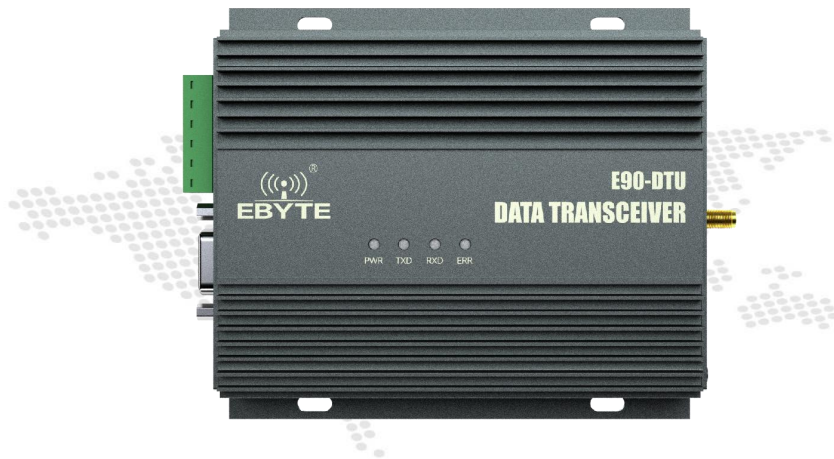




Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



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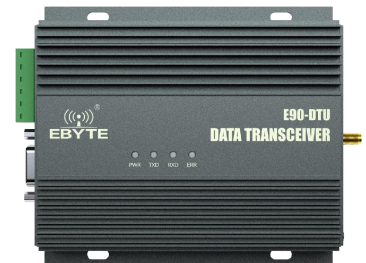
Chapter 1 Product Introduction

1.1 Product Introduction

E90-DTU (400SL42) is a real high-quality industrial-grade wireless data transmission unit (the unit has won the national appearance design patent ZL202030009845.3), it adopts LORA spread spectrum technology, with strong anti-interference ability, it allows wireless communication more stable and reliable.

It has a variety of transmission methods, works in the frequency band 410.125 ~ 493.125MHz (default 433.125MHz), and the radio provides a transparent RS232/RS485 interface. LoRa direct-sequence spread spectrum technology brings a longer communication distance and has the advantage of strong anti-interference ability. The module has a software FEC forward error correction algorithm, which has high coding efficiency and strong error correction ability. In the case of sudden interference, it can actively correct the interfered data packet, greatly improving reliability and transmission distance. In the absence of FEC, such packets can only be dropped. It has the function of data encryption. The data transmitted by the radio in the air is random through the strict encryption and decryption algorithm, which makes the data interception meaningless; It supports the setting of sub-packet length, and supports different real-time and data packets.

As a communication medium, wireless data transmission radio has a certain scope of application like optical fiber, microwave, and wire: it provides monitoring real-time and reliable data transmission of signals in private networks under certain special conditions, with the advantages of low cost, easy installation and maintenance, strong diffraction ability, flexible network structure, and long coverage. It is suitable for occasions with multiple points but scattered locations, and complex geographical environments. It can be connected with data terminals such as PLC, RTU, rain gauge, and liquid level gauge.



1.2 Function Features

- Environmental field strength dynamic indication, data packet RSSI dynamic indication;
- Software and hardware dual watchdog;
- Dustproof and moistureproof;
- The product is simple and easy to use, with host computer configuration software;
- Using the latest LoRa technology, the distance is farther than the traditional LoRa data transmitter, and the performance is more powerful;
- Military-grade LoRa modulation technology is adopted, with data encryption and adjustable subpacket length;
- Super large single package, up to 240 bytes;
- Simple and high-efficiency power supply design, using crimp wire, supporting 12V power supply;
- Transmitting power up to 15W;
- Support LBT function, the radio automatically waits for transmission according to the current environmental noise intensity. Greatly improve the communication success rate of the module in harsh environments;
- Support communication key function to effectively prevent data from being intercepted;
- Multi-level relay networking can be realized, the communication distance can be effectively extended, and ultra-long-distance communication can be realized;
- Using temperature compensation circuit, the frequency stability is better than $\pm 1\text{PPM}$;
- All aluminum alloy shell, compact size, easy installation, good heat dissipation; perfect shielding design, good electromagnetic compatibility, strong anti-interference ability;

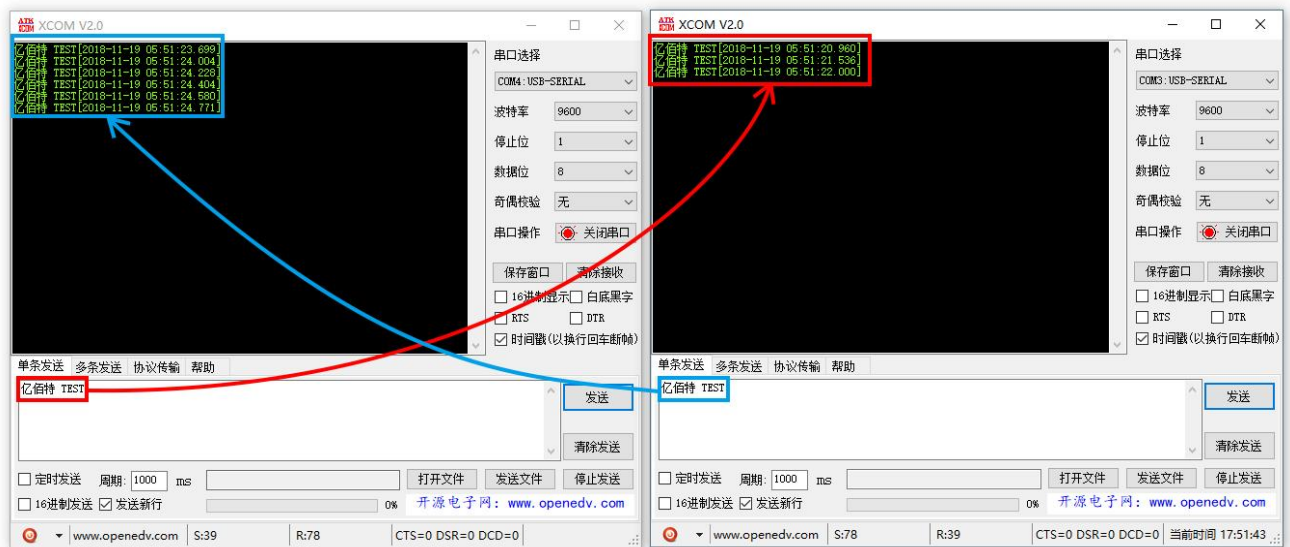
- Powerful software functions, all parameters can be set by programming: such as power, frequency, air rate, address ID, etc.;
- Temperature monitoring, antenna abnormality monitoring;

Chapter 2 Quick Start

The equipment must be connected with an external 50 ohm impedance antenna, and the two devices and antennas must be used at least 6 meters apart, otherwise the equipment will be damaged. If the equipment is not damaged according to the above operations, the consequences of equipment damage will be borne! !

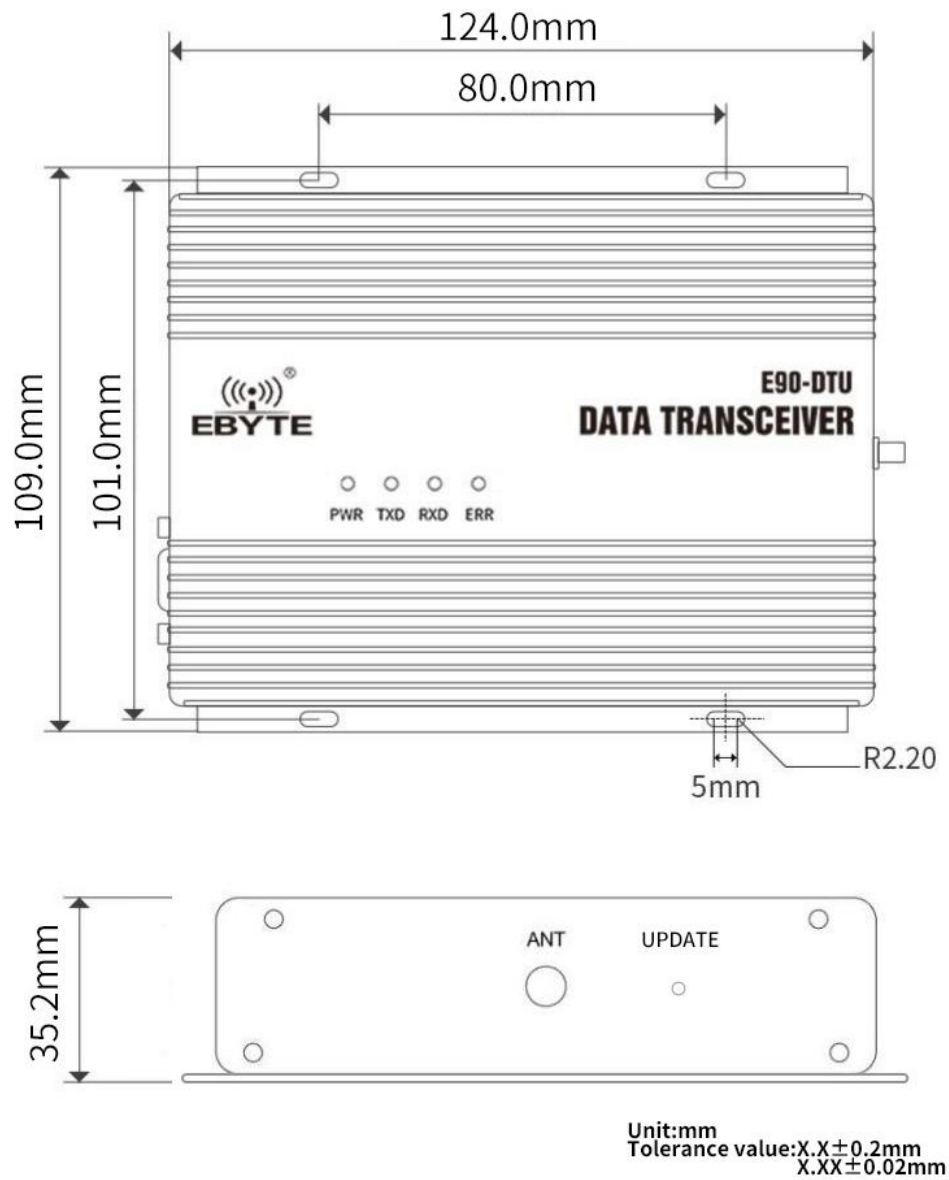
You need to prepare E90-DTU (400SL42) radio, antenna, 12V/4A power supply, and serial cable.

1. First install the antenna for the digital radio, and then install the power supply. Only the crimping method is supported. At this time, the power light is on, and the abnormal light has no indication;
2. Use USB to RS-232 or USB to RS-485 to connect the computer to the digital radio;
3. Start the two serial port debugging assistants, select the serial port baud rate as 9600bps, and the verification method as 8N1, then the serial port transparent transmission can be realized;

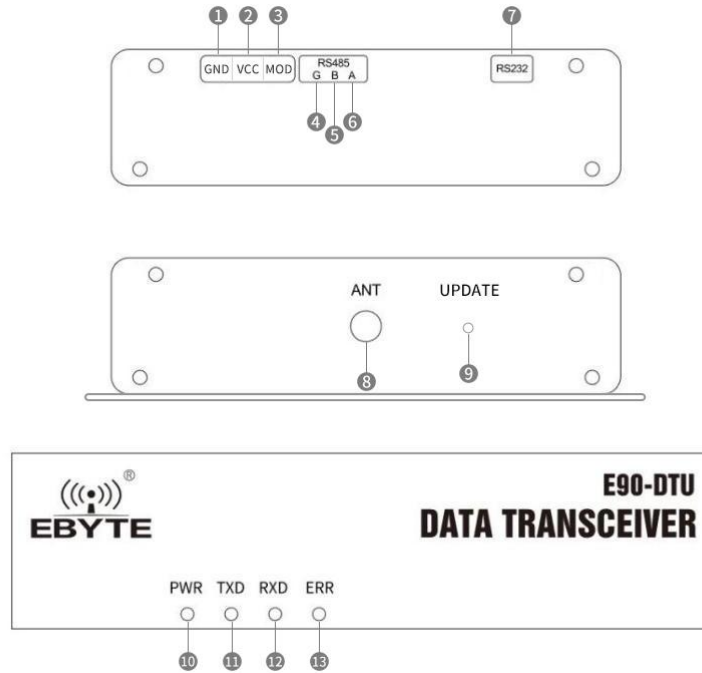


4. If the customer needs to modify the parameters, please short the MOD pin with GND to enter the configuration mode. And then open the E90-DTU SL digital radio configuration software to modify the relevant parameters. After completing the configuration, please put the MOD pin in the air state.

Chapter 3 Product Size



3.1 interface and indication



Pin no.	Name	Function	Description
1	GND	negative pole of crimping power input	power reference ground
2	VCC	positive pole of crimping power input	Power input (12V/4A)
3	MOD	Mode control	Floating: normal mode; Grounded: configuration mode
4	RS485 G	RS485 interface G	RS485 interface G is connected to the device GND interface (recommended connection)
5	RS485 B	RS485 interface B	RS485 interface B is connected to device B interface
6	RS485 A	RS485 interface A	RS485 interface A is connected to device A interface
7	RS232	RS232 interface	Standard RS232 interface
8	ANT	SMA-K interface	External threaded inner hole, length 10mm, characteristic impedance 50Ω
9	UPDATE	-	Hidden buttons, users do not need to care
10	PWR	Power indicator	Red, lights up when power is on
11	TXD	Serial port data sending indicator	Yellow, blinking when sending data
12	RXD	Serial port data receiving indicator	Yellow, blinking when receiving data
13	ERR	warning light	The antenna is not connected or the voltage and temperature are abnormal. After solve the abnormality of antenna not connected, it needs to be powered on again to work normally.

Chapter 4 Interface definition

4.1 Power Interface Description

The user uses the crimping method to supply power, 12V/4A DC power supply.

4.2 RS232 interface definition

E90-DTU can use standard DB9 interface to connect with equipment through RS232.

4.3 RS485 interface definition

E90-DTU can use A, B, G of RS485 interface to connect with RS485 A, B, G of the device respectively.

- Note: If the communication is not smooth when the E90-DTU is connected to multiple devices, but there is no such phenomenon when the radio is connected to a single device. Please try to connect a 120Ω matching resistor in parallel between the 485_A terminal and the 485_B terminal.

Chapter 5 Technical Indicators

5.1 Model Specifications

Model Specifications	Working frequency	Transmitting power	Reference distance	Specifications and Features	Recommended Application Scenarios
	Hz	W	km		
E90-DTU(400SL42)	433.125M	15	30	LoRa spread spectrum	suitable for long-distance and interference-prone environments

- Test condition: Sunny weather, open air without obstacles, 12V/4A power supply, 5dBi sucker antenna, the height of the antenna from the ground is 2 meters, and the factory default parameters are used.

5.2 General Specifications

No.	Item	Specification	Description
1	product size	124*109.1*35.2mm	See installation dimensions for details
2	product weight	425g	Weight tolerance 5g

3	operating temperature	-40°C~+85°C	Meet the needs of industrial use
4	antenna impedance	50Ω	Standard 50Ω characteristic impedance
5	voltage range	12±1V DC	It is recommended to support instantaneous current 4A
6	communication interface	RS232/RS485	Standard DB9 hole type/5.08 terminal block
7	baud rate	factory default 9600	Baud rate range 1200~115200
8	address code	factory default 0	A total of 65536 address codes can be set

5.3 Frequency range and number of channels

Model	Default Frequency	Frequency Band Range	Channel Interval	Number of Channels
	Hz	Hz	Hz	
E90-DTU(400SL42)	433.125M	410.125~493.125M	1M	84, half duplex

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

5.4 Transmitting power level

Model	10/15W
E90-DTU(400SL42)	Software adjustable, default 15W

5.5 Air Data Rate Grades

Model	Default Air Data Rate	number of grades	Air Data Rate Grades
	bps		kbps
E90-DTU(400SL42)	2.4k	8	0.3、1.2、2.4、4.8、9.6、19.2、38.4、62.5

- Note: The higher the air data rate, the faster the transmission rate and the shorter the transmission distance; therefore, if the air rate meets the requirements of use, it is recommended to set air data rate as low as possible.

5.6 Current parameter

Model	Supply voltage (V)	Emission current (A)	Waiting current (mA)
E90-DTU(400SL42)	12±1	2.5~3.5	45

- Note: It is recommended to reserve more than 50% of the current margin when selecting the power supply, which is conducive to the long-term stable operation of the radio. **If it falls below or exceeds the power supply range of the device, it may trigger the internal protection of the device to fail to work. Please ensure the stability of the power supply voltage when using it.**

5.7 TX/RX data package length and subpackage method

Model	Cache size	Subpackage method
E90-DTU(400SL42)	1000 bytes	Subpackage 32/64/128/240 bytes can be sent by command setting

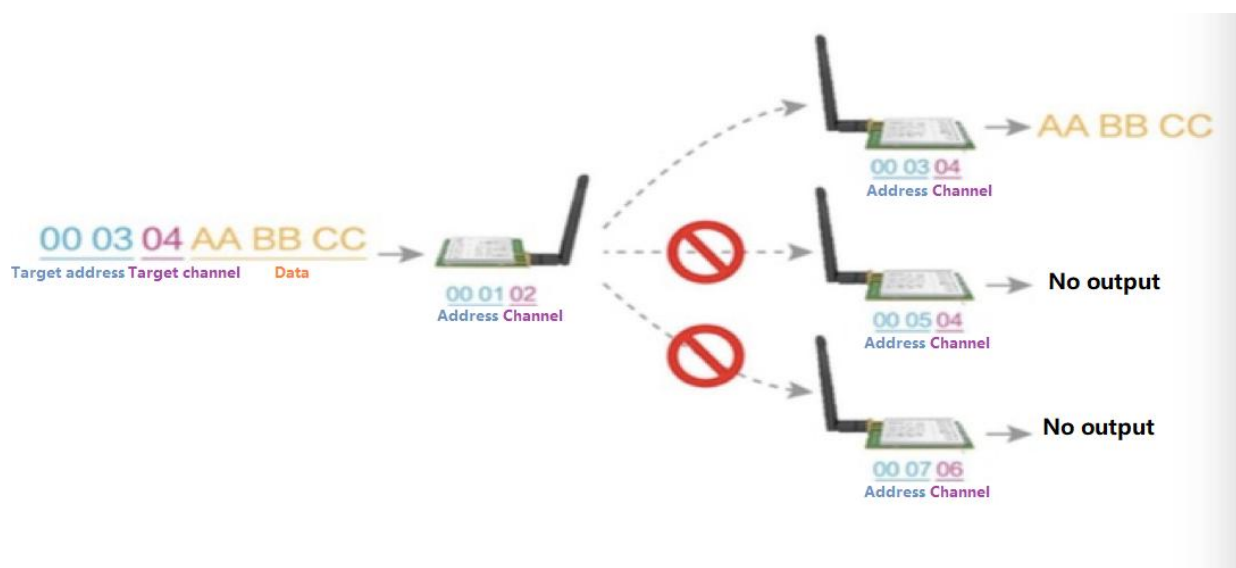
Note:

- If the data received by the radio at a time is greater than the capacity of a single packet, the excess data will be automatically allocated to the second transmission until the transmission is completed;
- The data received by the radio at a time cannot exceed the buffer capacity.

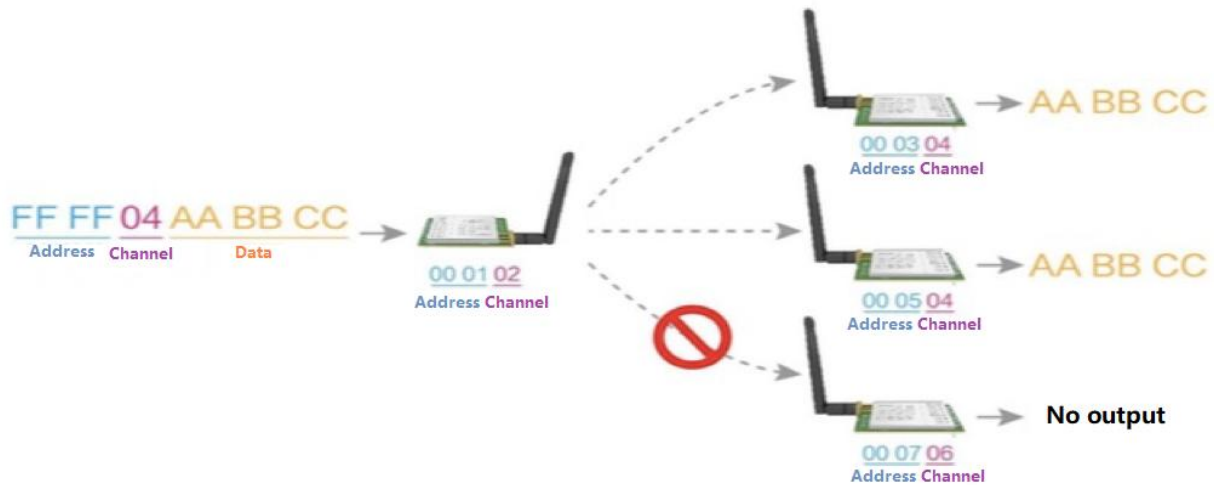
Chapter 6 Function Description

6.1 Fixed Transmission (Hex)

During fixed-point transmission, the module will recognize the first three bytes of the received serial port data as: Address high + address low + channel, and use it as a wireless transmission target.



6.2 Broadcasting Transmission (Hex)



6.3 Broadcasting Address

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

6.4 Listening Address

- For example: Set the address of module A as 0xFFFF, and the channel as 0x04;
- When module A is the receiver, it can receive the data sent from all modules under channel 0x04, the purpose of listening is realized.

6.5 Detailed explanation of abnormal working status log printing

1. The ERR indicator will flash according to the specific abnormal working status showed in the table below.

Abnormal working status	Threshold for judging abnormal status	ERR indicator flashing
Undervoltage	Supply voltage < 11V	Blink once every 500ms
overvoltage	Supply voltage > 13V	Blink once every 1s
overheating	Module temperature > 120°C	Blink once every 2s
overvoltage and overheating	Supply voltage > 13V and module temperature > 120°C	always on
Unplugged antenna	Transmitting without Antenna	always on

2. The module will temporarily turn off the RF transmission function when it is in an abnormal working state, and it will restart and start the transmission after returning to the normal working state.

3. When the module is in an abnormal state, it will print a circular log every 500ms (set on/off) to inform the user of the current abnormal working state. The format of the printed log is shown in the following table:

Abnormal working status	print log format
Undervoltage	Under Voltage!!!
overvoltage	Over Voltage!!!
overheating	Over Temperature!!!
overvoltage and overheating	Over Voltage & Over Temperature!!!
Unplugged antenna	WARNING!!!: No antenna

Exception log printing enable bit (bit2 of instruction register 04H) 0: off 1: on, the default is 0 (off)

Chapter 7 Working Mode

E90-DTU has two working modes:

the MOD pin is floating, it is in the normal mode, that is, the radio communicates normally;

the MOD pin is grounded, it is in the configuration mode.

Modes	Description
normal mode	Serial port open, wireless open, transparent transmission (factory default mode)
configuration mode	The user accesses the register through the serial port to control the working status of the radio, and the user can configure the module through the host computer configuration software.

7.1 Normal mode

Type	Radio works in normal mode (MOD pin is floating)
Transmitting	Users can input data through the serial port and the module will start wireless transmission.
Receiving	The module wireless receiving function is turned on, and after receiving the wireless data, it will be output through the serial port.

7.2 Configuration mode

Type	Radio works in configuration mode (MOD pin is grounded)
Transmitting	Wireless transmitting off
Receiving	Wireless receiving off
Configuring	User can access registers to configure module operating parameters

Chapter 8 Register read and write control

8.1 Command format

In configuration mode, the list of supported commands are as follows (only 9600, 8N1 format is supported when setting):

No.	Command format	Description															
1	Set register	Command: C0+starting address+length+parameters Response: C1+starting address+length+parameters E.g 1: Configure Channel to be 0x09 <table><thead><tr><th></th><th>command</th><th>starting address</th><th>length</th><th>parameter</th></tr></thead><tbody><tr><td>Send:</td><td>C0</td><td>05</td><td>01</td><td>09</td></tr><tr><td>Return:</td><td>C1</td><td>05</td><td>01</td><td>09</td></tr></tbody></table> E.g 2: Meanwhile Configure module address (0x1234), network address (0x00), serial port (9600 8N1) and air data rate (1.2K). Send: C0 00 04 12 34 00 61 Return: C1 00 04 12 34 00 61		command	starting address	length	parameter	Send:	C0	05	01	09	Return:	C1	05	01	09
	command	starting address	length	parameter													
Send:	C0	05	01	09													
Return:	C1	05	01	09													
2	Read register	Command: C1+starting address+ length Response: C1+starting address+length+parameters E.g 1: Read channel <table><thead><tr><th></th><th>command</th><th>starting address</th><th>length</th><th>parameter</th></tr></thead><tbody><tr><td>Send:</td><td>C1</td><td>05</td><td>01</td><td></td></tr><tr><td>Return:</td><td>C1</td><td>05</td><td>01</td><td>09</td></tr></tbody></table> E.g 2: Read module address, network address, serial port and air data rate. Send: C1 00 04 Return: C1 00 04 12 34 00 61		command	starting address	length	parameter	Send:	C1	05	01		Return:	C1	05	01	09
	command	starting address	length	parameter													
Send:	C1	05	01														
Return:	C1	05	01	09													
3	Wrong format	Wrong format respond: FF FF FF															

8.2 Register description

No.	Read or write	Name	Description	Remark
00H	Read/W rite	ADDH	ADDH (default 0)	High byte and low byte in the module address; Note: When the module address is FFFF, it can be used as the broadcast and listening address, that is: the module will not perform address filtering.
01H	Read/W rite	ADDL	ADDL (default 0)	
02H	Read/W rite	NETID	NETID (default 0)	Network address, used to distinguish the network. When two or more modules need to communicate with each other, their network address should be the same.
03H	Read/W rite	REG0	7 6 5 UART Serial port rate (bps)	For the two modules communicating with each other, their serial port baud rate can be different, and their serial parity bit can also be different. When transmitting large packets
			0 0 0 Serial port baud rate 1200	
			0 0 1 Serial port baud rate 2400	
			0 1 0 Serial port baud rate 4800	

			0	1	1	Serial port baud rate 9600 (default)	continuously, users need to consider the data blocking and possible data loss caused by the same baud rate. It is generally recommended that both communication parties have the same baud rate.
			1	0	0	Serial port baud rate 19200	
			1	0	1	Serial port baud rate 38400	
			1	1	0	Serial port baud rate 57600	
			1	1	1	Serial port baud rate 115200	
			4	3		Serial parity bit	
			0	0		8N1 (default)	
			0	1		8O1	
			1	0		8E1	
			1	1		8N1 (equal to 00)	
			2	1	0	Wireless air data rate (bps)	The communication parties must have the same air data rate. The higher the air data rate is, the smaller the delay in response, and the shorter the transmission distance is.
			0	0	0	Air data rate 0.3k	
			0	0	1	Air data rate 1.2k	
			0	1	0	Air data rate 2.4k (default)	
			0	1	1	Air data rate 4.8k	
			1	0	0	Air data rate 9.6k	
			1	0	1	Air data rate 19.2k	
			1	1	0	Air data rate 38.4k	
			1	1	1	Air data rate 62.5k	
04H	Read/W rite	REG1	7	6		Sub packet setting	When the data sent is smaller than the sub packet length, the serial output of the receiving end is an uninterrupted continuous output. When the data sent is larger than the sub packet length, the serial port in receiving end will sub packet the data and then output them.
			0	0		240 bytes (default)	
			0	1		128 bytes	
			1	0		64 bytes	
			1	1		32 bytes	
			5			RSSI Ambient noise enable	After enabling, the command C0 C1 C2 C3 can be sent in the transmission mode to read the register. Register 0x00: current ambient noise RSSI Register 0x01: RSSI at Last Data Received (Current channel noise is: dBm = -(256 - RSSI)); Command format: C0 C1 C2 C3+start address+read length; Return: C1 + address + read length + read valid value; For example: Send: C0 C1 C2 C3 00 01 Return: C1 00 01 RSSI (the address can only start from 00)
			0			Disable (default)	
			1			Enable	
			4	3		Reserve	
			2			Abnormal working status log printing enable	
			0			Disable (default)	Print logs in different formats according to different abnormal working statuses. For details, see Chapter 6.5,Detailed explanation of abnormal working status log printing
			1			Enable	
			1	0		TX power	

			0	0	41.5±0.5dBm （default）	power efficiency is the highest at maximum power.	
			0	1		The current does not decrease in proportion to the decrease in power.	
			1	0			
			1	1	40dBm		
05H	Read/W rite	REG2	Channel control （CH） 0-83 represents a total of 84 channels			Actual Frequency= 410.125Mhz+ CH *1Mhz	
06H	Read/W rite	REG3	7	Enable RSSI			After enabled, when the module receives the wireless data, it will follow an RSSI strength byte after output via the serial port TXD
			0	Disable （default）			
			1	Enable			
			6	Transmission mode			In Fixed point transmission mode, the module will recognize the first three bytes of the received serial port data as:
			0	Transparent transmission mode （default）			
			1	Fixed point transmission mode			Address high + address low + channel, and use it as a wireless transmission target.
			5	Repeater function			After the repeater function is enabled, if the target address is not the module itself, the module will starting a forwarding.
			0	Disable repeater function （default）			
			1	Enable repeater function			In order to prevent data return-back, it is recommended to use it in conjunction with the fixed-point transmission mode. That is: the target address is different from the source address.
			4	LBT enable			After enabled, wireless data will be monitored before transmission, which can avoid interference to a certain extent, but may cause data delay
			0	Disable （default）			
			1	Enable			The maximum stay time of LBT is 2 seconds, and it will be issued forcibly when it reaches 2 seconds.
			3	Reserve			
			2	1	0	Reserve	
07H	Write	CRYPT_ H	High byte of Key （default 0）			Write only, read returns 0	
08H	Write	CRYPT_ L	Low byte of Key （default 0）			Used for user encryption to avoid interception of wireless data over the air by similar modules. The module will internally use these two bytes as a calculation factor to do a transform encryption processing for the wireless signal over the air..	
80H~ 86H	Read only	PID	Product information: 7bytes			Product information: 7bytes	

8.3 Factory default parameter

Item	Factory default parameter: 00 00 00 62 00 17 03 00 00						
Model No	Frequency	Address	Channel	Air data rate	Baud rate	Parity format	Power
E90-DTU (400SL42)	433.125MHz	0x0000	0x17	2.4kbps	9600	8N1	41.5±0.5dBm

Chapter 9 Repeater networking mode

No.	Repeater mode description
1	User need to set the repeater function in configuration mode. After setting, switch module to the normal mode. Then the repeater starts working.
2	In the repeater mode, ADDH/ADDL is no longer used as the module address, it is used as a NETID to pair and forwarding. If the repeater receive the data from a network, then it will forward the data to the other network. The network ID of the repeater itself is invalid in this case. (See below examples)
3	The repeater module cannot transmit and receive data, and cannot perform low-power operation.

Repeater networking rules:

1. Forwarding rules: the repeater can forward data in both directions between two NETIDs.
2. In repeater mode, ADDH\ADDL is no longer used as the module address. It is used as a NETID to pair and forwarding.

As shown in the figure:

① Primary repeater

“Node 1” NETID is 08.

“Node 2” NETID is 33.

ADDH\ADDL of Repeater 1 are 08, 33 respectively.

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

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

② Secondary repeater

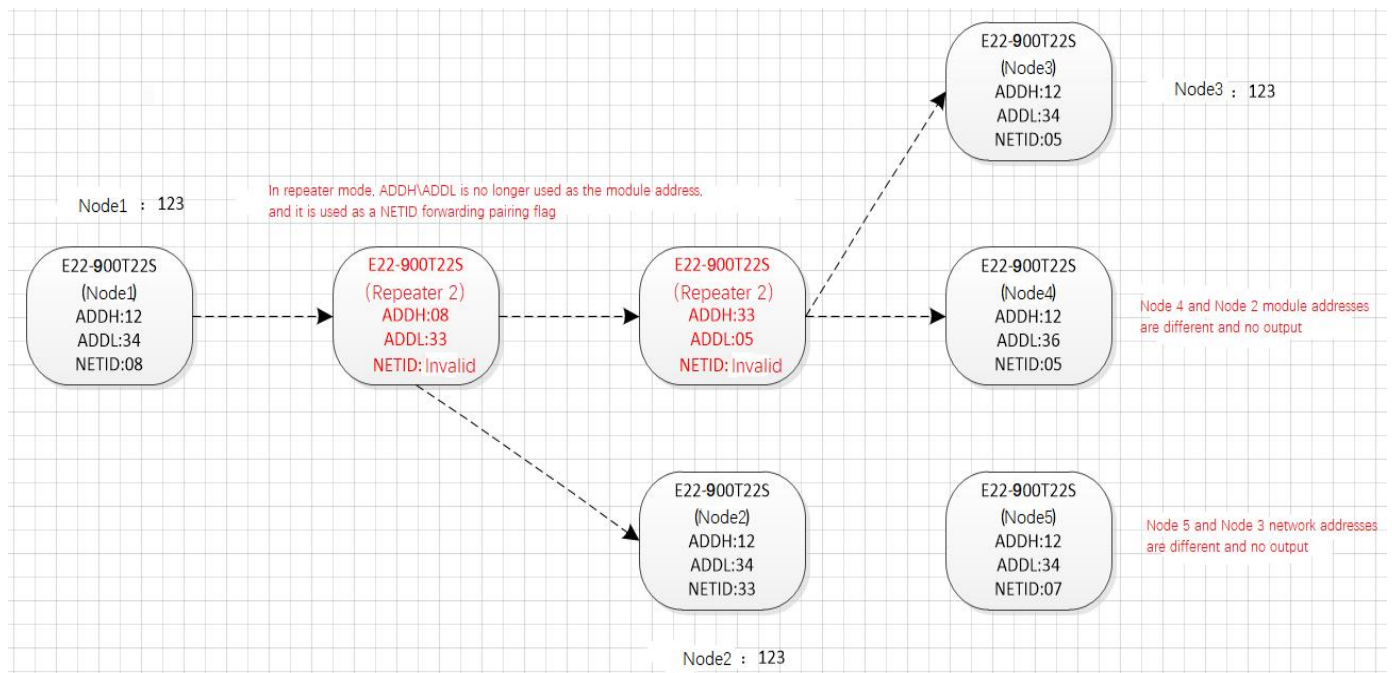
ADDH\ADDL of Repeater 2 are 33, 05 respectively.

Therefore, Repeater 2 can forward the data of Repeater 1 to the network NETID: 05.

Thus node 3 and node 4 can receive the data from node . Node 4 outputs data normally, but no output from Node3 because Node 3 has a different address from Node 1.

③ Two-way repeater

As shown in below: The data sent by Node 1 can be received by Node 2 and Node 4; The data sent by by Node 2 and Node 4 can also be received by Node 1.



Chapter 10 Configuration instructions on computer

- The following figure is the display interface of E90-DTU configuration on computer. The user can switch to the configuration mode by grounding the MOD pin, and quickly configure and read parameters on the host computer.



- In the configuration on computer, the module address, Channel, network ID, and key are all in **decimal**. The range of values of each parameter is:

Network address: 0~65535

Channel: 0~83

Network ID: 0~255

Key: 0~65535

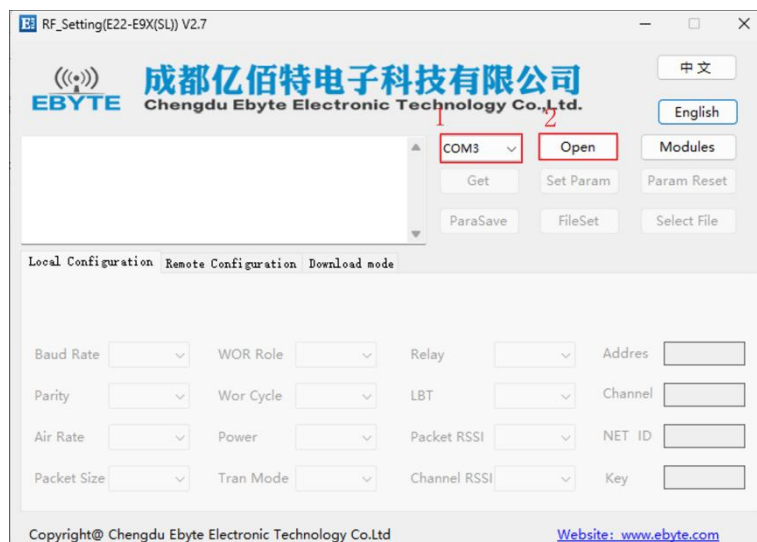
- When user configures the repeater mode using the host computer, one point much be paid attention to: In the configuration software, each parameter is in decimal, so the module address and network ID need to be converted when set it.
- For example, in the configure software, if the network ID of Transmitter A is input 02, and the network ID of Receiver B is input 10, then the module address of Repeater R should be set as 522. (The address of Repeater R is 0X020A in hex, and it need to be converted to decimal.)

Chapter 11 IAP online firmware upgrade

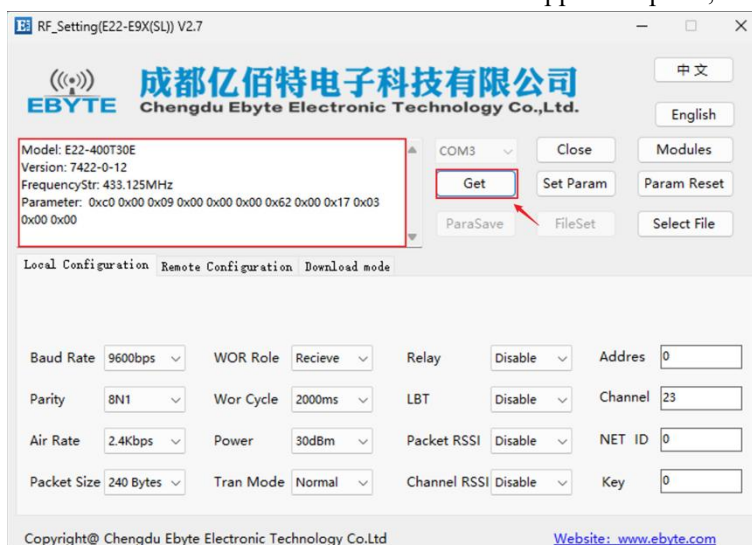
IAP is online application programming. This module uses this method to upgrade the firmware online through the serial port.

● PC instruction upgrade

1. Enter the configuration mode by grounding the MOD pin (note: the baud rate is 9600 in the configuration mode);
2. Open the official website to configure the upper computer "RF_Setting (E22-E9X (SL)) V2.7. exe", and select Serial Port > Open;



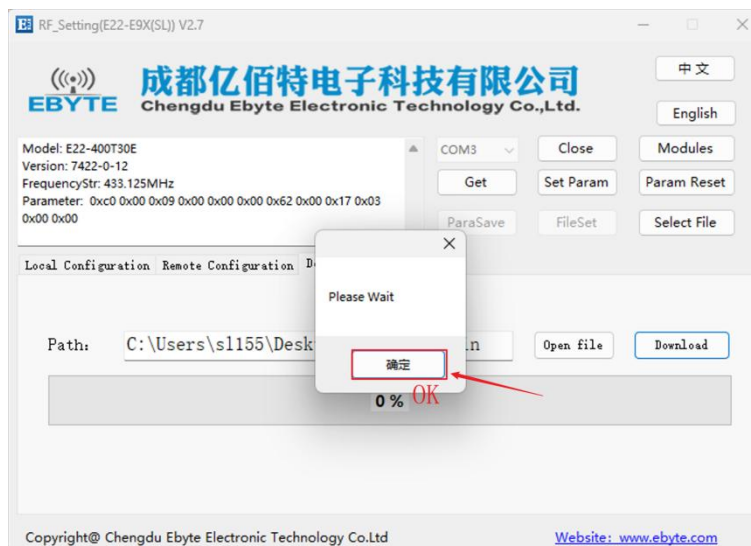
3. Click Get to view the module information in the left window of the upper computer;



4. Click Download mode > Click Open File (select Firmware. bin file)> Click Download;



5. Click 确定 (OK), Firmware upgrade starts;



6. Click 确定 (OK), Firmware upgrade completed;



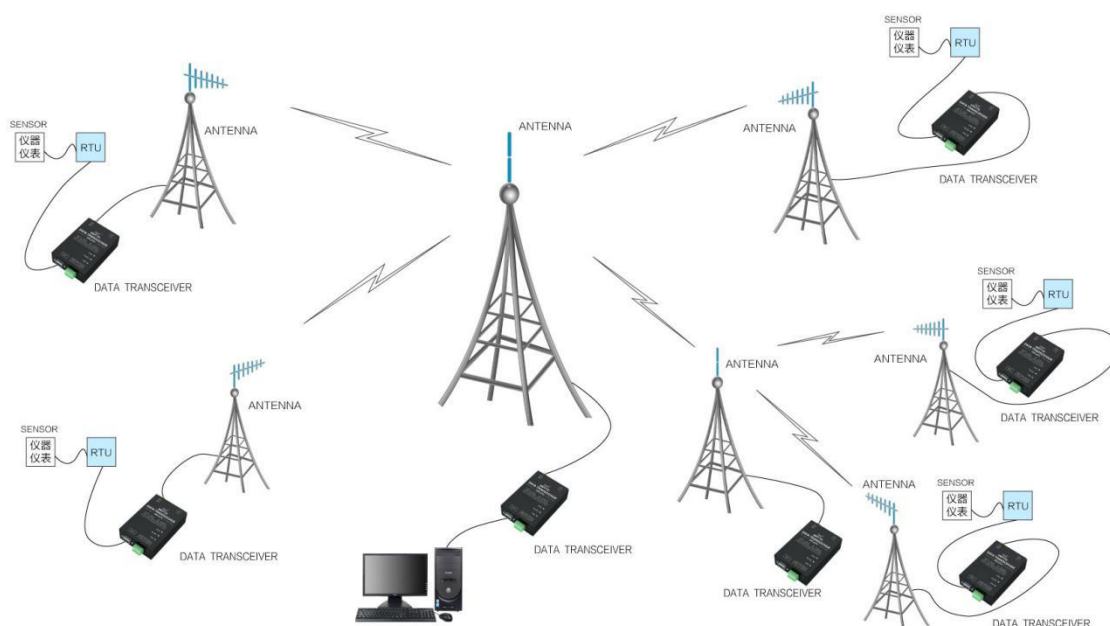
The host computer command upgrade logic: the host computer sends: "AT+IAP", the module replies: "AT+IAP=OK", wait for the module to automatically reset and enter the IAP upgrade mode. The character "C" output by the serial port indicates that the module is waiting to receive the firmware bin file. After the host computer detects the character "C", it starts to automatically send the bin file in packets. After the module is received, it will automatically reset and enter the application program, and the upgrade is complete.

Chapter 12 Related Products

Model No.	Interface type	Frequency Hz	Tx power W	Tested Distance km	Functions and Features
E90-DTU(230SL22)	RS232 RS485	230M	0.16	5	LoRa spread spectrum, wireless configuration, networking transmission, suitable for complex environments
E90-DTU(230SL30)	RS232 RS485	230M	1	10	LoRa spread spectrum, wireless configuration, networking transmission, suitable for complex environments
E90-DTU(400SL22)	RS232 RS485	433\470M	0.16	5	LoRa spread spectrum, wireless configuration, networking transmission, long-distance anti-interference
E90-DTU(400SL30)	RS232 RS485	433\470M	1	10	LoRa spread spectrum, wireless configuration, networking transmission, long-distance anti-interference
E90-DTU(900SL22)	RS232 RS485	868\915M	0.16	5	LoRa spread spectrum, wireless configuration, networking transmission, long-distance anti-interference
E90-DTU(900SL30)	RS232 RS485	868\915M	1	10	LoRa spread spectrum, wireless configuration, networking transmission, long-distance anti-interference
E90-DTU(170L30)	RS232 RS485	170M	1	8	LoRa spread spectrum, super penetrating diffraction
E90-DTU(433L30)	RS232 RS485	433M	1	8	LoRa spread spectrum, long-distance anti-interference
E90-DTU(433L37)	RS232 RS485	433M	5	20	LoRa spread spectrum, 20km extremely 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, long-distance
E90-DTU(230N27)	RS232 RS485	230M	0.5	5	Low frequency narrowband, suitable for complex environments
E90-DTU(230N33)	RS232 RS485	230M	2	8	Low frequency narrowband, suitable for complex environments
E90-DTU(230N37)	RS232 RS485	230M	5	15	Low-frequency narrow-band, suitable for complex environments, super strong diffraction

Chapter 13 Practical application field

Ebyte digital 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, hydrology and water regime monitoring, tap water pipe network monitoring, urban street lights Monitoring, air defense alarm control, railway signal monitoring, centralized control of railway water supply, oil and gas supply pipeline network monitoring, GPS positioning system, remote meter reading, electronic crane scale, automatic target reporting, earthquake forecasting, fire prevention and anti-theft, environmental monitoring and other industrial automation system, as shown below:



Chapter 14 Precautions for use

- Please keep the warranty card of this device properly. The warranty card contains the factory number (and important technical parameters) of the device, which is of great reference value for users to maintain and add new devices in the future.
- During the warranty period, if the radio is damaged due to the quality of the product itself rather than man-made damage or natural disasters such as lightning strikes, free warranty is available; please do not repair by yourself, and contact our company if there is a problem. Ebyte provides first-class after-sales service.
- Do not operate this radio near some flammable places (such as coal mines) or explosive dangerous objects (such as detonators for detonation).
- Appropriate DC stabilized power supply should be selected, which requires strong anti-high-frequency interference ability, small ripple, and sufficient load capacity; it is best to have over-current, over-voltage protection and lightning protection functions to ensure that the digital transmission station normal work.
- 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.

- Don't let the radio continuously transmit at full load, otherwise the transmitter may be burned out.
- The ground wire of the digital radio should be well connected with the ground wire of the external equipment (such as PC, PLC, etc.) and the ground wire of the power supply, otherwise it is easy to burn out the communication interface, etc.; do not plug or unplug the serial port while the power is on.
- When testing the digital radio, it must be connected with a matching antenna or 50Ω dummy load, otherwise the transmitter will be easily damaged; if the antenna is connected, the distance between the human body and the antenna should be more than 2 meters to avoid injury. Don't touch the antenna while transmitting.
- Wireless data transmission radio often have different communication distances in different environments, and the communication distance is often affected by temperature, humidity, obstacle density, obstacle volume, and electromagnetic environment; in order to ensure stable communication, it is recommended to reserve 50% of the communication distance margin.
- If the measured communication distance is not good, 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.
- 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.
- Wireless communication products need to be connected with an impedance-matched antenna to work normally. Even for a short-term test, antenna should be connected with it. If the product is damaged due to this reason, it will not be covered by the warranty.

Important statement

- Ebyte reserves the right of final interpretation and modification of all contents in this manual.
- Due to the continuous improvement of the hardware and software of the product, this manual may be changed without prior notice, and the latest version of the manual shall prevail.

Revision history

Version	Date	Description	Issued by
1.0	2023-05-16	Initial version	Bin

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