EBYTE E32-915T30D

EBYTE E32-915T30D LoRa Module User Manual

Model: E32-915T30D

1. Product Overview

The EBYTE E32-915T30D is a high-performance wireless serial port module (UART) designed for long-range communication. It is based on SEMTECH's SX1276 RF chip and utilizes LoRa spread spectrum technology, operating in the 900MHz to 931MHz frequency band (default 915 MHz). This module offers extended communication distances, concentrated power density, and robust confidentiality through data encryption and compression. It is suitable for a wide range of applications including IoT, smart home systems, utility metering, and industrial control.
Key specifications include:

- **IC:** SX1276
- **Frequency:** 900~931MHz
- **Power:** 21~30dBm (1W)
- **Distance:** Up to 8.0 km
- **Interface:** UART

Figure 1: EBYTE E32-915T30D LoRa Module. This image shows the compact design of the E32-915T30D module with its SMA antenna connector and clear labeling including the model number, serial number, manufacturer, and FCC ID.

2. Features

- Communication distance up to 8km in optimal conditions.
- Maximum transmission power of 1W (30dBm), with software-adjustable multi-level power settings.
- Supports the global license-free ISM 915MHz band.
- Supports air data rates from 0.3kbps to 19.2kbps.
- Low power consumption, ideal for battery-powered applications.
- Wide power supply range: 3.3V to 5.2V (5.0V recommended for best performance).
- Industrial-grade design, operating reliably from -40°C to 85°C.
- SMA access point for easy connection of coaxial cables or external antennas.
- Features data encryption and compression for enhanced security and efficiency.

3. Specifications

3.1 Main Parameters

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Main Parameters	E32-915T30D
Product Size	24 * 43 mm
Working frequency	900~931 MHz
Transmitting power	21~30 dBm
Test distance	8000 meter
Antenna type	SMA-K
Communication Interface	UART
Power supply	3.3V~5.2V
Transmitting current	560mA~660mA
Receiving current	20mA~23mA
Sleep current	4~6μA

Figure 2: Main Parameters of the E32-915T30D Module. This table provides a quick reference for the module's key technical specifications.

Parameter	Value (E32-915T30D)
Product Size	24 * 43 mm
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3.2 Physical Dimensions

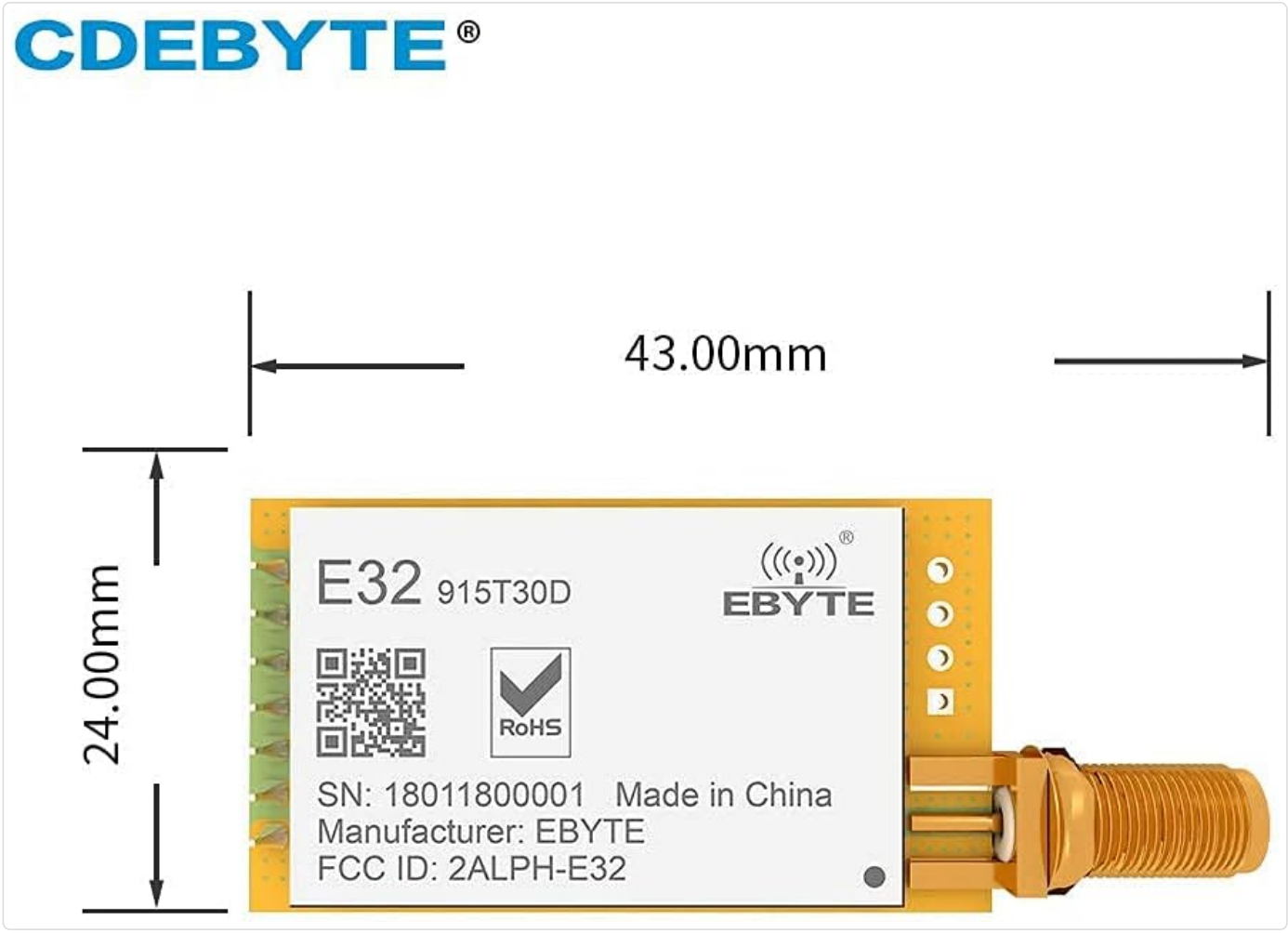


Figure 3: Physical Dimensions of the E32-915T30D Module. The module measures 43.00mm in length and 24.00mm in width.

The E32-915T30D module has compact dimensions, making it suitable for integration into various projects. Its physical size is 43.00mm x 24.00mm.

4. Setup and Installation

Proper setup is crucial for optimal performance of the E32-915T30D module. This section outlines the basic steps for installation.

4.1 Component Identification

Figure 4: Key Internal Components. This image highlights the main components of the module, including the SX1276 RF IC, crystal oscillator, wire wound inductor, LNA, and the 4-layer PCB design.

The module incorporates high-quality components for stable and reliable operation:

- **Crystal Oscillator:** 1ppm TCXO (Temperature Compensated Crystal Oscillator) for high frequency stability.
- **RF IC:** Original imported SX1276 from SEMTECH, the core of the LoRa functionality.
- **Wire Wound Inductor:** From Germany Wurth, ensuring high Q value and low attenuation.
- **LNA:** Low Noise Amplifier, improving receiving sensitivity.
- **PCB:** 4-layer PCB design for improved EMC performance.

4.2 Physical Installation

The E32-915T30D is a UART DIP module. It is designed for easy integration into your circuit board. Ensure proper pin alignment when inserting the module into a DIP socket or soldering it directly.

Figure 5: Included Installation Accessories. The module comes with factory nuts and washers, which are beneficial for secure installation, especially for the SMA connector.

For securing the SMA antenna connector, utilize the provided nuts and washers to ensure a stable and reliable connection. This prevents loosening and maintains signal integrity.

4.3 Power Supply Connection

Connect the module to a stable power supply within the range of 3.3V to 5.2V. A 5.0V supply is recommended for optimal performance. Ensure correct polarity to prevent damage to the module.

4.4 UART Interface Connection

Connect the module's UART pins (TX, RX, GND, VCC) to your microcontroller or host system. Ensure that the UART baud rate and other parameters are correctly configured on both the module and the host device for proper communication.

5. Operating Modes and Data Transmission

The E32-915T30D module supports various data transmission modes to suit different application requirements.

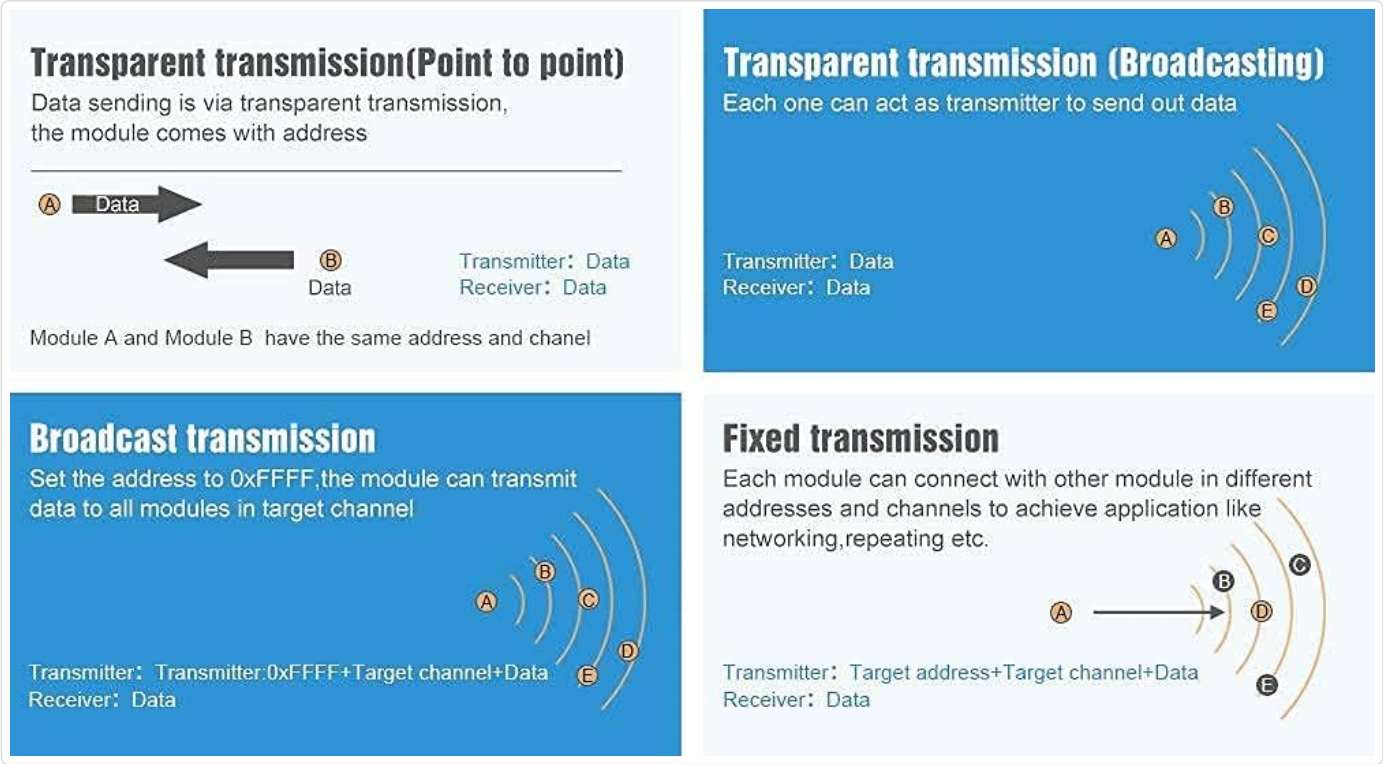


Figure 6: Overview of Data Transmission Modes. This diagram illustrates Transparent (Point-to-Point), Transparent (Broadcasting), Broadcast 0xFFFF, and Fixed Transmission modes.

5.1 Transparent Transmission (Point-to-Point)

In this mode, data is sent transparently between two modules. Both modules (Module A and Module B) must have the same address and channel configured. Data sent by one module is received directly by the other, acting as a simple wireless serial link.

5.2 Transparent Transmission (Broadcasting)

Each module can act as a transmitter to send out data to multiple receivers. In this mode, a single transmitting module sends data that can be received by any other module within range, regardless of their specific address, as long as they are on the same channel.

5.3 Broadcast 0xFFFF Transmission

To broadcast data to all modules on a target channel, set the sending address to 0xFFFF. This allows a single module to transmit data that will be received by every module configured for that specific channel, enabling a one-to-many communication setup.

5.4 Fixed Transmission

This mode allows each module to connect with other modules in different addresses and channels. This is useful for more complex network applications, such as repeating or routing data, where specific modules need to communicate with designated partners across different network segments.

6. Applications

The E32-915T30D module's robust features and long-range capabilities make it suitable for a wide array of applications:

Figure 7: Diverse Application Scenarios. The module is widely used in smart agriculture, smart oil fields, and other industrial IoT solutions.

- Home security alarm systems and remote keyless entry.
- Smart home and industrial sensor networks.
- Wireless alarm security systems.
- Building automation solutions.
- Wireless industrial-grade remote control.
- Health care products and monitoring.
- Advanced Meter Reading Architecture (AMI).
- Automotive industry applications.
- Smart agriculture and environmental monitoring.
- Smart oil field management.

7. Maintenance

The E32-915T30D module is designed for robust and long-term operation with minimal maintenance. Follow these guidelines to ensure its longevity:

- **Environmental Conditions:** Operate the module within its specified temperature range (-40°C to 85°C) and avoid

excessive humidity or direct exposure to water.

- **Power Supply:** Always use a stable and clean power supply within the recommended voltage range (3.3V-5.2V). Voltage fluctuations or overvoltage can damage the module.
- **Physical Handling:** Handle the module with care to avoid physical damage to components or solder joints. Avoid bending or stressing the PCB.
- **Antenna Connection:** Ensure the SMA antenna connector is securely fastened. A loose connection can degrade performance.
- **Cleaning:** If necessary, gently clean the module with a dry, soft brush or compressed air to remove dust. Do not use liquid cleaners.

8. Troubleshooting

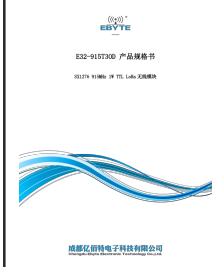
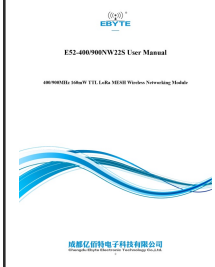
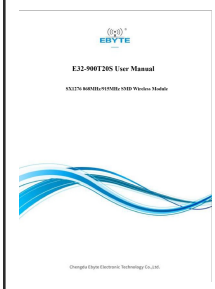
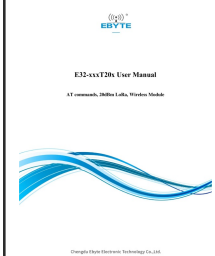
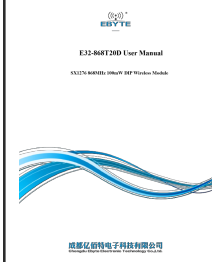
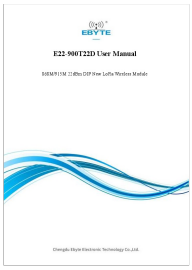
If you encounter issues with your E32-915T30D module, consider the following troubleshooting steps:

- **No Communication:**
  - Verify power supply voltage and polarity.
  - Check UART connections (TX, RX, GND) and ensure they are correctly wired.
  - Confirm that the UART baud rate, parity, and stop bits are correctly configured on both the module and the host device.
  - Ensure both transmitting and receiving modules are on the same frequency and channel.
- **Poor Range/Signal Strength:**
  - Check the antenna connection; ensure it is securely attached and the correct type (SMA-K).
  - Ensure there are no major obstructions (e.g., thick walls, metal objects) between the transmitting and receiving modules.
  - Verify that the transmitting power is set to the desired level (up to 1W).
  - Minimize electromagnetic interference from other electronic devices.
- **Module Not Responding:**
  - Power cycle the module.
  - Check for any short circuits on the PCB.
  - Ensure the module is not overheating.

9. Warranty and Support

For detailed warranty information, technical support, or further inquiries, please visit the official EBYTE website or contact their customer service.
Official Website: http://www.cdebyte.com/
EBYTE modules are designed and manufactured to meet high industrial standards, ensuring stability and consistency.

Related Documents - E32-915T30D

	E32-915T30D LoRa E32-915T30D EBYTE SX1276 LoRa 915MHz 1W TTL/UART LoRa PA+LNA
	EBYTE E52-400/900NW22S LoRa MESH Wireless Networking Module User Manual Comprehensive user manual for the EBYTE E52-400/900NW22S LoRa MESH wireless networking module, operating on 400/900MHz bands with 160mW power. Covers specifications, AT commands, hardware design, and application scenarios.
	E32-900T20S SMD Wireless Module User Manual User manual for the EBYTE E32-900T20S, an 868MHz/915MHz SMD wireless module utilizing LoRa technology. Covers specifications, operation, commands, and hardware design.
	E32-xxxT20x LoRa Wireless Module User Manual User manual for the E32-xxxT20x LoRa wireless module by Ebyte, detailing specifications, hardware, AT commands, and application notes for 20dBm LoRa modules. Covers features, parameters, pin definitions, connections, working modes, register control, AT commands, hardware design, FAQ, production guidance, and model information.
	E32-868T20D User Manual: SX1276 868MHz 100mW DIP Wireless Module Comprehensive user manual for the EBYTE E32-868T20D wireless serial port module. Details include its SX1276 LoRa technology, 868MHz frequency, 100mW transmission power, DIP package, specifications, operating modes, command formats, hardware design considerations, and frequently asked questions. Suitable for IoT and industrial applications.
	E22-900T22D LoRa Wireless Module User Manual Comprehensive user manual for the EBYTE E22-900T22D LoRa wireless module, detailing specifications, features, applications, configuration, and hardware design for 868MHz/915MHz communication.