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	* Actual frequency = 410MHz + CH * 0.5MHz, default 433MHz = [0x2E]. * Value range: 410MHz ~ 441MHz, [0x00] ~ [0x3E].

06H	Read/ Write	REG3	7	Receive packet RSSI						* For general transmission mode only; * When enabled, wireless data received by the radio and output through the serial port TXD will follow an RSSI strength byte to indicate the signal strength at the time the data was received; * Conversion formula: dBm = RSSI/2-146.
			0	Close (default)						
			1	Open						
			6	Transmission method						* For general transmission mode only; * When transmitting at a fixed point, the radio recognizes the first three bytes of the serial port data as: address high + address low + channel, and uses them as the wireless transmit target.
			0	Transparent transmission (default)						
			1	Fixed-point transmission						
			5	Relay function						* For general transmission mode only; * When the relay function is enabled, the radio will initiate a forward if the destination address is not the radio itself; * In order to prevent data back propagation, it is recommended to be used in conjunction with fixed-point mode; i.e., the destination address is different from the source address.
			0	Close (default)						
			1	Open						
			4	3	2	1	0		Reserve	
07H	Write	CRYPT_H	Key high byte (default 0)							*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 station as a computational factor to transform and encrypt the over-the-air radio signal.
08H	Write	CRYPT_L	Key low byte (default 0)							

5.3 Factory Default Parameters

Model		Restore Factory Default Parameters Command：C0 00 09 00 00 00 40 00 2E 00 00 00						
Modem model		Freque ncy	Address	Signal path	Airspeed	Baud rate	Serial Port	Transmit power

						Format	
E95-DTU(433C20-485)-V2.0	433MHz	0x0000	0x2E	0.5kbps	9600	8N1	20dbm
E95-DTU(433C30-485)-V2.0	433MHz	0x0000	0x2E	0.5kbps	9600	8N1	30dbm

Ⅵ Relay Networking Mode Usage

Serial number	Description of relay mode
1	After setting the relay mode through the configuration mode, switch to the general mode and the relay starts working.
2	In relay mode ADDH and ADDL are no longer used as radio addresses, but correspond to NETID forwarding pairing respectively, and if one of the networks is received, it is forwarded to the other network; the repeater's own network ID is invalid.
3	In relay mode, the relay radio cannot send and receive data for low-power operation.
4	Entering from mode 3 (sleep mode) or during a reset, the radio resets the user parameters, during which the AUX output goes low.

Relay networking rule description:

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

2、In relay mode, ADDH\ADDL is no longer used as a radio address and is forwarded as a NETID pair.

As shown:

① **First class relay**

"Node 1" NETID is 08.

"Node 2" NETID is 33.

The ADDH\ADDL of relay 1 is 08, 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

② **Secondary Relay**

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

So Relay 2 can forward the data of Relay 1 to the 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 it does not output data.
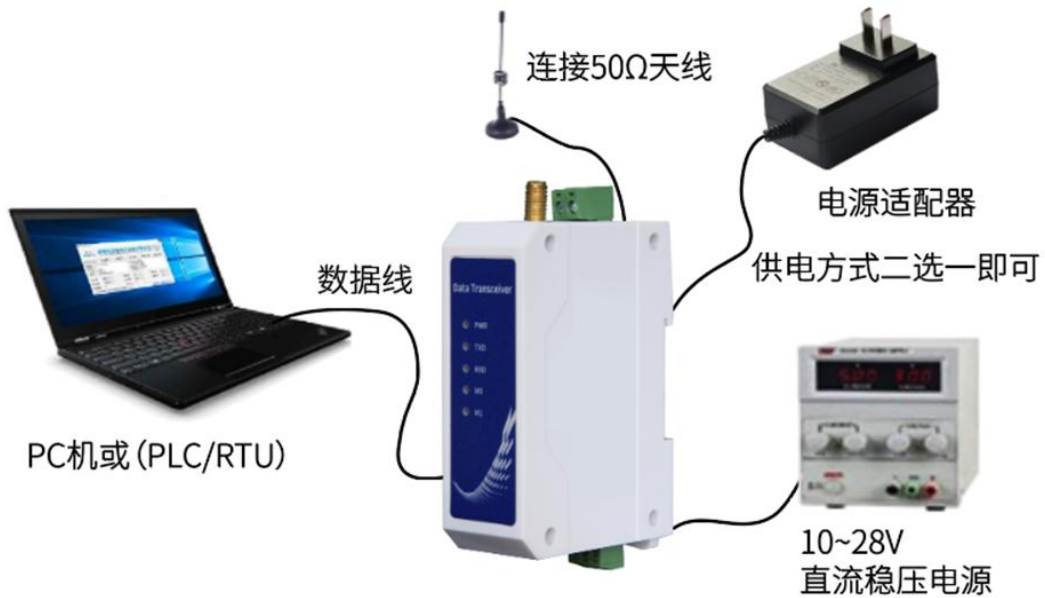
③ **Two-way relay**

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.
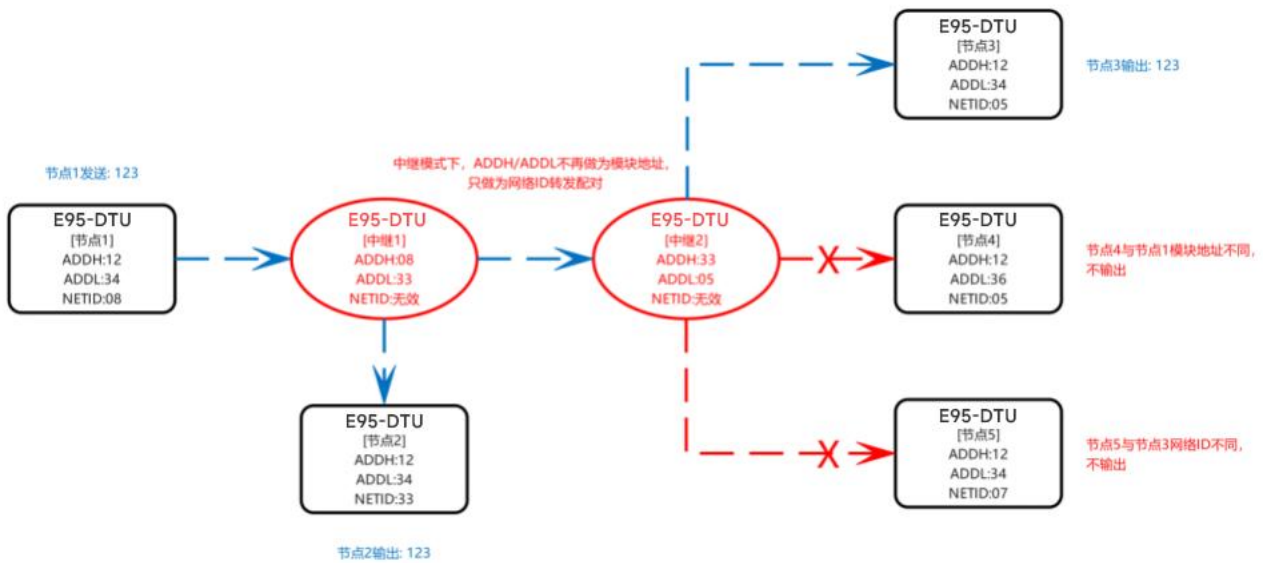
Ⅶ Programming of radio station

7.1 Schematic

Working mode	M1	M0	Remark
Configuration Mode	lights on	Lights out.	Radio can be programmed using configuration software (fixed 9600, 8N1)

1. Programming can only be carried out in specific working modes (see above table), when programming fails, please make sure that the working mode of the radio is correct.
2. If no complex programming is required, open the E95(433Cxx-485)-V2.0 configuration software and modify the relevant parameters.

7.2 Configuration Software Details

The following figure shows the display interface of E95-DTU configuration upper computer. Users can switch to the configuration mode through M0 and M1 for quick configuration and reading of parameters in the upper computer.

Parameters	Parameter details
Baud rate	The serial port baud rate at which the wireless digital radio operates, 1200bps to 115200bps.
Parity checking	Supports 8N1: no parity; 8E1: even parity; 8O1: odd parity; all 8 data bits, 1 stop bit.
Airspeed	Wireless communication rate, also called air baud rate. With a high air rate, data is transmitted faster and the time delay for transmitting the same data is small, but the transmission distance will be shorter.
Frequency channel	Wireless digital transmission radio working frequency, each channel corresponds to its different working frequency, theoretically different frequency channels can not communicate with each other. If there are several wireless digital transmission radios in the same area, it is recommended that the communication frequency interval is 2 to 5 MHz.
Transmit power	Output power, that is, the power that can be radiated externally. In order to ensure the efficiency of the work is recommended to use the maximum power, if you reduce the transmission power, the communication distance will become shorter, the need to consume less current.
Radio station address	The internal address of the wireless digital radio is independent of the Modbust address. Only stations with the same address can communicate with each other, and this feature can be used to realize software filtering and grouping. Input range: 0 to 65535, decimal number.

Transmission method	Transparent transmission, what you send is what you get. Fixed point: Send data at a fixed point according to the format.

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

network address：0～65535

frequency channel：0～83

Network ID：0～255

Key:0～65535

2. Users in the use of the host computer configuration relay mode, you need to pay special attention to, due to the host computer, the parameters for the decimal display mode, so the radio address and network ID fill in the need to convert the conversion; such as transmitter A input network ID for 02, the receiver B input network ID for 10, then the relay terminal R to set the radio address, will be converted from hexadecimal value 0X020A to decimal value 522 as the relay terminal R to fill in the radio address; that is, at this time the relay terminal R need to fill in the radio address value of 522. When the relay R sets the radio address, the hexadecimal value 0X020A will be converted to the decimal value 522 as the radio address filled in by the relay R; i.e., at this time, the radio address value to be filled in by the relay R is 522.

7.3 Firmware Upgrade

● E610-DTU supports serial port firmware upgrade, when special after-sales support is needed, you can contact us to get the corresponding firmware for upgrade processing.

● Use USB to RS485 or RS232 tool to connect the corresponding port of the radio.

Ⅷ Connection diagrams for testing and practical applications

Ⅸ Practical application areas

EBYTE digital transmission radio is suitable for all kinds of point-to-point and point-to-multipoint wireless data transmission systems, such as smart home, Internet of Things transformation, power load monitoring, distribution network automation, hydrological and water condition measurement and reporting, water mains network monitoring, urban street light monitoring, air-raid alarm control, railroad signal monitoring, centralized control of water supply to the railroads, monitoring of oil and gas supply pipeline network, GPS positioning system, remote meter reading, electronic crane weighing, automatic target reporting, seismic measurement and reporting, fire prevention and burglary, environmental monitoring, and other industrial automation systems, as the following figure:
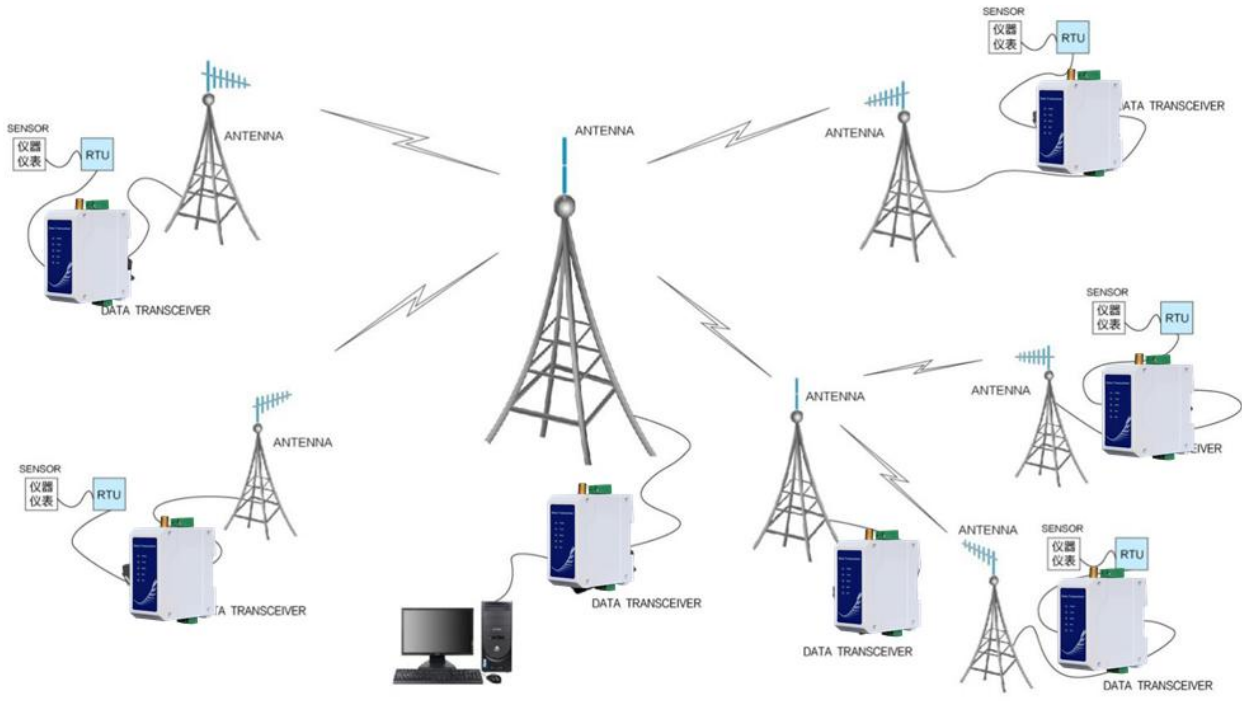
X Precautions of use

1. Please keep the warranty card of this equipment, the warranty card has the factory number of the equipment (and important technical parameters), for the user's future maintenance and new equipment has an important reference value.

2. The radio in the warranty period, if due to the quality of the product itself and not man-made damage or damage caused by lightning and other natural disasters, enjoy free warranty; please do not repair the user, the problem is to get in touch with our company,EBYTE provide first-class after-sales service.

3. The radio should not be operated in the vicinity of flammable places (such as coal mines) or explosive hazardous objects (such as detonators).

4. Suitable DC voltage regulator should be used, which is required to have strong resistance to high-frequency interference, small ripple and sufficient load capacity; it is better to have the functions of over-current, over-voltage protection and lightning protection, etc., to ensure the normal work of the digital radio.

5. Do not use the digital radio in the working environment beyond the environmental characteristics, such as high temperature, humidity, low temperature, strong electromagnetic field or dusty environment.

6. Do not allow the digital radio to continuously transmit at full load, or the transmitter may be burned out.

7. The ground wire of the digital radio should be well connected with the ground wire of external devices (such as PC, PLC, etc.) and the ground wire of the power supply, or it will easily burn out the communication interface, etc.; do not plug or unplug the serial port with electricity.

8. When testing the digital radio, it must be connected with matching antenna or 50Ω dummy load, otherwise it is easy to damage the transmitter; if it is connected with antenna, it is better to keep the human body away from the antenna for more than 2 meters to avoid injury, and never touch the antenna when transmitting.

9. wireless digital transmission radios often have different communication distance in different environments,

the communication distance is often affected by temperature, humidity, density of obstacles, volume of obstacles and electromagnetic environment; in order to ensure stable communication, it is recommended to reserve more than 50% of the communication distance.

10. If the measured communication distance is unsatisfactory, it is recommended to analyze the quality of the antenna and the way the antenna is mounted to improve the communication distance.You can contact support@cdebyte.com for help.

11. When selecting the power supply, in addition to keeping 50% of the current margin according to the recommendation, more attention should be paid to its ripple should not exceed 100mV.

12. Wireless communication products need to be connected with impedance matching antenna to work normally, even if it is a short time test should not be omitted, if the product damage caused by this reason will not be covered by warranty.

XI Important statement

1. EBYTE reserves the right of final interpretation and modification of all contents of this manual.
2. Due to the continuous improvement of the hardware and software of the product, this manual may be changed without further notice, and the latest version of the manual should prevail.
3. Protecting the environment is everyone's responsibility: in order to reduce the use of paper, this manual is only printed in Chinese, the English manual is only available in electronic files, if necessary, please download from our official website; in addition, if the user is not a special request, the user bulk order, we will only be provided with a certain percentage of the order quantity of the product specification, not every digital transmission radio with the corresponding, please understand.

Revision history

Version	Revision date	Revised description	Maintainer
1.0	2023.9.11	Initial version	Hao

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