Industrial grade wireless digital radios

E610-DTU 20/30dBm

User Manual



Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Disclaimer

EBYTE reserves all rights to this document and the information contained herein. Products, names, logos and designs described herein may in whole or in part be subject to intellectual property rights. Reproduction, use, modification or disclosure to third parties of this document or any part thereof without the express permission of EBYTE is strictly prohibited.

The information contained herein is provided “as is” and EBYTE assumes no liability for the use of the information. No warranty, either express or implied, is given, including but not limited, with respect to the accuracy, correctness, reliability and fitness for a particular purpose of the information. This document may be revised by EBYTE at any time. For most recent documents, visit www.ebyte.com.

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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 ±1.5PPM;
- 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 ≤ 0.4A;
- 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;

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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

2. Quick start

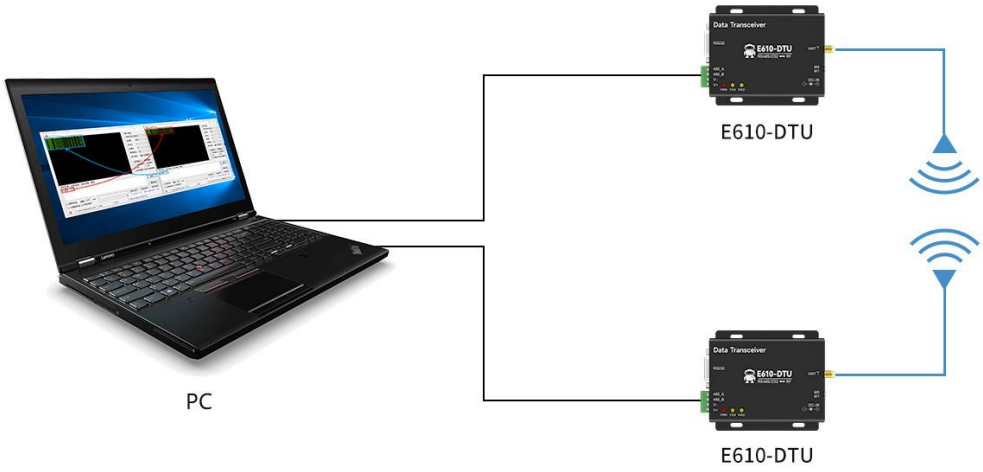
You will need to prepare



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;



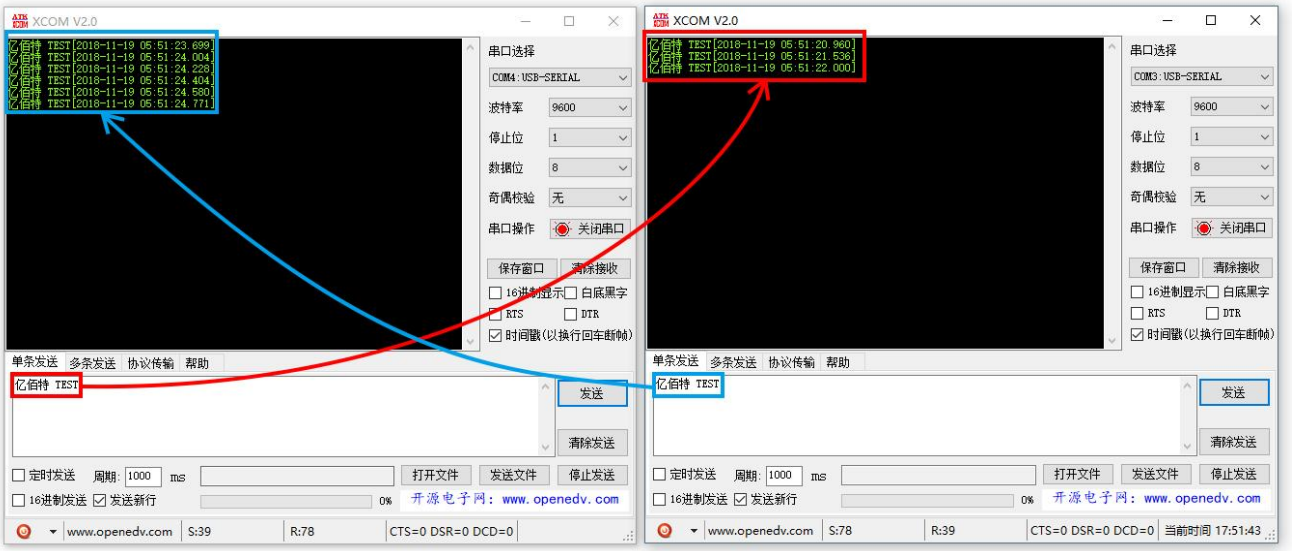
2. Use USB to RS-232, USB to RS-485 or other means to connect the PC to the digital radio;



Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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.

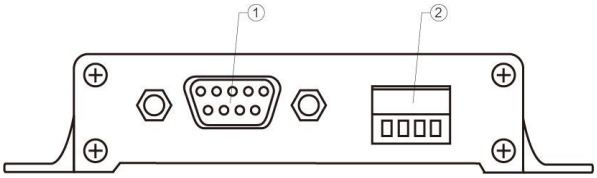


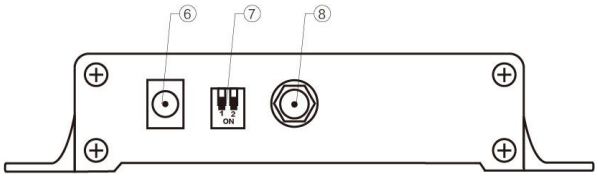
Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

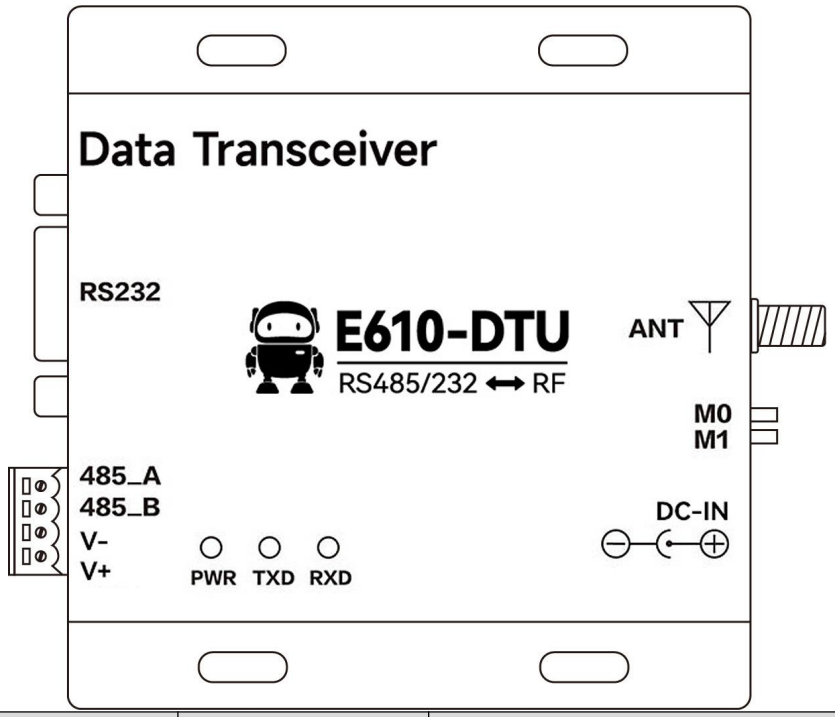
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3. Mounting dimensions

3.1 Description of each department





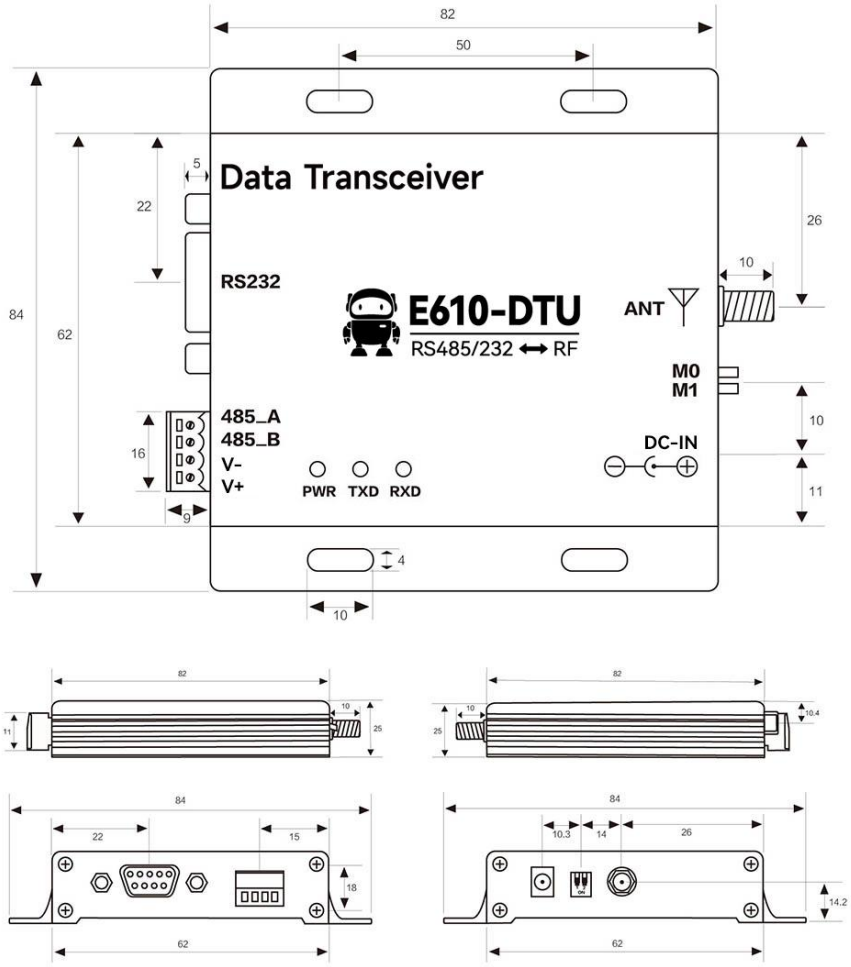


No.	Name	Function	Description
1	DB-9 female socket	RS232 interface	Standard RS232 interface
2	3.81 Terminal blocks	RS485, power interface	Standard RS485 interface with crimped power supply interface
3	PWR-LED	Power Indicator	Red, illuminated when power is on
4	TXD-LED	Sending indicator	Yellow, blinks 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

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

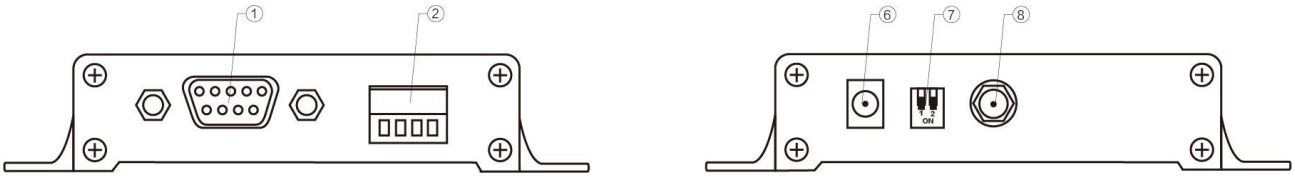
3.2 Mounting dimensions



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4. Interface definitions

4.1 Description of the power supply interface



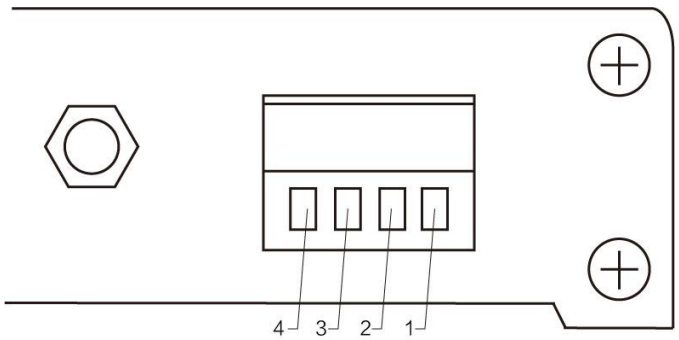
- can be powered by the DC power connector of your choice, using a 5.5mm outer diameter and 2.5mm inner diameter power adapter;
- can also be powered by the VCC terminal and the GND terminal in ②, simply by selecting either power supply method;
- E610-DTU can be powered from 10 to 28V DC power supply,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

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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-441M	20	1	High-speed continuous transmission	Suitable for applications with high data volumes and support for customer Moudbus protocols.
		20	6	General transmission mode	Suitable for small data volumes and remote application environments.
E610-DTU(433C30)	410M-441M	30	2	High-speed continuous transmission	For applications with large data volumes, supporting the customer's Moudbus 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℃ ~ +85℃	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

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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	62, 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.

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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

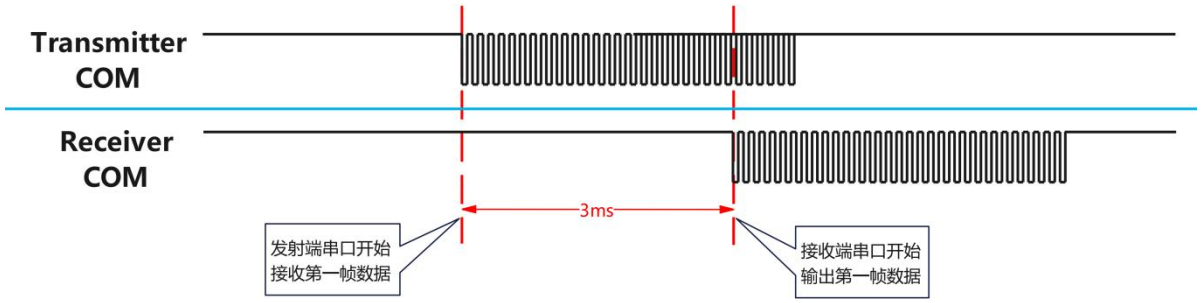
6.1 Continuous transmission mode (mode 0)

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.

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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**

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2	Read register	Instruction: C1+start address+length Response: C1+start address+length+parameters Example 1: Read channel Command Start address Length Parameter Send：C1 05 01 Return: C1 05 01 09 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
3	Set temporary register	Instruction: C2 + start address + length + parameters Response: C1 + start address + length + parameters Example 1: Configure the channel as 0x09 Command Start address Length Parameter 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) at the same time 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 + General command Response: CF CF + general response 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 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
6	Format error	Format Error Response FF FF FF

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）	

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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	Air speed (bps)	* Only for the general transmission mode, the wireless transmission rate to be selected by the user 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/ 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

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

			0	Close(Default)		mode; * 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; * Conversion formula: dBm = RSSI/2 - 146; * 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.
			1	Open		
			4	3	Reserved	
			2	Policy types in continuous transmission mode		* 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. * 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, with the power supply being 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/ WriteRead/Write	REG2	Channel Control (CH) 0-62 represent a total of 62 channels respectively			* Actual frequency = 410MHz + CH * 0.5MHz, Default433MHz = [0x2E]. * Value range: 410MHz ~ 441MHz, [0x00] ~ [0x3E].
06H	Read/ WriteR	REG3	7	Receive packet RSSI		* For general transmission mode only; * When enabled, wireless data
			0	Off(Default)		

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

	ead/Write		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: dBm = 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	
			5	Relay function	* 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.
			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

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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:

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

2、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

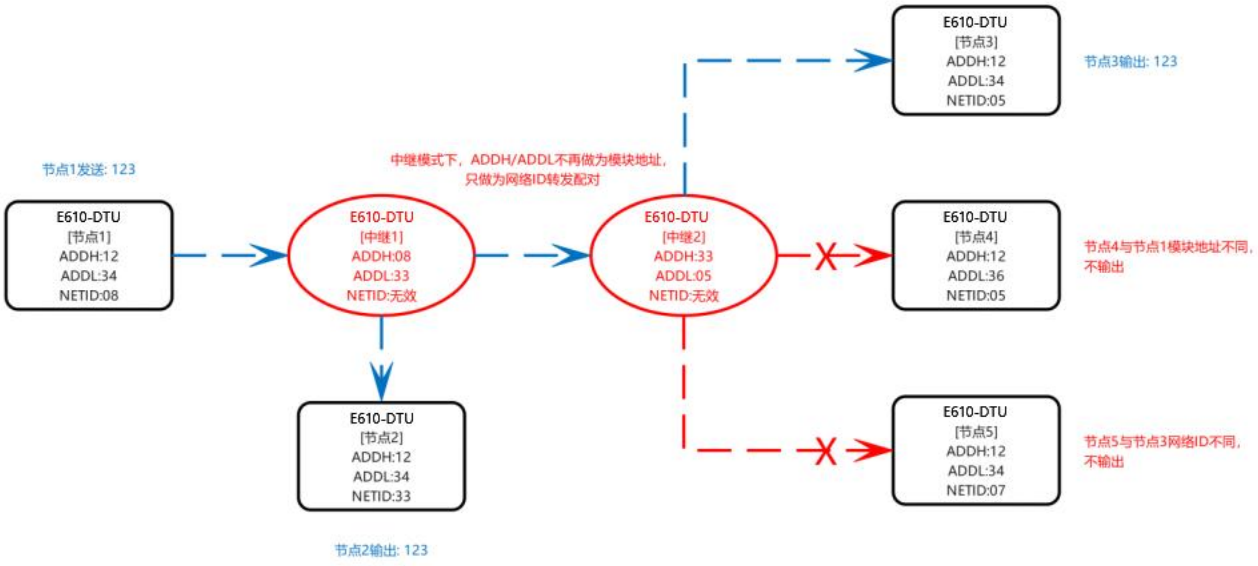
The ADDH\ADDL of relay 2 is 33, 05 respectively.

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.



Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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.

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



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 Modbust 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 ~ 61
Network ID: 0 ~ 255
Key: 0 ~ 65535

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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



Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

12. Related products

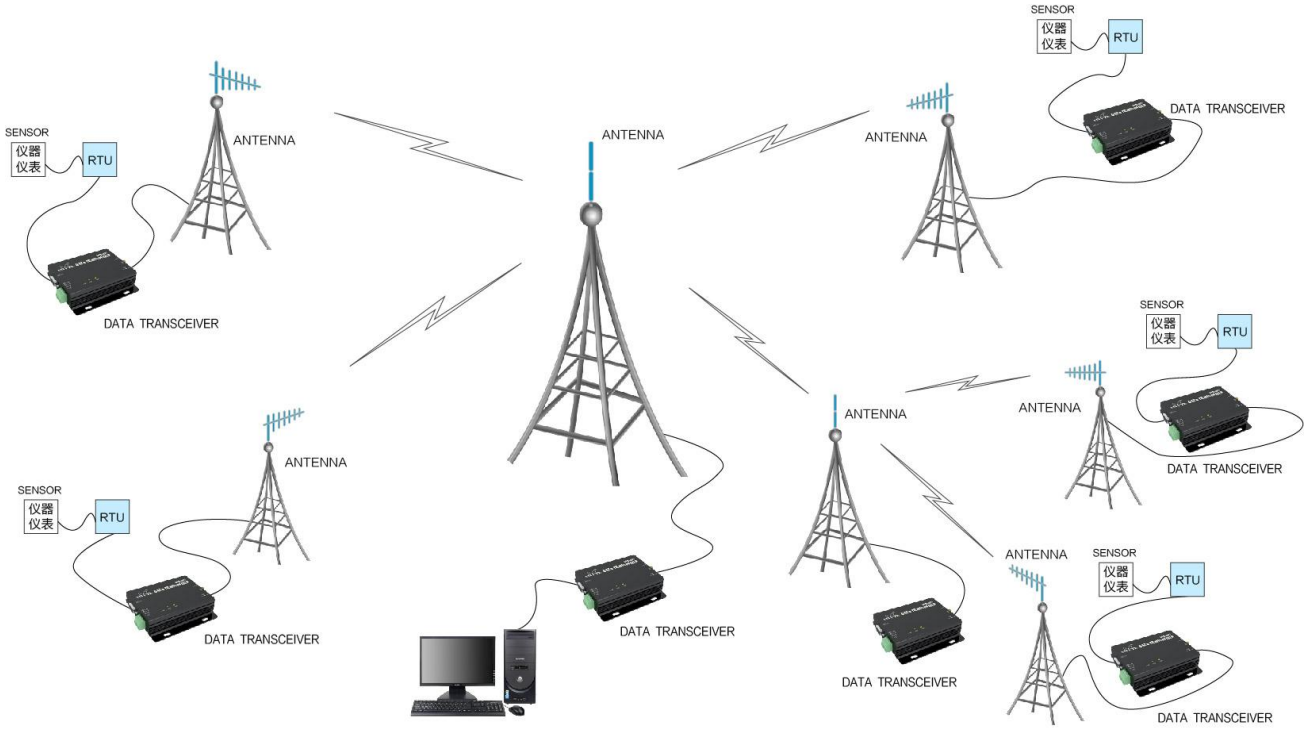
Product Model	Interface Type	Operating frequency Hz	Transmitting power W	Communication distance km	Functional Features
E90-DTU(170L30)	RS232/RS485	170M	1	8	LoRa spread spectrum technology, low frequency penetration bypass
E90-DTU(433L30)	RS232/RS485	433M	1	8	LoRa spread spectrum technology, long-range 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,

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

					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

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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
1.3	2023-11-17	Content correction	Hao

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

About us

成都亿佰特电子科技有限公司
Chengdu Ebyte Electronic Technology Co.,Ltd.

Sales Hotline: 4000-330-990 (available 24 hours a day)

Company phone: 028- 61543675 (callable during working hours)

Company Fax: 028- 64146160

Official website: https://www.cdebyte.com

Company Address: Building B5, No. 199, Xiqu Ave, High-tech West District, Chengdu, Sichuan Province

ISO9001:2 008 ISO14001:2004 Chengdu Yibyte Electronic Technology Co., Ltd. reserves the right of final interpretation and modification of all contents in this manual

Copyright ©2012–2023，Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000