E22-170Txxx User Manual

AT command 170MHz band LoRa wireless module



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

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

Table of contents

Disclaimer and Copyright Notice 4
Chapter 1 Product Overview 5
1.1 Product Introduction 5
1.2 Features 5
1.3 Application Scenario 6
Chapter 2 Specifications 6
2.1 RF parameters 6
2.2 Electrical parameters 6
2.3 Hardware Parameters 77
Chapter 3 Mechanical Dimensions and Pin Definition 8
3.1 E22-170Txx S Mechanical Dimensions and Pin Definition 8
Chapter 4 Recommended Connection Diagram 9
Chapter 5 Function Details 10
5.1 Working mode 10
5.1.1 Transfer mode used (M1, M0 pins set to 0,0) 10
5.1.2 WOR mode use (M1, M0 pins set to 0,1) 14
5.1.3 Configuration mode use (M1, M0 pins set to 1, 0) 14
5.1.3 Sleep mode use (M1, M0 pins set to 1,1) 16
5.2 Module reset 16
5. 3 AUX Detailed Explanation 16
5.3.2 Serial port data output indication 17
5.3.3 Wireless transmission indication (only for E22-170T33S) 17
5.3.4 Switching Mode 18
5.3.4 Notes 19
6 Register Read and Write Control 19
6.1 Command Format 19
6.2 Register Description 20
6.3 Factory default parameter 23
Chapter 7 AT Command 24
7.1 AT command table 24
7.1.1 Command Command 24
7.1.2 Setting Commands 24
7.1.3 Query command 25
7.2 AT parameter analysis 26
7.3 Notes on upgrading firmware via serial port 27
7.3.1 PC upgrade operation steps 27
8 Hardware Design 29
9 FAQ 30
9.1 Transmission distance is not ideal 30
9.2 Module is vulnerable to damage 31
9.3 Bit error rate is too high 31
10 Welding Operation Commands 31
10.1 Reflow temperature 31

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

10.2 Reflow Oven Curve 32
11 Related Models 32
12 Antenna Guide 33
1 2 .1 Antenna recommendation 33
Chapter 13 Bulk Packaging Methods 33
13.1 E22-170T30S & E22-170T33S Batch Packaging 33
Revision History 34
About us .....错误！未定义书签。

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

Disclaimer and Copyright Notice

The information in this document, including URL references, is subject to change without notice. The document is provided "as is" without warranty of any kind, including any warranty of merchantability, fitness for a particular purpose, or non-infringement, and any warranty otherwise provided by any proposal, specification, or sample. No liability is assumed for this document, including liability for infringement of any patent arising from the use of the information in this document. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document.

The test data obtained in this article are all obtained by Ebyte Laboratory testing, and the actual results may be slightly different.

All trade names, trademarks and registered trademarks mentioned herein are the property of their respective owners and are hereby acknowledged.

The final right of interpretation belongs to Chengdu Ebyte Electronic Technology Co., Ltd.

Notice :

Due to product version upgrades or other reasons, the contents of this manual may be changed. Ebyte Ltd. reserves the right to modify the contents of this manual without any notice or reminder. This manual is only used as a guide. Chengdu Ebyte Electronic Technology Co., Ltd. tries its best to provide accurate information in this manual, but Chengdu Ebyte Electronic Technology Co., Ltd. does not ensure that the contents of the manual are completely error-free, and all statements, information and suggestions in this manual do not constitute any express or implied warranty.

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

Chapter 1 Product Overview

1.1 Product Introduction

E22-170Txxx is a new generation of LoRa wireless data transmission module. This series (UART) module is developed based on SEMTECH high-performance RF chip . Its maximum transmission power is 33 dBm, with multiple transmission modes, working frequency band of 150.125MHz~173.125MHz (factory default 170.125MHz band) , TTL level output, compatible with 3.3V IO port voltage.

E22-170Txxx series uses the new generation of LoRa spread spectrum technology, which is faster, has lower power consumption and is smaller in size. It supports functions such as air wake-up, wireless configuration, carrier monitoring, automatic relay, communication key, etc. It supports packet length setting and can provide customized development services. The six modules in the figure below have the same power, different frequency bands and different packages.



Figure 1: E22-170T30S



Figure 2: E22-170T33S

1.2 Features

- Adopting the new generation of LoRa spread spectrum modulation technology, it brings a longer communication distance and stronger anti-interference ability;
- Support serial port firmware upgrade , which makes firmware update more convenient;
- Support AT commands, which makes it more convenient to use;
- Supports automatic relay networking, multi-level relay is suitable for ultra-long-distance communication, and multiple networks can run simultaneously in the same area;
- Supports users to set communication keys by themselves, which cannot be read, greatly improving the confidentiality of user data;
- Support LBT function, which monitors the channel environment noise before sending, and can greatly improve the communication success rate of the module in harsh environments;
- Support RSSI signal strength indication function, which is used to evaluate signal quality, improve communication network, and measure distance;
- Support wireless parameter configuration, remotely configure or read wireless module parameters by sending command data packets wirelessly;
- Supports wake-up on the air, an ultra-low power consumption feature suitable for battery-powered applications;
- Supports fixed-point transmission, broadcast transmission, and channel monitoring;
- Supports deep sleep, in which the power consumption of the whole device is about 2 uA;
- Under ideal conditions, the communication distance can reach 16 km;
- The parameters are saved when power is off, and the module will work according to the set parameters after power is

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

turned on again;

- Internal watchdog, automatically reset and resume work in unexpected situations;
- Supports wireless transmission rate of 2.4K~15.6Kbps (air rate) ;
- Supports 2.7 ~ 5.5V power supply, and the best performance can be guaranteed when the power supply is greater than 5 V;
- Industrial-grade standard design, supports long-term use at -40～+85℃;
- The module's maximum transmission power can reach 2 W (33 dBm), allowing for longer and more stable transmission.

1.3 Application Scenario

- Agricultural intelligent irrigation and environmental testing;
- Photovoltaic power station monitoring and distributed photovoltaic system management, etc.;
- Home security alarm and remote keyless entry;
- Wireless alarm security system ;
- Building automation solutions;
- Wireless industrial remote control;
- Healthcare products;
- Advanced Metering Infrastructure (AMI) .

Chapter 2 Specifications

2.1 RF parameters

RF parameters	Unit	Model		Remark
		E2 2 - 170T30 S	E2 2 - 170T33 S	
Maximum transmit power	dBm	30.0 ± 1	33.0 ± 1	-
Receiving sensitivity	dBm	-133 ～ -13 1	-134	Air rate is 2.4 kbps
Reference distance	m	10k	16k	Clear and open air, antenna gain 5dBi, antenna height 2.5 meters, air rate 2.4 kbps .
Working frequency band	MHz	15 0.125～ 173 .125MHz	15 0.125～ 173 .125MHz	Default frequency band 170.125MHz
Air speed	bps	2.4K～15.6K	2.4K～15.6K	User programmable control

2.2 Electrical parameters

Electrical parameters	Unit	Model		Remark
		E2 2 - 170T30 S	E2 2 - 170T33 S	
Operating voltage	V	2. 7～5.5	2. 7～5.5	≥ 5 V can guarantee the output power ,

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

					and exceeding 5.5 V may burn the module .
Communication level		V	3.3V	3.3V	Using 5V TTL may burn out
Power consumption	Emission current	mA	650	1200	E22-170T30S instantaneous power consumption @ 30 dBm E22-170T3 3 S instantaneous power consumption @ 33 dBm
	Receiving current	mA	14	14	
	Sleep current	uA	2	2	Software shutdown
Temperature	Operating temperature	℃	-40 ～ + 85	-40 ～ + 85	Industrial-grade design
	Storage temperature	℃	-40 ～ + 85	-40 ～ + 85	Industrial-grade design

2.3 Hardware Parameters

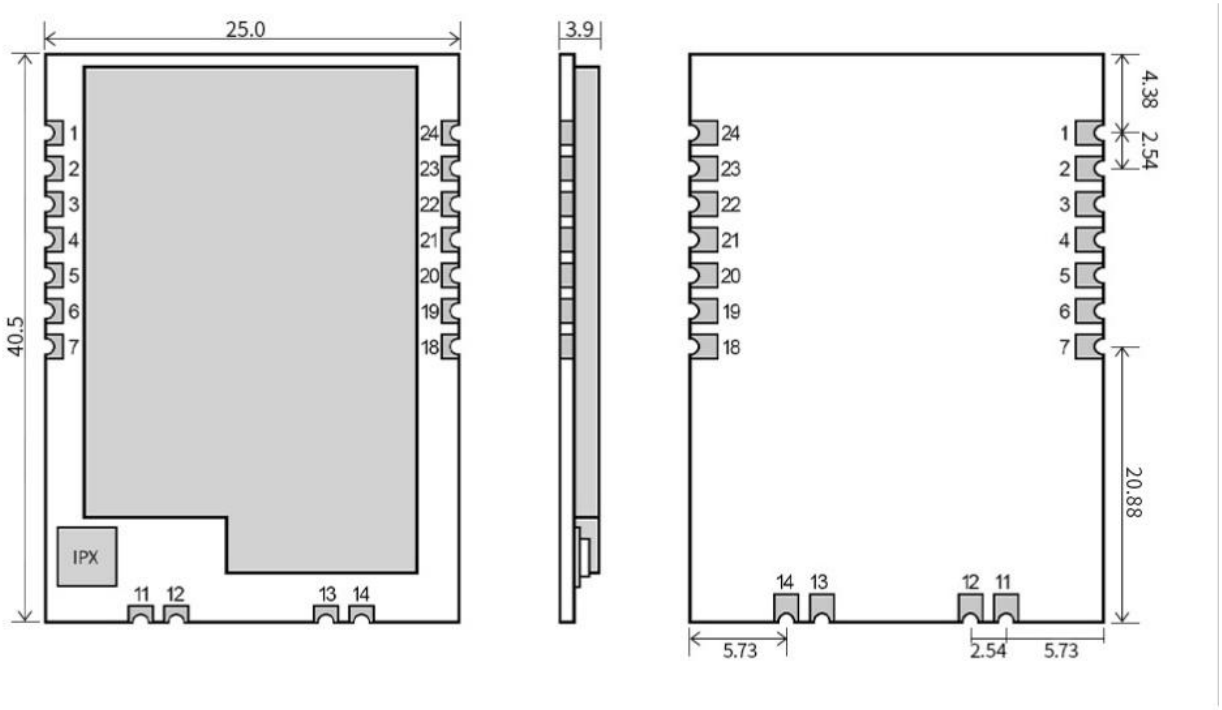
Hardware Parameters	**Model**		**Remark**
	E2 2 - 170T30 S	**E2 2 - 170T33 S**	
Crystal frequency	32MHz	32MHz	Industrial grade high precision crystal oscillator
Modulation	LoRa	LoRa	New generation LoRa modulation technology
Interface	1.27mm stamp hole	1.27mm stamp hole	
Communication interface	UART Serial Port	UART Serial Port	TTL level
Launch length	240 Byte	240 Byte	The command can be set to send packets of 32/64/128/240 bytes
Packaging	SMD	SMD	-
Cache capacity	1000 Bytes	1000 Bytes	-
Antenna interface	IPEX generation /stamp hole	IPEX generation /stamp hole	Equivalent impedance is about 50 Ω
size	40.5 * 25 mm	40.5 * 25 mm	±0.2mm
Product Net Weight	5.8g	5.8g	±0.2g

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

Chapter 3 Mechanical dimensions and pin definition

3.1 E22-170TxxS Mechanical Dimensions and Pin Definition



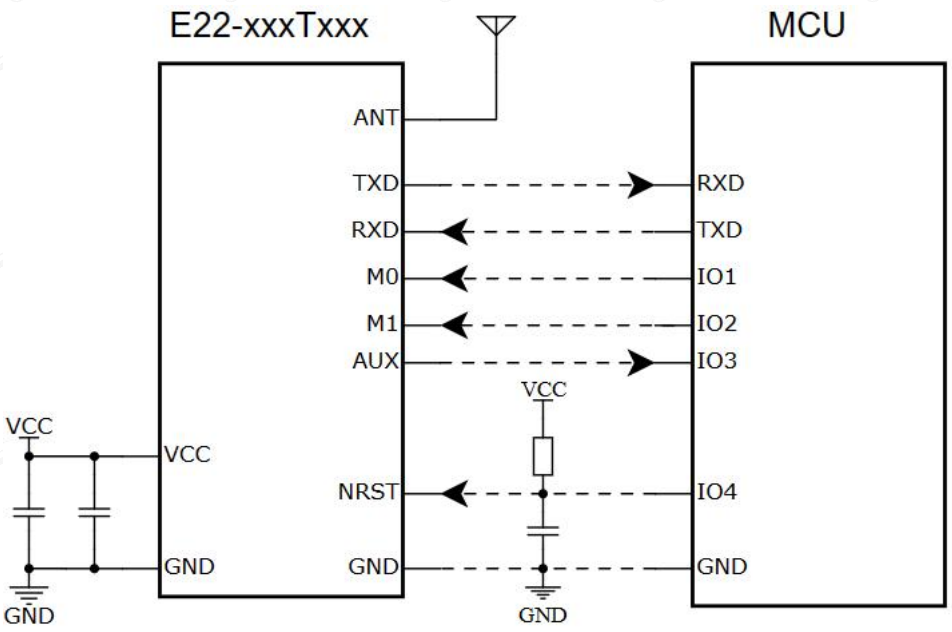
Pin number	Pin Name	Pin Direction	Pin Purpose
1	GND	Input	Module ground wire
2	VCC	Input	Module power positive reference, voltage range: 2.7 ~ 5.5V DC
3	AUX	Output	Used to indicate the working status of the module; when the user wakes up the external MCU and the module is just powered on to execute the boot program, the pin is in the pull-up input state. If it is not detected to be pulled down externally, it will immediately switch to output and normally indicate the working status of the module. During the self-test initialization, it outputs a low level (high level: module idle, low level: module busy).
4	TXD	Output	TTL Serial port output, connected to external RXD input pin;
5	RxD	Input	TTL Serial port input, connected to external TXD output pin;
6	M1	Input (very weak	Cooperate with M0 to determine the 4 working modes of the module (cannot

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

		pull-up)	be left floating , can be grounded if not used)
7	M0	Input (very weak pull-up)	Cooperate with M1 to determine the 4 working modes of the module (cannot be left floating , can be grounded if not used)
11	ANT	Output	Antenna interface (high frequency signal output, 50 ohm characteristic impedance)
12	GND	-	Fixed
13	GND	-	Fixed
14	GND	-	Fixed
18	NC	_	SWCLK
19	NC	_	SWDIO
20	NC	_	-
21	NC	_	-
22	RESET	Input	Module reset pin, low level trigger. It is recommended that customers use a microcontroller to connect to the module to reset and resume operation in unexpected situations.
23	GND	-	Fixed
24	NC	_	-

Chapter 4 Recommended Connection Diagram



Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

Serial number	Brief connection commands between the module and the MCU (the above figure takes the STM8L MCU as an example)
1	The wireless serial port module is TTL level, please connect it to the TTL level MCU.
2	~ 10K pull-up resistors to the TXD and AUX pins of the module .

Chapter 5 Functional Details

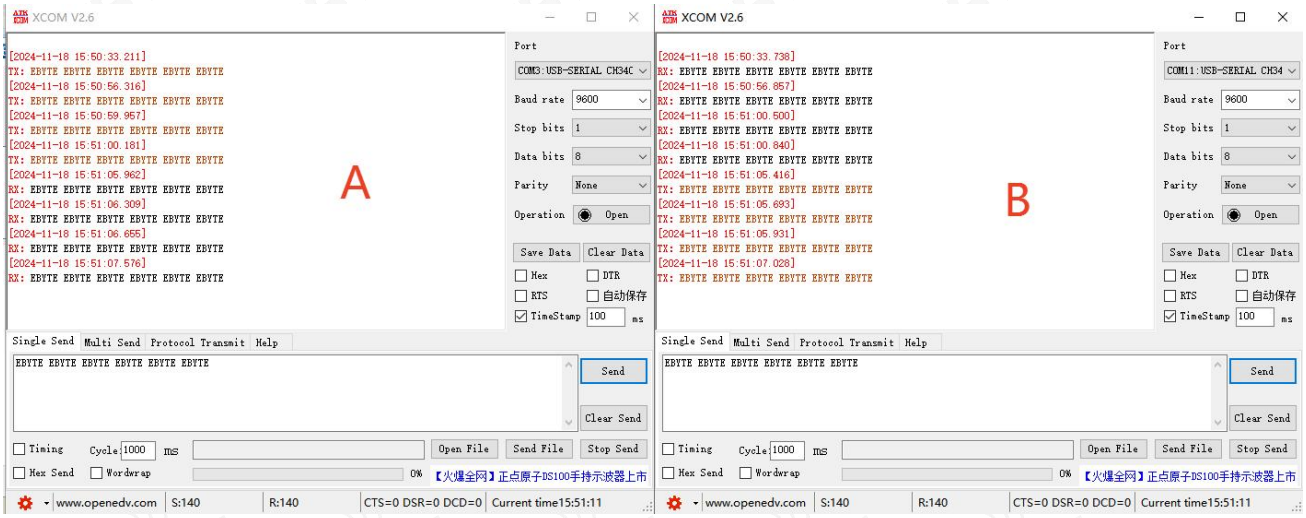
5.1 Working mode

The module has four working modes, which are set by pins M1 and M0 . The details are shown in the following table:

Mode (0-3)	M1	M0	Mode Introduction	Remark
0 Transfer Mode	0	0	Serial port open, wireless open, transparent transmission	Support special command air configuration
1 WOR mode	0	1	Can be defined as WOR sender and WOR receiver	Support air wake-up
2 Configuration Mode	1	0	Users can access the registers through the serial port to control the working status of the module	
3 Deep Sleep	1	1	The module enters sleep mode	

5.1.1 Transmission mode (M1, M0 pins are set to 0,0)

- **Transparent transmission function** : What you send is what you get. You can use the serial port assistant to communicate with each other (the factory default parameters are consistent, and the transmission method is transparent transmission). The example is as follows:

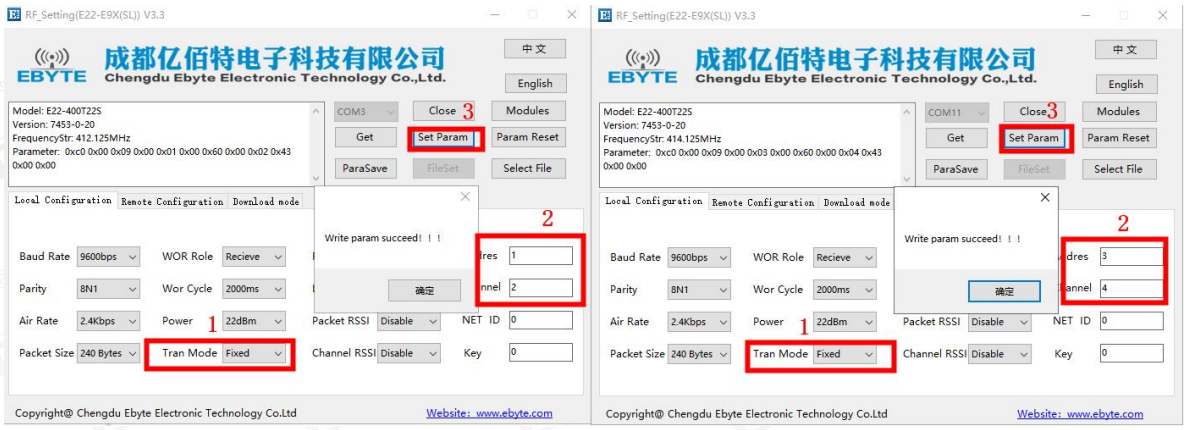
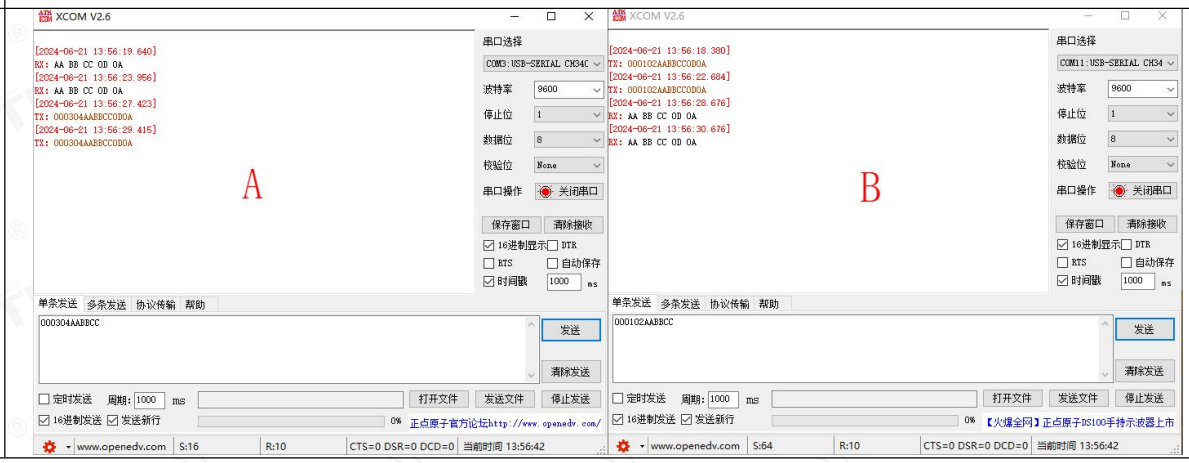


Schematic diagram

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

- **Fixed-point transmission function:** Send and receive data in a fixed data format, the format is: target address + target channel + data, effectively avoiding partial interference.

Serial number	Steps for using fixed-point launch
1. Modify the parameters of the module through the configuration software: modify the module address and channel under the configuration mode (M1, M0 pins are set to 1, 0) , change the transparent transmission mode to fixed-point transmission, and finally write the parameters to complete the modification .	
2. Change the module working mode to the general mode: edit the parameters of module A to 000304AABBCC and send it to module B. Similarly, the data sent by module B is 000102AABBCC. (The transmission data format in fixed-point mode is: target address + target channel + data)	

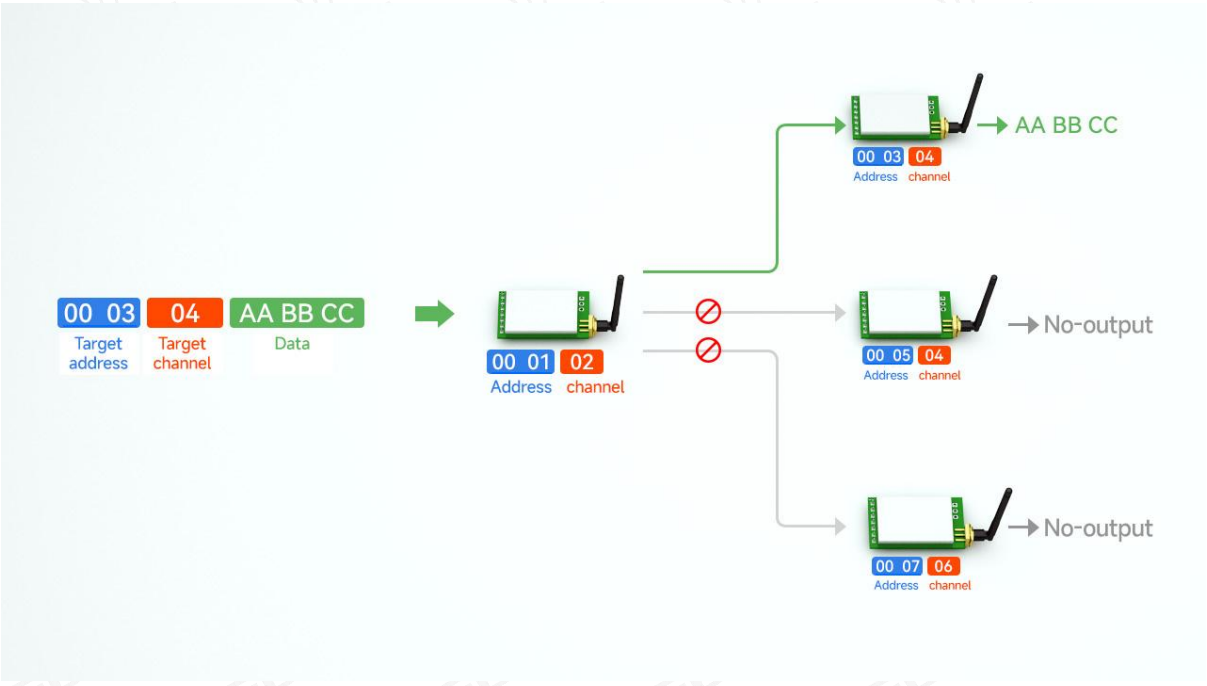


Figure 1 Schematic diagram of fixed-point transmission

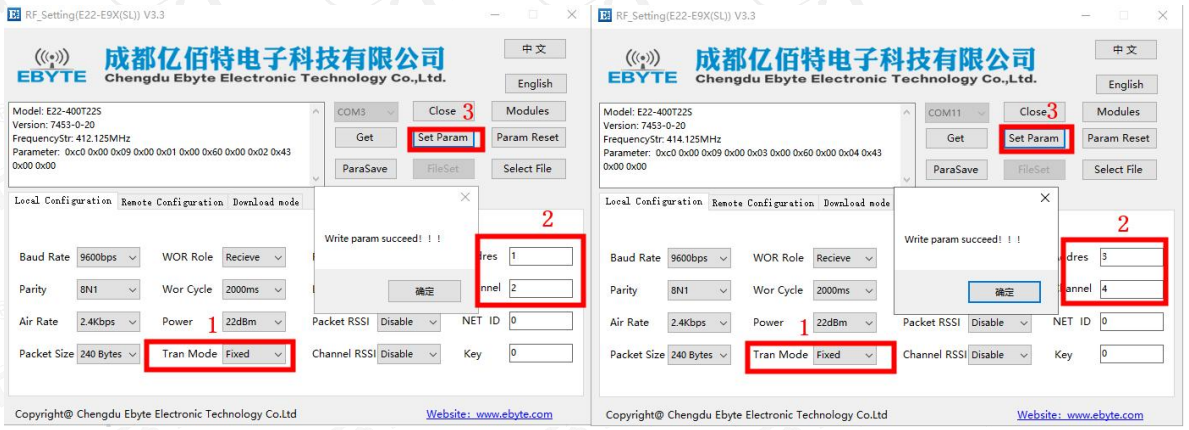
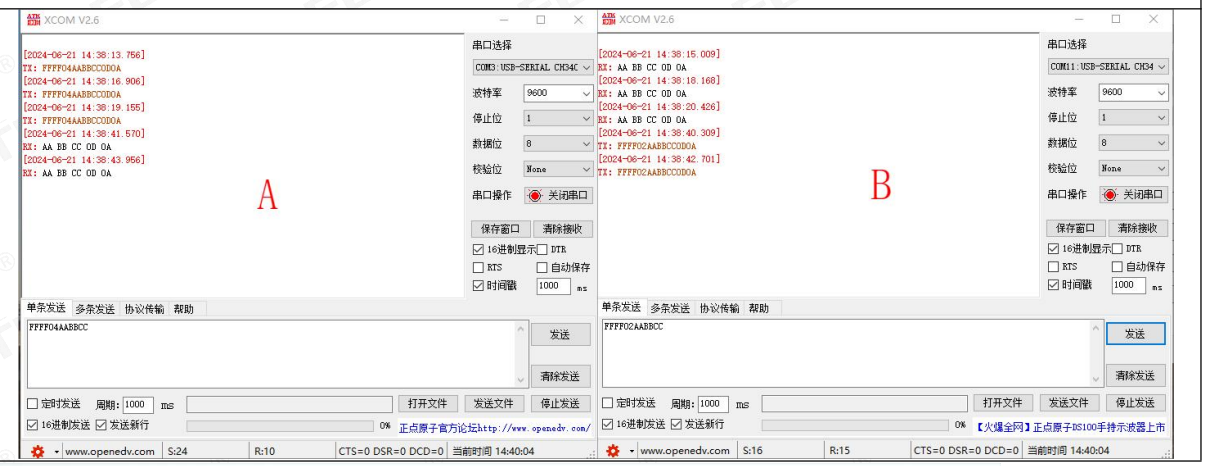
Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

- **Broadcasting function:**

1) Set the address of module A to 0xFFFF and set the channel to 0x04 . When module A is used as a transmitter (same mode, transparent transmission or fixed-point transmission), all receiving modules under the 0x04 channel can receive data, achieving the purpose of broadcasting.

2) Set the address of module A to 0xFFFF and set the channel to 0x04. When module A is used as a receiver, it can receive all the data under the 0x04 channel to achieve the purpose of monitoring.

Serial number	Steps for using fixed-point broadcast transmission
1. Modify the parameters of the module through the configuration software: modify the module address and channel in the configuration mode (M1, M0 pins are set to 1, 0) , change the transparent transmission mode to fixed-point transmission, and finally write the parameters to complete the modification .	
2. Change the module working mode to the general mode: edit the parameters of module A to FFFF04AABBCC and send it to module B. Similarly, the data sent by module B is FFFF02AABBCC. (The data transmission format in fixed-point broadcast mode is: broadcast address + target channel + data)	

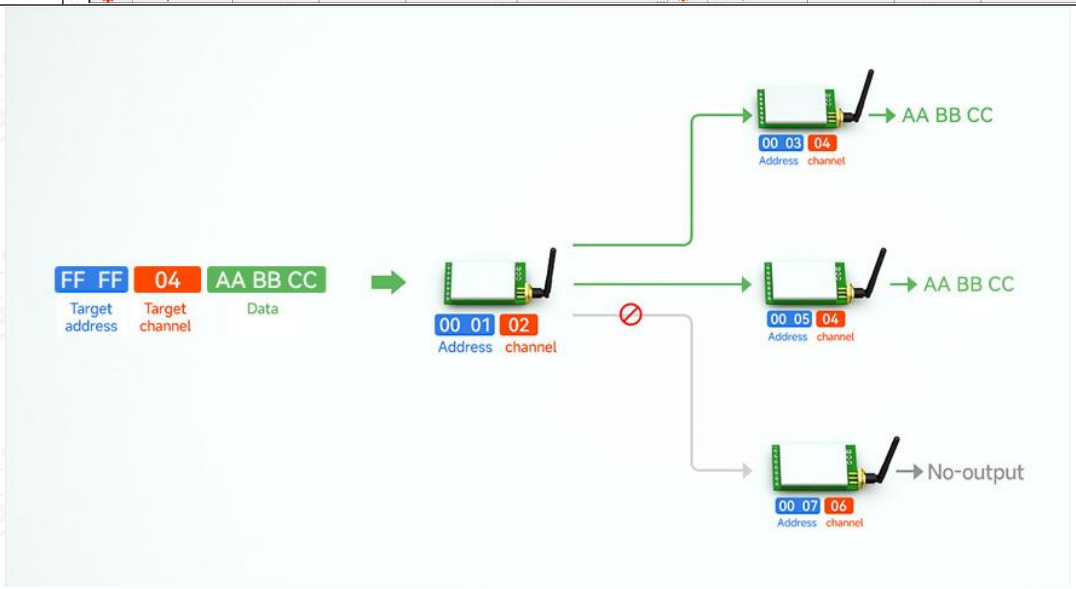


Figure 2 Schematic diagram of fixed-point broadcast transmission

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

- **Relay networking mode:** Relay networking forwards data between source nodes and target nodes through relay nodes, thereby expanding network coverage and improving communication reliability.

Serial number	Relay Mode Description
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 module addresses, but are forwarded and paired with NETID respectively. If a signal is received from one network, it will be forwarded to the other network . The repeater's own network ID is invalid.
3	In the relay mode, the relay module cannot send and receive data and cannot perform low-power operation.
4	When the user enters other modes from mode 3 (sleep mode) or during the reset process, the module will reset the user parameters, during which AUX outputs a low level.

Relay networking rules:

1、Forwarding rules, the relay can forward data bidirectionally between two NETIDs.

2、In relay mode, ADDH\ADDL is no longer used as the module address, but as NETID for forwarding pairing.

As shown in the figure:

①First -level relay

"Node 1" NETID is 08.

"Node 2" NETID is 33.

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

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

At the same time, the addresses of node 1 and node 2 are the same, so the data sent by node 1 can be received by node 2.

② Secondary relay

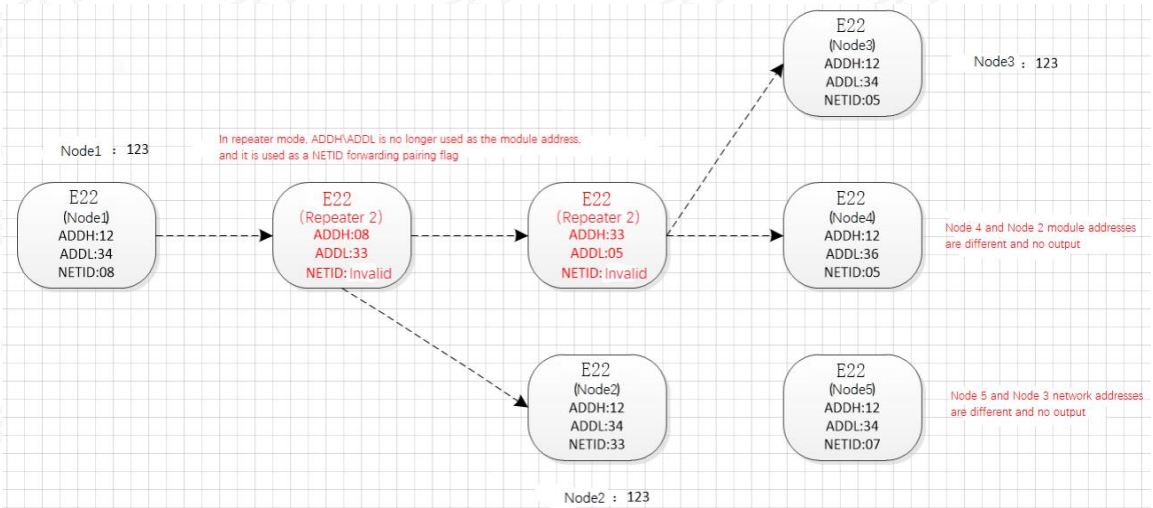
The ADDH\ADDL of relay 2 are 33, 05 respectively.

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

Therefore, nodes 3 and 4 can receive data from node 1. Node 4 outputs data normally, but node 3 does not output data because its address is different from that of node 1.

③Two -way relay

As shown in the configuration figure: the data sent by node 1 can be received by nodes 2 and 4, and the data sent by nodes 2 and 4 can also be received by node 1.

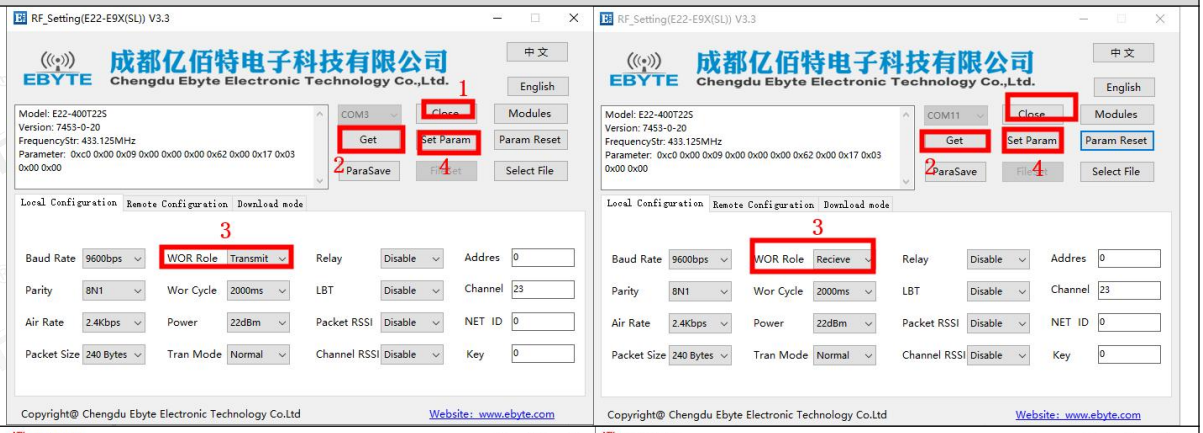
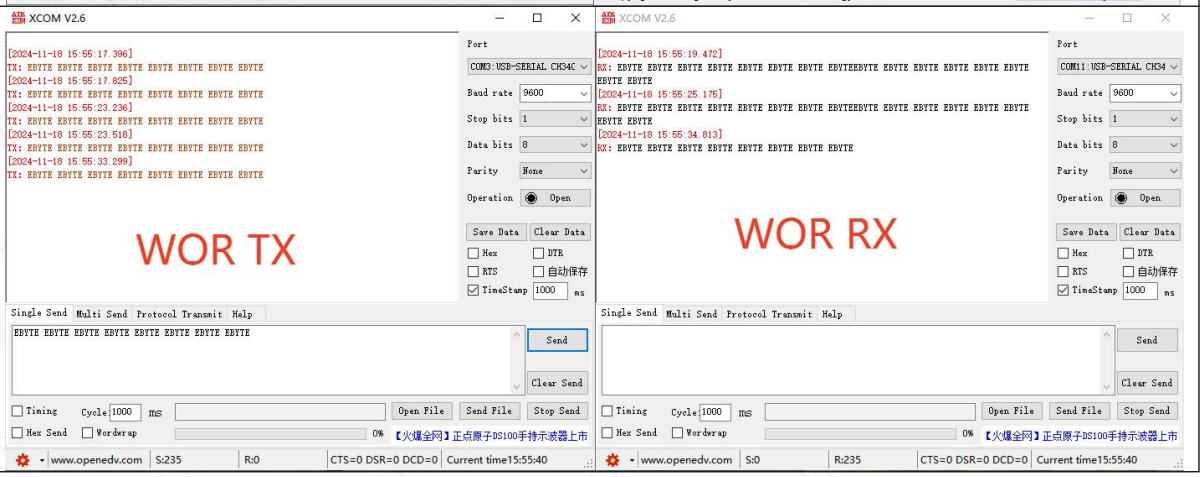


Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

Figure 3 Example of relay mode

5.1.2 WOR mode use (M1, M0 pins set to 0,1)

Serial number	Steps to use WOR mode
1. Modify the parameters of the module through the configuration software: modify the module WOR role in the configuration mode (M1, M0 pins are set to 1, 0), and write the parameters to complete the modification .	
2. The module working mode is changed to WOR mode (M1, M0 pins are set to 0, 1): The WOR receiver module sends data to the WOR receiver module, but the WOR receiver module cannot send data to the sender.	

5.1.3Configuration mode use (M1, M0 pins set to 1, 0)

1) The following figure shows the display interface of the module software configuration. Users can switch to command mode through M0 and M1 to quickly configure and read parameters on the software tool.

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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



2) In the configuration software, the module address, frequency channel, network ID, and key are all displayed in decimal mode; the value range of each parameter is:

Network address: 0-65535

Frequency channel: 0～ 92

Network ID: 0-255

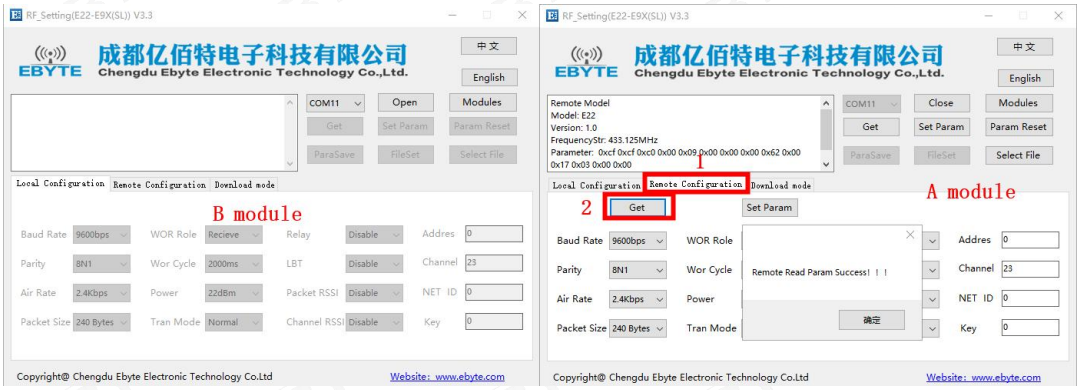
Key: 0-65535

3) When users use the software to configure the relay mode, they need to pay special attention to the fact that since the parameters in the software tool are displayed in decimal mode, the module address and network ID need to be converted when filling in the decimal system.

If the network ID input by the transmitter A is 02 and the network ID input by the receiver B is 10, when the relay R sets the module address, the hexadecimal value 0X020A is converted to the decimal value 522 as the module address filled in by the relay R;

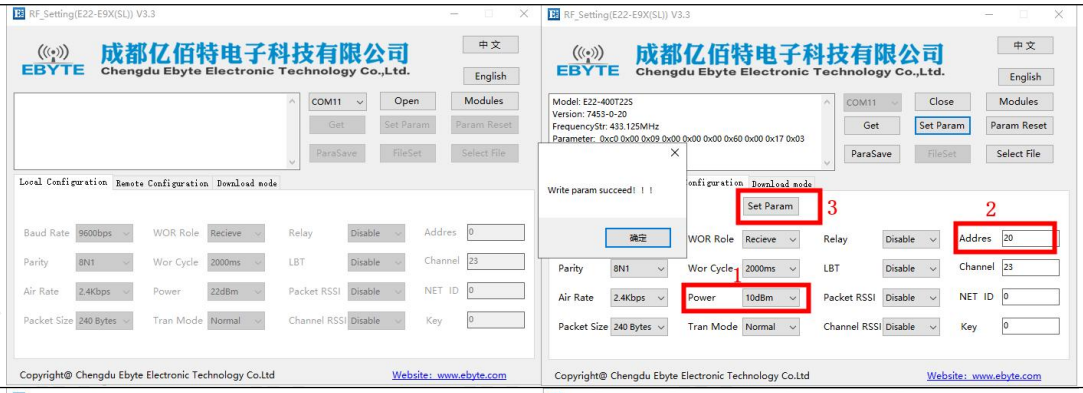
That is, the module address value that needs to be filled in at the relay end R is 522.

- **Use of the Over-the-Air Configuration Function**

Serial number	Over-the-air configuration steps
1. Remotely read and modify the module parameters through the configuration software: Module A and module B must have the same parameters to perform remote configuration . The example is shown in the right figure: Module A is in configuration mode, and module B is in general mode. Module A can use the configuration software to open remote configuration and read parameters.	

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

2. Remote parameter modification and parameter writing.	
3. Switch module B to configuration mode to view the modified parameters.	

5.1.3 Sleep mode use (M1, M0 pins set to 1,1)

- **To enter sleep mode, just set the M1 and M0 pins to 1, 1.**

5.2 Module reset

- the module is reset , AUX will output a low level, perform hardware self-test, and set the working mode according to user parameters;

  During this process, AUX maintains a low level. After completion, AUX outputs a high level and starts working normally according to the working mode composed of M1 and M0.

  Therefore, the user needs to wait for the AUX rising edge as the starting point for the module to work normally.

5. 3 AUX Detailed Explanation

5.3.1 Power-on start indication

1) After power-on, the entire startup process (entering the mode working state) takes about 16ms
2) power-on and VCC is established, AUX does not immediately indicate a busy state (low level) because the internal microcontroller also requires a certain amount of startup time.

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

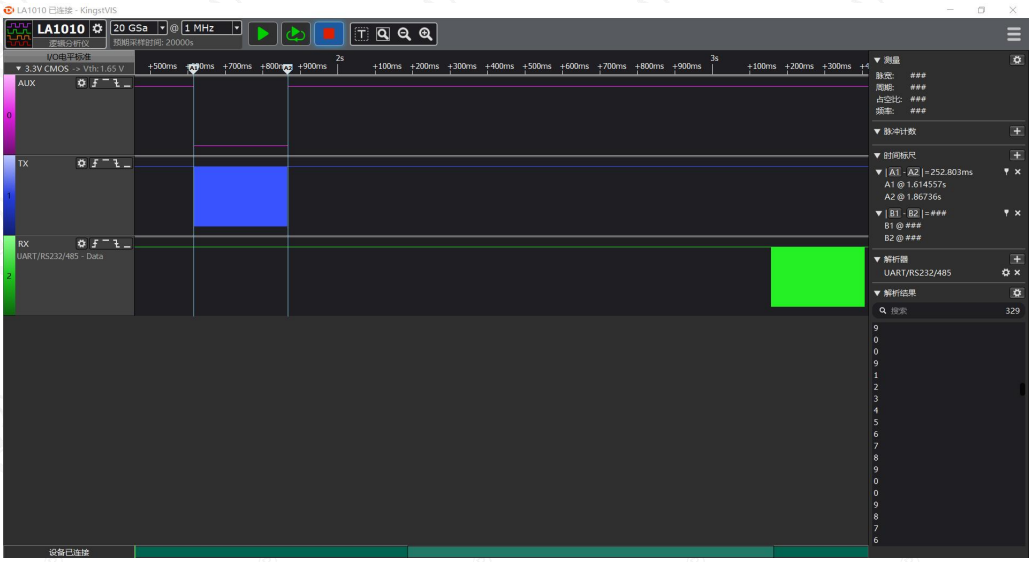
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



Figure 4 Power-on startup timing diagram

5.3.2 Serial port data output indication

1) When the receiving module receives a wireless data packet, it will indicate a busy state (low level) through the AUX pin before giving data on the wired serial port;
2) Used to wake up the external MCU in sleep mode;



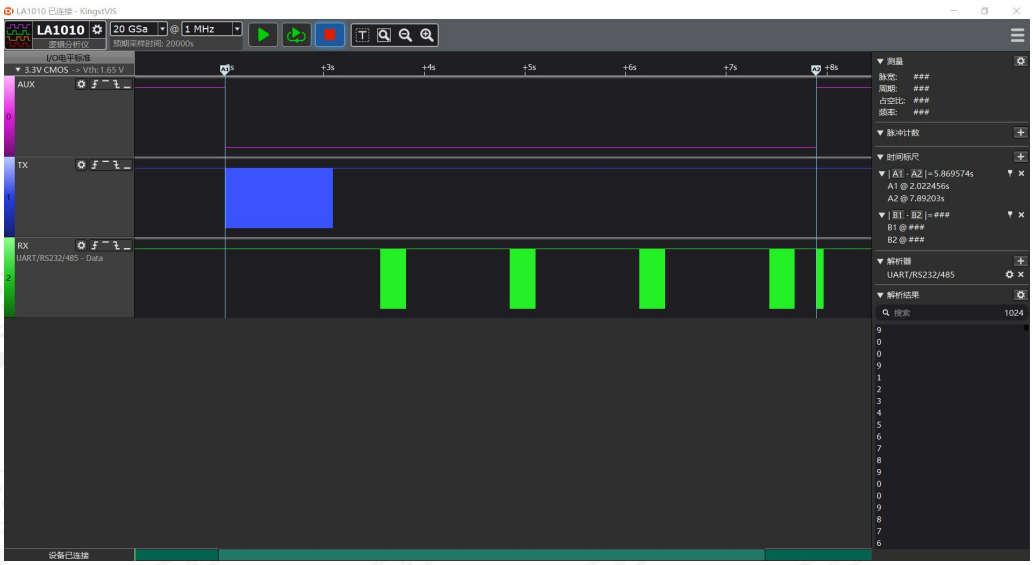
AUX timing diagram when the module serial port sends data

5.3.3 Wireless transmission indicator (only for E22-170T33S)

1) When the module is in idle state (not in sleep mode), if the user inputs data to the module, the module will start to indicate busy state (low level) only after the first byte of the serial data packet is recognized and received by the module. There is a one-byte delay difference depending on the serial port baud rate, and the user program needs to pay attention to the AUX detection logic.
2) Buffer empty: data in the internal 1000-byte buffer are all written to the wireless chip (automatically divided into packets) ;
When AUX=1, the user can continuously send data less than 1000 bytes without overflow ;
When AUX=0, the buffer is not empty: the data in the internal 1000-byte buffer has not been fully written to the wireless chip and the transmission has not yet started. At this time, the module may have timed out waiting for the end of user data, or is transmitting wireless packets .

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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



AUX timing diagram when the module receives serial port data

5.3.4 Switching Mode

When the module switches between all modes, AUX will indicate busy status. The specific time is as follows:

Original working mode	Switching Mode	E22-XXXTXXX switching time (ms)
Sleep Mode	Transparent transmission mode	9-11
	WOR Mode	9-11
	Configuration Mode	9-11
Transparent mode	Sleep Mode	9-11
	WOR Mode	9-11
	Configuration Mode	9-11
Configuration Mode	Sleep Mode	9-11
	Transparent transmission mode	9-11
	WOR Mode	9-11
WOR Mode	Sleep Mode	9-11
	Transparent transmission mode	9-11
	Configuration Mode	9-11

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

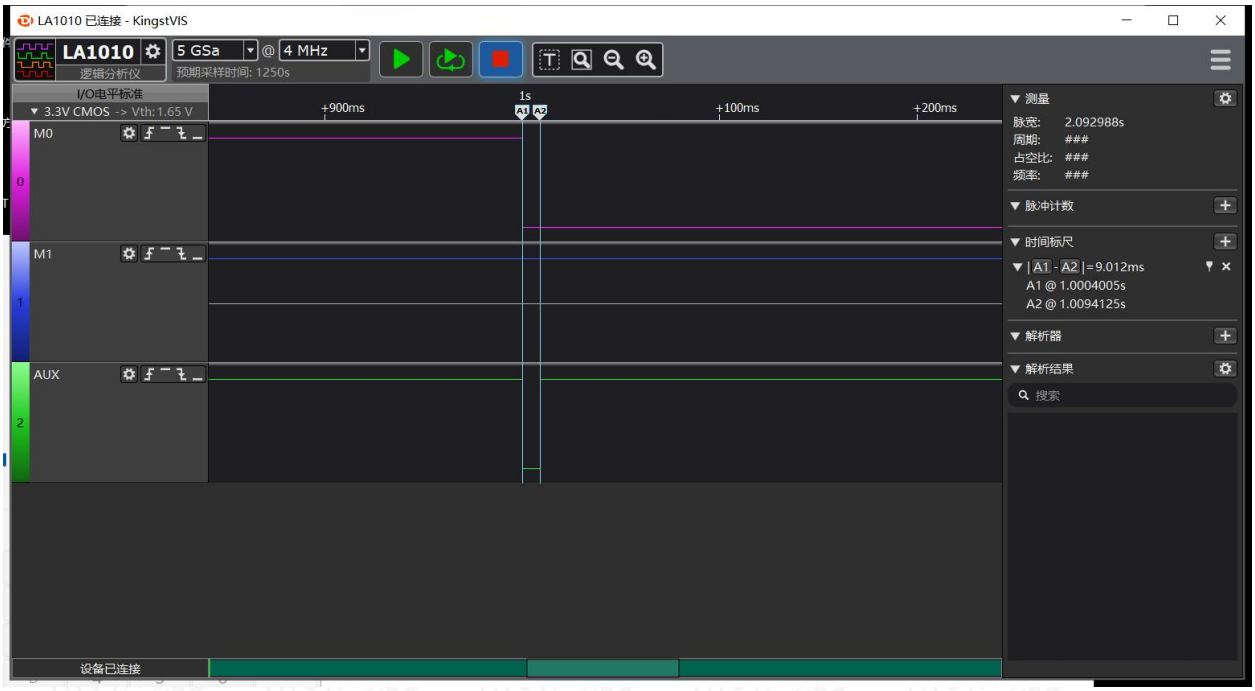


Figure 5 Mode switching timing diagram

5.3.4 Notes

Serial number	AUX Notes
1	For the above functions 1 and 2, the output low level is given priority, that is, if any output low level condition is met, AUX will output low level; When all low-level conditions are not met, AUX outputs a high level.
2	When AUX outputs a low level, it means the module is busy and no working mode detection will be performed at this time; When the module AUX outputs a high level within 1ms, the mode switching will be completed.
3	After the user switches to a new working mode, the module will not actually enter this mode until at least 2ms after the AUX rising edge. If AUX is always at a high level, the mode switch will take effect immediately.
4	When the user enters other modes from mode 3 (sleep mode) or during the reset process, the module will reset the user parameters, during which AUX outputs a low level.
5	Due to the characteristics of LoRa modulation, the information transmission delay is much longer than FSK.

Chapter 6 Register Read and Write Control

6.1 Commands format

Configuration mode (mode 2: M1=1, M0=0), the supported command list is as follows (**when setting, only 9600, 8N1 format is supported**):

Serial number	Command Format	Detailed description

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

1	Setting Registers	Command: C0+starting address+length+parameter Response: C1+starting address+length+parameters Example 1: Configure the channel to 0x09 Command start address length parameter Send: C0 05 01 09 Return: C1 05 01 09 Example 2: Configure the module address (0x1234), network address (0x00), serial port (9600 8N1), and speed (1.2K) at the same time Send: C0 00 04 12 34 00 61 Return: C1 00 04 12 34 00 61
2	Read Register	Command: C1+starting address+length Response: C1+starting address+length+parameters Example 1: Reading a channel Command start address length parameter Send: C1 05 01 Return: C1 05 01 09 Example 2: Read module address, network address, serial port, and airspeed simultaneously Send: C1 00 04 Return: C1 00 04 12 34 00 61
3	Setting up temporary registers	Command: C2 + starting address + length + parameter Response: C1 + start address + length + parameter Example 1: Configure the channel to 0x09 Command start address length parameter Send: C2 05 01 09 Return: C1 05 01 09 Example 2: Configure the module address (0x1234), network address (0x00), serial port (9600 8N1), and speed (1.2K) at the same time Send: C2 00 04 12 34 00 61 Return: C1 00 04 12 34 00 61
4	Wireless Configuration	Command: CF CF + regular command Response: CF CF + normal response Example 1: The 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 simultaneous configuration module address (0x1234), network address (0x00), serial port (9600 8N1), airspeed (1.2K) Send: CF CF C0 00 04 12 34 00 61 Return: CF CF C1 00 04 12 34 00 61
5	Format Error	Format Error Response FF FF FF

6.2 Register Description

Serial number	Read and Write	Name	Description	Remark
00H	Read/ Write	ADDH	ADDH (default 0)	Module address high byte and low byte ; Note: When the module address is equal to FFFF, it can be used as a broadcast and monitoring address, that is, the module will not perform
01H	Read/ Write	ADDL	ADDL (default 0)	

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

<table>
<tr><td></td><td></td><td></td><td colspan="4"></td><td>address filtering at this time</td></tr>
<tr><td>02H</td><td>Read/ Write</td><td>NETID</td><td colspan="4">NETID (default 0)</td><td>Network address, used to distinguish networks ; When communicating with each other, they should be set to the same.</td></tr>
<tr><td rowspan="20">0 3H</td><td rowspan="20">Read/ Write</td><td rowspan="20">EG0</td><td>7</td><td>6</td><td>5</td><td>UART serial port rate (bps)</td><td rowspan="9">The two modules that communicate with each other can have different serial port baud rates and verification methods ;
When transmitting large data packets continuously, users need to consider data blocking or even data loss caused by the same baud rate ;
It is generally recommended that both parties in communication have the same baud rate.</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>The serial port baud rate is 1200</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>The serial port baud rate is 2400</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>The serial port baud rate is 4800</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>The serial port baud rate is 9600 (default)</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>The serial port baud rate is 19200</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>The serial port baud rate is 38400</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>The serial port baud rate is 57600</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>The serial port baud rate is 115200</td></tr>
<tr><td>4</td><td>3</td><td colspan="2">Serial port check digit</td><td rowspan="5">The serial port modes of the two communicating parties can be different ;</td></tr>
<tr><td>0</td><td>0</td><td colspan="2">8 N1 (default)</td></tr>
<tr><td>0</td><td>1</td><td colspan="2">8 O1</td></tr>
<tr><td>1</td><td>0</td><td colspan="2">8 E1</td></tr>
<tr><td>1</td><td>1</td><td colspan="2">8 N1 (equivalent to 0 0)</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">1</td><td rowspan="2">0</td><td>Wireless air rate (bps)</td><td rowspan="10">The air rate of both communicating parties must be the same ;
air rate, the smaller the delay and the shorter the transmission distance.</td></tr>
<tr><td>E22- 17 0T30S & E22- 17 0T3 3S</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>Air speed 2.4k</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>Air speed 2.4k</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>Air speed 2.4k</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>Air rate 2.4k (default)</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>Air speed 4.8k</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>Air speed 9.6k</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>Air speed 15.6 k</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>Air speed 15.6 k</td></tr>
<tr><td rowspan="9">0 4H</td><td rowspan="9">Read/ Write</td><td rowspan="9">REG1</td><td>7</td><td>6</td><td colspan="2">Subcontracting settings</td><td rowspan="5">The data sent by the user is smaller than the packet length, and the serial port output at the receiving end appears as uninterrupted continuous output ;
If the data sent by the user is larger than the packet length, the receiving serial port will output it in packets.</td></tr>
<tr><td>0</td><td>0</td><td colspan="2">2 40 bytes (default)</td></tr>
<tr><td>0</td><td>1</td><td colspan="2">1 28 bytes</td></tr>
<tr><td>1</td><td>0</td><td colspan="2">6 4 bytes</td></tr>
<tr><td>1</td><td>1</td><td colspan="2">3 2 bytes</td></tr>
<tr><td>5</td><td colspan="3">RSSI Ambient Noise Enable</td><td rowspan="3">After enabling, you can send commands C0 C1 C2 C3 in transfer mode or WOR send mode to read registers ;
Register 0x00: Current ambient noise RSSI ;
Register 0X01: RSSI when receiving data last</td></tr>
<tr><td>0</td><td colspan="3">Disabled (default)</td></tr>
<tr><td>1</td><td colspan="3">Enable</td></tr>
</table>

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

					time (The current environmental noise is: dBm = -(256 - RSSI)) ; Command format: C0 C1 C2 C3 + starting address + read length ; Return: C1 + address + read length + read valid value; such as: send C0 C1 C2 C3 00 01 Return C1 00 01 RSSI **(address can only start from 00)**
			4	3 reserve	
			2	Software mode switching	**E22-170T33S does not support this function. Only E22-170T30S is applicable to this function.** **If you use EBYTE configuration software to configure the parameters, this bit will be automatically turned off.** If you do not want to use the M0 M1 pins to switch the working mode, you can To enable this function, use specific serial port commands to switch modes. Format: C0 C1 C2 C3 02 + working mode Send C0 C1 C2 C3 02 00 to switch to transparent transmission mode Send C0 C1 C2 C3 02 01 to switch to WOR mode Send C0 C1 C2 C3 02 02 to switch to configuration mode Send C0 C1 C2 C3 02 03 to switch to sleep mode Return: C1 C2 C3 02 + working mode Note: After enabling this function, the configuration mode still supports 9600 baud rate.
			0	Disabled (default)	
			1	Enable	
			1	0 Transmit power	The relationship between power and current is nonlinear. When the power is at maximum, the power efficiency is the highest . The current does not decrease in the same proportion as the power decreases.
			0	0 30 dB m /33 dB m (default)	
			0	1 27dBm / 30dBm	
			1	0 24dBm / 27dBm	
			1	1 21dBm / 24dBm	
0 5H	Read/ Write	REG2	Channel control (CH) 0-92 represent a total of 93 channels		Actual frequency = 17 0.125 ± CH *0.25M
0 6H	Read/ Write	REG3	7	Enable RSSI Byte	After enabling, the module receives wireless data and outputs it through the serial port TXD, followed by an RSSI strength byte. The current data packet RSSI is: dBm = -(256 - RSSI)
			0	Disabled (default)	
			1	Enable	
			6	Transmission method	During fixed-point transmission, the module will recognize the first three bytes of the serial port data as: address high + address low + channel, and use it as the wireless transmission target.
			0	Transparent transmission (default)	
			1	Fixed-point transmission	
			5	Relay function	After the relay function is enabled, if the destination address is not the module itself, the module will initiate a forwarding ; In order to prevent data from being transmitted back, it is recommended to use it in conjunction with the fixed-point mode ; that is, the target
			0	Disable relay functionality (default)	
			1	Enable relay function	

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

<table>
<tr><td rowspan="15"></td><td rowspan="15"></td><td rowspan="15"></td><td colspan="4"></td><td>address and source address are different.</td></tr>
<tr><td colspan="4">4 L BT Enable</td><td rowspan="3">When enabled, wireless data will be monitored before transmission, which can avoid interference to a certain extent, but may cause data delays ;

The maximum stay time of LBT is 2 seconds, and it will be forcibly issued after two seconds.</td></tr>
<tr><td colspan="4">0 Disabled (default)</td></tr>
<tr><td colspan="4">1 Enable</td></tr>
<tr><td colspan="4">3 WOR mode transceiver control</td><td rowspan="3">Only valid for mode 1;
1. In the receiving mode of wor, the module can modify the delay time after wake-up, the default time is 0;
2. The receiving end needs to send the command C0 09 02 03 E8 in the configuration mode (C0 is the write command, 09 is the register start address, 02 is the length, 03 E8 is the set delay, the maximum FFFF is 65535ms, and setting it to 0 turns off the wake-up delay.)
3. Data can be sent within the delay</td></tr>
<tr><td colspan="4">0 W OR Receiver (Default)
Working in WOR monitoring mode, the monitoring cycle is shown below (WOR cycle), which can save a lot of power consumption.</td></tr>
<tr><td colspan="4">1 W OR transmitter
The module is turned on for transmission and reception, and a wake-up code is added for a certain period of time when transmitting data.</td></tr>
<tr><td>2</td><td>1</td><td>0</td><td>W OR Cycle</td><td rowspan="9">Only valid for mode 1;

Period T = (1+WOR) *500ms , maximum 4000ms , minimum 500ms ;

The longer the WOR monitoring interval is, the lower the average power consumption is, but the greater the data delay is;

The sender and receiver must be consistent (very important)</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>500 ms</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1000 ms</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1500 ms</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>2000 ms</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>2500 ms</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>3000 ms</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>3500 ms</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>4000 ms</td></tr>
<tr><td>0 7H</td><td>Write</td><td>CRYPT _H</td><td colspan="4">Key high byte (default 0)</td><td rowspan="2">Write only, read returns 0 ;
Used for encryption to prevent wireless data from being intercepted by similar modules ;
The module will use these two bytes as calculation factors to transform and encrypt the wireless signal in the air.</td></tr>
<tr><td>0 8H</td><td>Write</td><td>CRYPT _L</td><td colspan="4">Key low byte (default 0)</td></tr>
<tr><td>8 0H ～8 6H</td><td>read</td><td>PID</td><td colspan="4">Product information 7 bytes</td><td>Product information 7 bytes
Note: Please refer to section 7.1 for more convenient query command AT+DEVTYPE=?</td></tr>
</table>

6.3 Factory default parameters

Model	**Factory default parameter value: C0 00 09 00 00 00 6 3 00 50 03 00 00**						
Module Model	Frequency	Address	Channel	Air speed	Baud rate	Serial port format	Transmit power
E22-170T30S	17 0.125MHz	0x0000	0x 50	2.4kbps	9600	8N1	30 dBm
E22-170T33S	17 0.125MHz	0x0000	0x 50	2.4kbps	9600	8N1	33 dBm

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

Chapter 7 AT Commands

- Parameter configuration or query using AT commands needs to be performed in configuration mode;
- AT commands are used in configuration mode. AT commands are divided into three categories: command commands, setting commands and query commands;
- Users can query the AT command set supported by the module through "AT+HELP=?". The baud rate used by AT commands is 9600 8N1.
- When the input parameters exceed the range, they will be restricted. Please do not let the parameters exceed the range to avoid unknown situations.
- E22-170T33S does not support AT commands. This function is only available for E22-170T30S.

7.1 AT command table

7.1.1Command

Command	Description	Example	Example Description
AT+IAP (Use with caution, see 7.3 Notes on Serial Port Firmware Upgrade for details)	Enter IAP upgrade mode	AT+IAP	Enter IAP upgrade mode
AT+RESET	Device restart	AT+RESET	Device restart
AT+DEFAULT	Configuration parameters restored to default And the device restarts	AT+DEFAULT	Configuration parameters restored to default And the device restarts

7.1.2Setting Commands

Setting Commands	Description	Example	Example Description
AT+UART=baud,parity	Set baud rate and parity	AT+UART=3,0	Set the baud rate to 9600, 8N1
AT+RATE=rate	Set air speed	AT+RATE=7	Set the air rate to 15.6K
AT+PACKET=packet	Set packet length	AT+PACKET=0	Set the packet size to 240 bytes
AT+WOR=role	Setting WOR Roles	AT+WOR=0	Set to WOR reception
AT+WTIME=wtime	Setting the WOR period	AT+WTIME=0	Set the WOR period to 500ms
AT+POWER=power	Set the transmit power	AT+POWER=0	Set the transmit power to 30dBm / 3 3 dBm
AT+TRANS=trans	Set the delivery method	AT+TRANS=1	Set to fixed point mode
AT+ROUTER=router	Set Repeater Mode	AT+ROUTER=1	Set to Repeater Mode
AT+LBT=lbt	Set the Listen Before Talk function switch	AT+LBT=1	Set to on, refer to Section 6.2 LBT Enable for details
AT+LBR=lrssi,ltime	Set the LBT function RSSI judgment threshold and maximum waiting time	AT+LBR=-60,2000	Set the detection threshold to -60dBm and the maximum delay time to 2 seconds
AT+ERSSI=erssi	Setting the ambient noise	AT+ERSSI=1	Set to on, refer to Section 6.2

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

	RSSI switch		RSSI Environment Noise Function for details
AT+DRSSI=data_rssi	Set the RSSI switch for receiving data	AT+DRSSI=1	Receive data RSSI function is enabled
AT+ADDR=addr	Set module address	AT+ADDR=1234	Set the module address to 1234
AT+CHANNEL=channel	Set the module working channel	AT+CHANNEL=80	Set the channel to 80
AT+NETID=netid	Set Network ID	AT+NETID=2	Set the network ID to 2
AT+KEY=key	Set module key	AT+KEY=1234	Set the module key to 1234
AT+DELAY=delay	Set WOR delay sleep time	AT+DELAY=1000	Set the WOR delay sleep time to 1000ms
AT+SWITCH=switch	Set software switching mode switch	AT+SWITCH=1	Set to enable, allowing software switching ; Set to enable in configuration mode, allowing software switching
AT+MODE=mode	Switch working mode	AT+MODE=0	Switch to transparent mode
AT+UAUX=uaux	Set AUX indication mode	AT+UAUX=0	Switch to serial port buffer status indication mode

7.1.3Query command

Query command	Description	Return to example	Example Description
AT+HELP=?	Query AT command table		Return to AT command table
AT+DEVTYPE=?	Query module model	DEVTYPE=E22-170T30S/33S	Return module model
AT+FWCODE=?	Query firmware code	FWCODE=7453-0-21	Returns the firmware version
AT+UART=?	Query baud rate and checksum	AT+UART=3,0	The return baud rate is 9600, 8N1
AT+RATE=?	Query air speed	AT+RATE=7	The return air speed is 15.6K
AT+PACKET=?	Query packet length	AT+PACKET=0	The return packet is 240 bytes
AT+WOR=?	Query WOR roles	AT+WOR=0	Return to WOR Receive
AT+POWER=?	Query the transmit power	AT+POWER=0	Return transmit power is 30dBm/33dBm
AT+TRANS=?	Query sending mode	AT+TRANS=1	Return to fixed-point mode
AT+ROUTER=?	Query relay mode	AT+ROUTER=1	Return to relay mode
AT+LBT=?	Query the Listen Before Talk function switch	AT+LBT=1	Returns the LBT switch status
AT+LBR=?	Query LBT judgment parameters	AT+LBR=-55,2000	Return judgment parameters
AT+ERSSI=?	Query the ambient noise RSSI switch	AT+ERSSI=1	Returns the ambient noise on/off status

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

AT+DRSSI=?	Query RSSI output	AT+DRSSI=1	Return channel RSSI function is enabled
AT+ADDR=?	Query module address	AT+ADDR=1234	The returned module address is 1234
AT+CHANNEL=?	Query module working channel	AT+CHANNEL= 80	The return frequency is 170.125M
AT+NETID=?	Query Network ID	AT+NETID=2	The returned network ID is 2
AT+KEY=?	Query module key	Reading is not supported (for security reasons)	Return ERR
AT+DELAY=?	Query WOR delayed sleep time	AT+DELAY=1000	Return WOR delay sleep time is 1000ms
AT+SWITCH=?	Query software switching mode switch	AT+SWITCH=0	Software switch mode off
AT+MODE=?	Query the current working mode (can be queried in all modes)	AT+MODE=0	Returns the current transparent mode

7.2AT parameter analysis

When the serial port receives the correct command, the serial port will return "Command = OK", otherwise it will return "=ERR"

Command parameters	Parameter meaning
Baud (serial port baud rate)	0:1200 1:2400 2:4800 3:9600 4:19200 5:38400 6:57600 7:115200
Parity (serial port check bit)	0:8N1 1:8O1 2:8E1 3:8N1
Rate	0:2.4K 1:2.4K 2:2.4K 3: 2.4K 4: 4.8K 5: 9.6K 6: 15.6 K 7:15.6K
Packet (packet length)	0:240 1:128 2:64 3:32
Role(WOR role)	0: Receive 1: Send
Period/WTIME (WOR period)	0: 500 ms 1:10 00 ms 2:1 500 ms 3: 20 00 ms 4:2 500 ms 5: 30 00 ms 6:3 500 ms 7: 4000ms
Power (transmit power)	0: 30dBm / 3 3dBm 1:27dBm/ 30dBm 2: 24 dBm/ 27 dBm 3: 21 dBm/2 4 dBm
Trans (transmission method)	0: Transparent 1: Fixed point
Router (Relay Mode)	0: Disable 1: Enable
LBT (listen before talk)	0: Disable 1: Enable
Lrssi (LBT function detection RSSI threshold)	LBT function detection RSSI threshold -128~0
Ltime (maximum waiting time for LBT function detection)	LBT function detection maximum waiting time 1~65535ms
Erssi (Environmental RSSI)	0: Disable 1: Enable
Data_rssi (Data RSSI)	0: Disable 1: Enable
Addr (module address)	Module address 0~65535 (decimal)
Channel (module channel)	Module channel 0~ 92 (decimal)

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

Netid (Network ID)	Module network 0~255 (decimal)
Key	Module key 0~65535 (decimal)
Delay (WOR delay sleep)	Delay sleep 0~65535 (decimal)
SWITCH (software mode switch)	0: Off; 1: On
Mode (Working Mode)	0: Transparent mode 1: WOR mode 2: Configuration mode 3: Sleep mode
Uaux (AUX indication mode)	0: Serial port buffer is empty indication mode 1: Wireless transmission is completed indication mode

7.3Notes on upgrading firmware via serial port

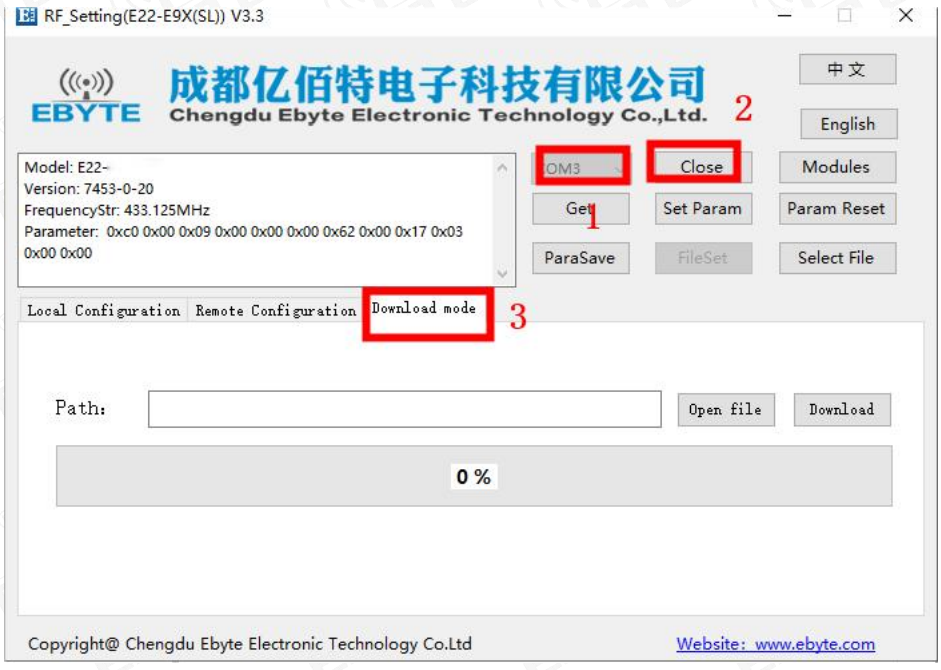
- If the customer needs to upgrade the firmware, he needs to find the corresponding BIN file provided by the official, and then use the official configuration software to upgrade the firmware. Under normal circumstances, users do not need to upgrade the firmware, and please do not use the "AT+IAP" command .
- The pins necessary for upgrading must be brought out (M1, M0, AUX, TXD, RXD, VCC, GND), and then send the "AT+IAP" command in configuration mode to enter the upgrade mode .
- After entering the upgrade mode, the baud rate will automatically switch to 115200 until it automatically exits, during which time there will be log output.
- E22-170T33S does not support serial port online upgrade. This function is only available for E22-170T30S.

7.3.1PC upgrade operation steps

- **Configuration software command upgrade**

1、By changing M0 and M1, the module enters the configuration mode (note: the baud rate in the configuration mode is 9600);

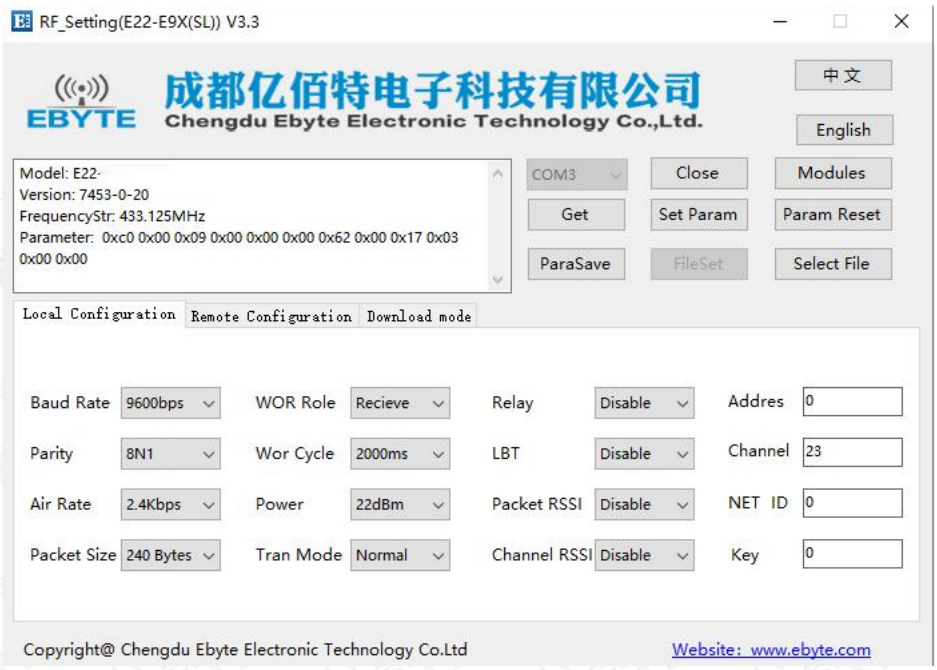
2、Open the official website to configure the software, select Firmware Upgrade > Select Serial Port > Open Serial Port;



Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

3、Click Read Parameters to view the module information in the left window of the configuration software;



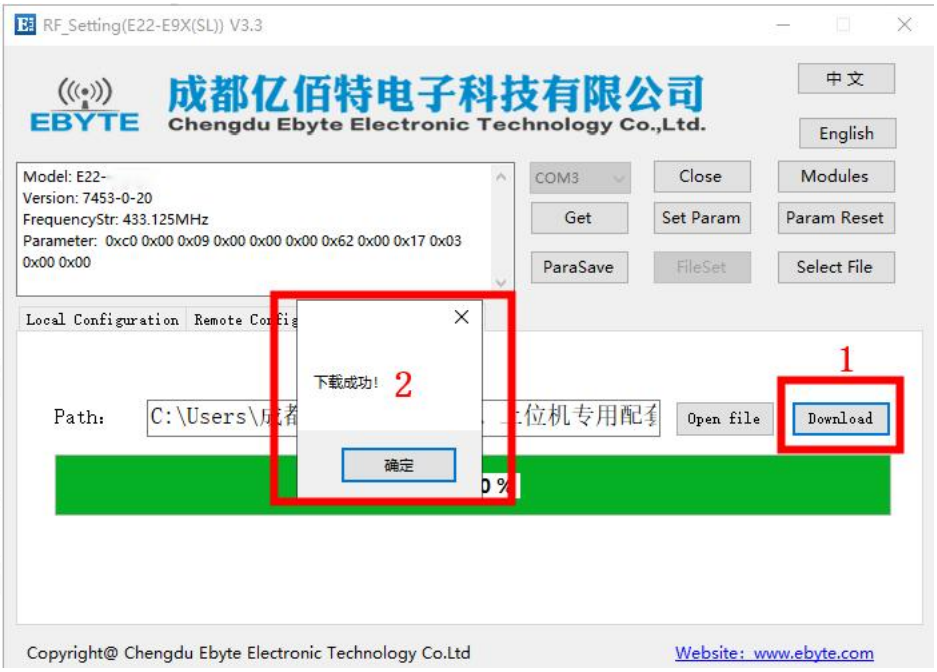
4、Click Firmware Upgrade > Click Open File (select the firmware .bin file) > Click Start Downloading;



Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

5、Click Start Downloading, the firmware will start upgrading, and after it is completed, it will prompt that the download is successful;



6、After the firmware upgrade is complete, reopen the serial port to confirm the reading parameters.



Chapter 8 Hardware Design

- It is recommended to use a DC regulated power supply to power the module. The power supply ripple coefficient should be as small as possible and the module should be reliably grounded.
- Please pay attention to the correct connection of the positive and negative poles of the power supply. Reverse connection may

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

cause permanent damage to the module.

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, the module will be permanently damaged.
- Please check the stability of the power supply. The voltage should not fluctuate greatly or frequently.
- When designing the power supply circuit for the module, it is often recommended to retain more than 30% margin, which is conducive to long-term stable operation of the whole machine;
- The module should be kept as far away as possible from parts with large electromagnetic interference, such as power supplies, transformers, and high-frequency wiring;
- High-frequency digital routing, high-frequency analog routing, and power routing must avoid the bottom of the module. If it is necessary to pass under the module, assuming that the module is soldered on the Top Layer, ground copper should be laid on the Top Layer of the module contact part (all copper should be laid and well grounded), and it must be close to the digital part of the module and routed on the Bottom Layer ;
- Assuming the module is soldered or placed on the Top Layer, it is also wrong to randomly route the wires on the Bottom Layer or other layers, which will affect the module's spurious signal and receiving sensitivity to varying degrees ;
- If there are devices with large electromagnetic interference around the module, it will also greatly affect the performance of the module. It is recommended to keep them away from the module according to the intensity of the interference. If possible, appropriate isolation and shielding can be performed.
- If there are traces with large electromagnetic interference around the module (high-frequency digital, high-frequency analog, power traces), it will also greatly affect the performance of the module. It is recommended to keep them away from the module according to the intensity of the interference. If possible, appropriate isolation and shielding can be performed.
- If the communication line uses 5V level, a 1k-5.1k resistor must be connected in series (not recommended, there is still a risk of damage) ;
- Try to stay away from some TTL protocols whose physical layer is also 2.4GHz, such as USB3.0;
- The antenna installation structure has a great impact on the module performance. Make sure the antenna is exposed and preferably vertically upward;
- When the module is installed inside the case, you can use a high-quality antenna extension cable to extend the antenna to the outside of the case;
- The antenna must not be installed inside a metal shell, as this will greatly reduce the transmission distance.

Chapter 9 FAQ

9.1 The transmission distance is not ideal

- When there is a straight-line communication obstacle, the communication distance will be attenuated accordingly ;
- Temperature, humidity, and co-channel interference can increase the communication packet loss rate ;
- The ground absorbs and reflects radio waves, so the test results are poor when close to the ground ;
- Seawater has a strong ability to absorb radio waves, so the test effect at the seaside is poor ;
- If there are metal objects near the antenna, or the antenna is placed in a metal shell, the signal attenuation will be very serious ;
- The power register is set incorrectly, or the air rate is set too high (the higher the air rate, the closer the distance) ;
- The power supply voltage at room temperature is lower than the recommended value. The lower the voltage, the lower the power output .
- The antenna used does not match the module well or the antenna itself has quality issues.

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

9.2 Module is easily damaged

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, the module will be permanently damaged .
- Please check the stability of the power supply. The voltage should not fluctuate greatly or frequently .
- Please ensure anti-static operation during installation and use, as high-frequency components are sensitive to static electricity ;
- Please ensure that the humidity is not too high during installation and use, as some components are humidity sensitive devices ;
- If there is no special requirement, it is not recommended to use it at too high or too low temperature.

9.3 Bit error rate is too high

- There is interference from the same frequency signal nearby. Stay away from the interference source or change the frequency or channel to avoid interference.
- An unsatisfactory power supply may also cause garbled characters, so the reliability of the power supply must be ensured;
- Extension cables or feeder cables that are of poor quality or are too long can also cause a high bit error rate.

Chapter 10 Welding Operation Commands

10.1 Reflow temperature

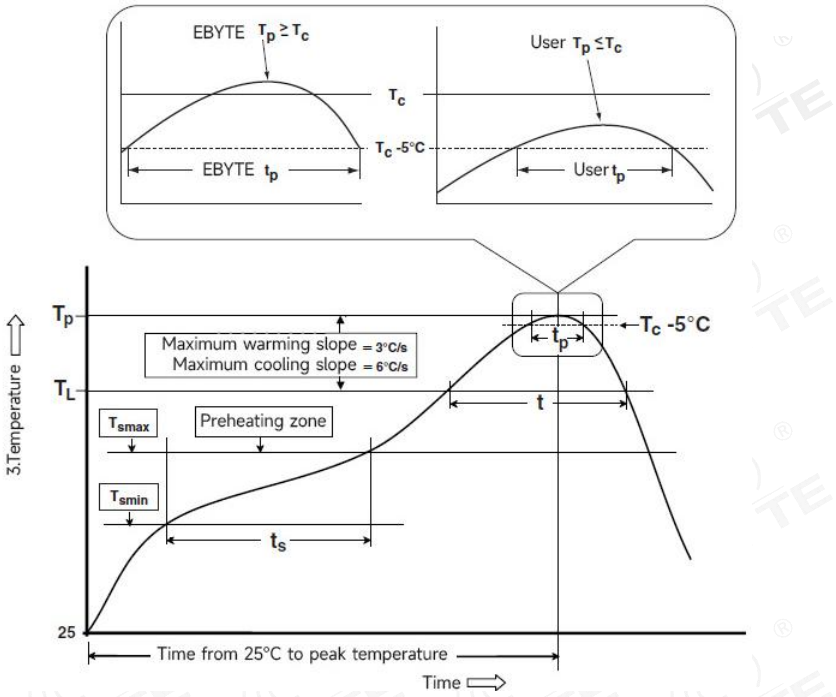
Reflow profile characteristics		Leaded process assembly	Lead-free assembly
Preheating /keeping	Minimum temperature (Tsmin)	100℃	150℃
	Maximum temperature (T smax)	150℃	200℃
	Time (T smin ~T smin)	60-120 seconds	60-120 seconds
Heating slope (T L ~T p)		3℃/sec, max.	3℃/sec, max.
Liquidus temperature (TL)		183℃	217℃
T L above the holding time		60~ 90 seconds	60~ 90 seconds
Package peak temperature Tp		Users must not exceed the temperature stated on the product's "Moisture Sensitivity" label.	Users must not exceed the temperature stated on the product's "Moisture Sensitivity" label.
The time (T p) within 5℃ of the specified classification temperature (Tc) is shown in the figure below.		20 seconds	30 seconds
Cooling slope (T p ~T L)		6℃/sec, max.	6℃/sec, max.
Time from room temperature to peak temperature		6 minutes, longest	8 minutes, longest

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

※The peak temperature (Tp) tolerance of the temperature curve is defined as the upper limit of the user

10.2 Reflow Oven Curve



Chapter 11 Related Models

Product Model	Carrier frequency Hz	Transmit power dBm	Test distance km	Package	Product size mm	Communication interface
E22-230T22S	230M	22	5	Patches	16*26	TTL
E22-230T30D	230M	30	10	Patches	20*40.5	TTL
E22-400T22S	433/470M	22	5	Patches	16*26	TTL
E22-400T30D	433/470M	30	10	Patches	20*40.5	TTL
E22-900T22S	868 / 915M	22	5	Patches	16*26	TTL
E22-900T30D	868 / 915M	30	10	Patches	20*40.5	TTL
E22-400M22S	433/470M	22	7	Patches	14*20	SPI
E22-400M30S	433/470M	30	12	Patches	24*38.5	SPI
E22-900M22S	868 / 915M	22	7	Patches	14*20	SPI
E22-900M30S	868 / 915M	30	12	Patches	24*38.5	SPI

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

Chapter 12 Antenna Guide

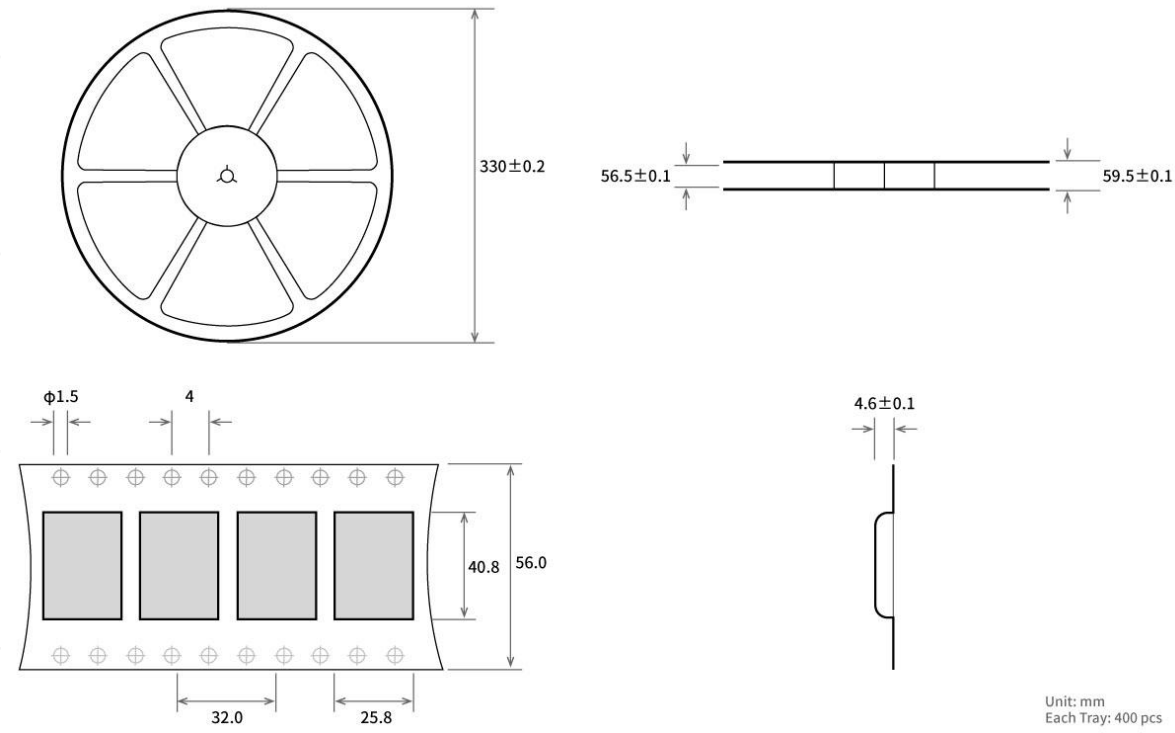
12.1 Antenna Recommendation

Antennas play an important role in the communication process. Often, poor-quality antennas will have a great impact on the communication system. Therefore, our company recommends some antennas as matching antennas for our wireless modules with excellent performance and reasonable prices.

Product Model	Type	Frequency band Hz	interface	Gain dBi	Height mm	Feeder c m	Features
TX170-XP-200	Suction cup antenna	170 M	SMA-J	4.0	5 00	200	Small suction cup antenna, omnidirectional antenna
TX170-JKD-20	Glue stick antenna	170 M	SMA-J	3.0	200	-	Bend the glue stick, omnidirectional antenna
TX170-JK-11	Glue stick antenna	170 M	SMA-J	2.5	110	-	Bend the glue stick, omnidirectional antenna

Chapter 13 Bulk Packaging Methods

13.1 E22-170T30S & E22-170T33S Bulk Packaging



Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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

Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2025-4-17	Initial release	Hao

About us

Technical support: support@cdebyte.com

Documents and RF Setting download link: https://www.cdebyte.com

Thank you for using Ebyte products! Please contact us with any questions or suggestions: info@cdebyte.com

---

Web: https://www.cdebyte.com

Address: B5 Mould Industrial Park, 199# Xiqu Ave, High tech Zone, Chengdu, Sichuan, China

Chengdu Ebyte Electronic Technology Co.,Ltd.

Copyright © 2012–2025 , Chengdu Ebyte Electronic Technology Co., Ltd.

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