# DTECH

## RS232 485 Wireless Data Transmission LORA

Please read the product manual carefully before using the product.

# RS232 to RS485 Transceiver with LORA Wireless Serial Port Data Transmission - User Manual

I.Overview

1. This product is a LoRa wireless data transceiver using LoRa spread spectrum modulation for high
-performance, highly reliable, stable, and low-power wireless data transmission. It provides a high
-performance, low-cost solution for environments where wiring is not feasible. LoRa is a long-range
wireless communication solution, known for its long-distance coverage and low power consumption.

It breaks through coverage scenarios that previously required relays. This product defaults to wireless data
transmission in the 410.11MHz frequency band, supporting a wireless frequency range of 410MHz-510MHz,
with a transmission distance of up to 3 kilometer. Compared to GPRS, 4G solutions, it doesn't require
network access fees (no frequency application required) and offers longer distances than WiFi or Zigbee.

Hence, LoRa is increasingly used in industrial serial communications for small data transmission over long
distances. LoRa performs excellently in coverage and power consumption, gaining extensive use in IoT
applications. This product can achieve one-to-one, one-to-many, or many-to-many data transmission
without distinguishing between transmitting and receiving ends.

This product provides standard signal interfaces, allowing various application scenarios using LoRa wireless
functionality:

① Wireless meter reading, e.g., smart electric meters, smart water meters, smart gas meters, heat meters, etc.;

② Slowly changing physical quantities (temperature, water pressure, PM2.5, electromagnetic sensors) for
ultra-low-power sensors;

③ Wireless alarms (smoke detectors, infrared thermometers);

④ Remote I/O controllers (lighting control, air conditioning control);

⑤ Industrial applications: industrial CNC machines, industrial automation instruments, long-distance irrigation
equipment, access control, security control systems, highway weighbridge data transmission, commercial
cash registers, and other device connections.

2.Product features:

(1) Supports fixed-point transmission, transparent transmission, air wake-up function, and automatic
internal packet transmission.

(2) Communication Distance: The most intuitive perception is that the distance is increased by 3-5 times.
Previously uncovered blind spots for 433MHz wireless products can now be fully covered by LoRa,
offering the ultimate solution for unreliable 433MHz communications.

(3) LoRa demodulation technology can correctly demodulate data even in noisy environments, with a
sensitivity of up to -120dBm.

(4) Explanation of Communication Distance

| Testing Environments | Testing Distances | Product Function Description: |
|---|---|---|
| Unobstructed communication | Around 3 km | Direct line-of-sight communication in open-air environments |
| Line-of-sight propagation in urban roads | Around 800 meters | Dependent on the actual usage environment |
| Urban areas with obstructive buildings | Around 500 meters | Dependent on the actual usage environment |
| Inside buildings | Through approximately 5 floors | Dependent on the actual usage environment |

3、 Product Connection Schematic
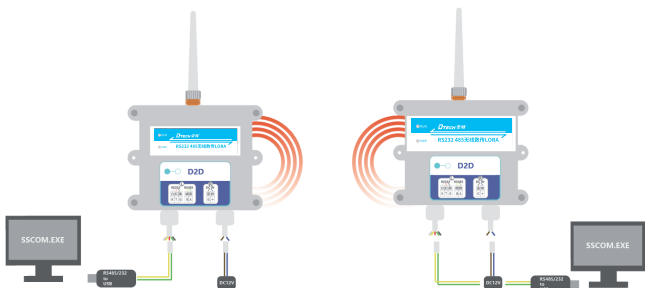


4. Product Accessories

(1) Product: 1 unit

(2) Glue Stick Antenna: 1 piece

(3) Magnet: 1 piece

# Table of Contents

1. Product Features
   - TPUNB Point-to-Point Communication Protocol
   - Supports Frequency Band 410MHz to 510MHz
   - Extended Long-range Coverage
   - Configurable with AT Commands
   - Built-in Watchdog, Never Crashes
   - Supports Serial Firmware Upgrades
   - Supports RS485/RS232 Interfaces

2.Product Overview

The IOT9062 is a multifunctional TPUNB wireless data transmission device operating in the frequency range of 410MHz to 510MHz. It utilizes 232/485 interfaces for data transmission and reception, lowering the barrier for wireless applications. It supports both one-to-one and one-to-many data transmission modes.
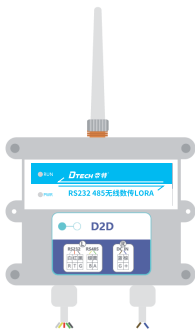


2.1 Product Technical specifications

| Functional parameter | |
| --- | --- |
| Business mode | Transparent Transmission Mode, Directed Transmission Mode, Configuration Mode |
| Wireless performance index | |
| Operating frequency band | 410MHz – 510MHz |
| Wireless Channels | 500 |
| Operating Bandwidth | ≤200KHz(Single Carrier) |
| Air speed | Support1 . 2/2 .44. 8/9 . 6/19. 2/76 . 8kbps |
| Maximum Transmit Power | 25 ± 1dBm |

| Receive sensitivity | - 120dbm |
|---|---|
| Wired performance index | |
| Data bits | 8bit |
| Stop Bits | 1,2 |
| Parity Bits | None，Even，odd |
| Baud Rate | 1200/24004800/9600/19200/38400/57600/1 1 5200 |

| Electrical index | |
|---|---|
| Interfaces | 1) Power Interface: DC Input Terminal X1 |
| | 2) RS485 Interface X1 |
| | 3) RS232 Interface X1 |
| | 4) TPUNB Antenna SMA Female Connector × 1 |
| | 5) Magnetic Suction Mode Switch × 1 |
| Power Supply Voltage | Typical Value: DC 12V (Supports Wide Voltage Input: 6 - 28V) |
| Installation Scene | Outdoor |
| Total Power Consumption | ≤ 1W |
| Dimensions | 116mm × 85mm × 41mm" |
| Weight | < 0 . 25k9 |
| Environmental Adaptability | Operating Temperature: -40°C to 70°C |
| | Storage Temperature: -40°C to 85°C |
| Level of protection | IP65 Rating |
| Electrostatic discharge immunity | Air Discharge: ±15kV |
| | Contact Discharge: ±8kV |
| Way to install | Screw Fixing |

## 2.2产品接口连接图
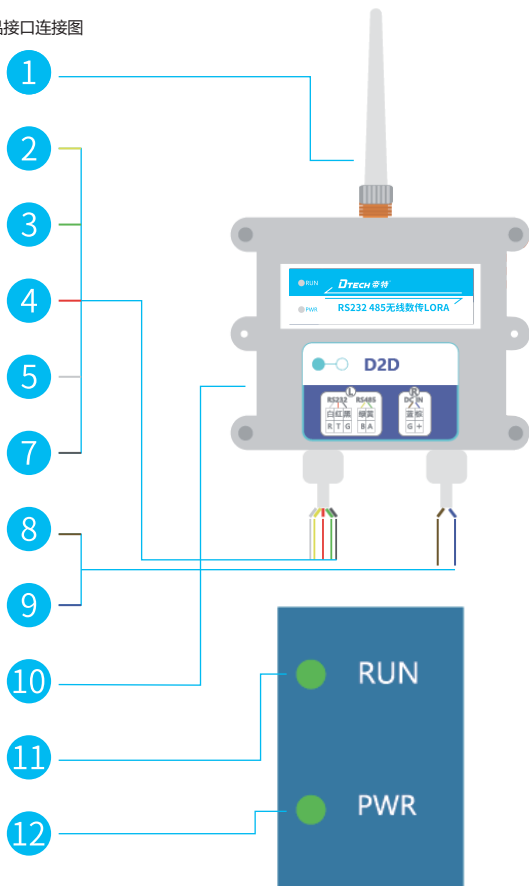
## 2.2 Product Interfaces

| Serial No. | Interfaces | 备注 | |
|---|---|---|---|
| 1 | UNB Communications Interfaces | SMA Female Head Base | |
| 2 | 485 Communication Interfaces | 485 B | Default Baud Rate: 9600 |
| 3 | | 485 A | |
| 4 | 232 Communication Interfaces | TX | Default Baud Rate: 9600 |
| 5 | | RX | |
| 7 | | GND | |
| 8 | Power Input Interfaces | 1 2V DC- | Support 6~28V wide voltage power supply |
| 9 | | 1 2V DC+ | |
| 10 | Mode switch key | Magnetic Suction Button | |
| 11 | Indicating interface | RUN Indicator Light | Green Monochrome |
| 1 2 | | PWR Indicator Light | Green Monochrome |

## 3.Quick Start

### 3.1 Product Parameter Configuration

To achieve data transmission between two IOT9062 devices, the configurations of the IOT9062 should meet the following conditions:
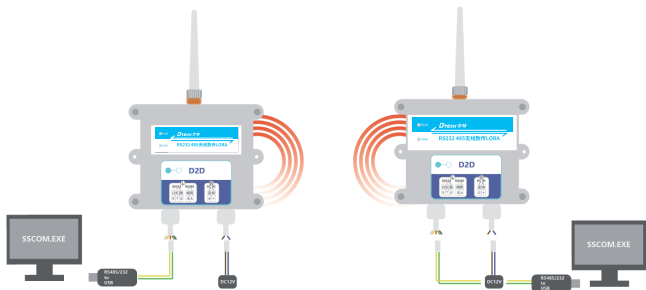
1. Same air interface rate
2. Same frequency

This example utilizes the following default parameters (no need for configuration):

| Parameters | IOT9062 | IOT9062 |
|---|---|---|
| Air Interface Rate | 19 . 2 kbps | 19 . 2kbps |
| Frequency | 41 0 . 1 1 MHz | 41 0 . 1 1 MHz |

Check whether the indicator is RUN and the PWR 2 indicator is steady on
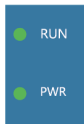
## 3.2 Data Transmission Test



1. Both IOT9062 and IOT9062  are connected to the PC via USB interfaces, resulting in the PC recognizing two serial ports.
2. Launch two serial port tool software.
3. Select the respective serial port numbers and click on the 'Open Port' button.

4. Data Transmission Test
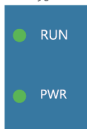IOT9062 :
Input: Hi TPUNB
IOT9062 :
Response: Hi TPUNB
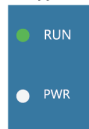
4. Function Explanation
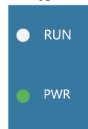Indicator Light Display

**Mod1**
数据透传模式
RUN 亮
PWR 亮

○ RUN

○ PWR

**Mod2**
定向传输模式
RUN 亮
PWR 灭

○ RUN

○ PWR

**Mod3**
预留模式
RUN 灭
PWR 亮

○ RUN

○ PWR

**Mod**
配置模式
RUN 100MS 频率闪烁
PWR 100MS 频率闪烁

◑ RUN

◑ PWR

4.1 Transparent Data Transmission (Default on Startup)
Under default configuration, the IOT9062 operates in transparent data transmission mode.
When data is input to the business interfaces, it's wirelessly transmitted, and upon reception
at the receiving end, the data is output directly from the business interfaces.
To enter transparent data transmission mode: Power on and observe if the indicator lights
are in a constant ON state for both RUN and PWR lights. If they are not, use a magnet to
trigger the magnetic suction switch to switch modes.
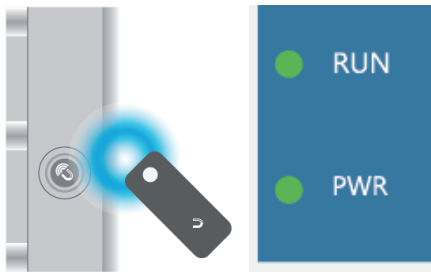
44.2 Directed Data Transmission

The IOT9062 supports entering Directed Data Transmission mode, where the first two bytes of the data represent the address of the target device. Only devices with matching addresses can correctly receive the data.

To enter Directed Data Transmission mode: Trigger the magnetic suction switch using a magnet and observe if the indicator lights show a state where the RUN light is off, and the PWR light is constantly on.
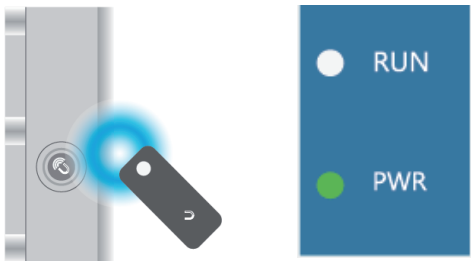


Directional transmission

Input: 000111223344 //hex Input

Means to send data to the device with address 1 0x11 0x22 0x33 0x44:

4.2.1Input for Directed Transmission - On-Demand Data:

Entering Directed Transmission Mode:

Input: 000111223344 (in hexadecimal)

Sends data 0x11 0x22 0x33 0x44 to the device with address 1.

4.2.2Input for Directed Transmission - Broadcasting Data:

Entering Directed Transmission Mode:

Input: 000011223344 (in hexadecimal)

Broadcasts data 0x11 0x22 0x33 0x44 to all devices.

4.3 Configuration Mode

The IOT9062's configuration mode allows adjustments to the wireless serial port settings, wireless communication parameters, as well as RS485/RS232 wired serial port configurations of the DTU terminal.

To enter Configuration Mode: Trigger the magnetic suction switch using a magnet and observe if the indicator lights are flashing intermittently for both RUN and PWR lights.
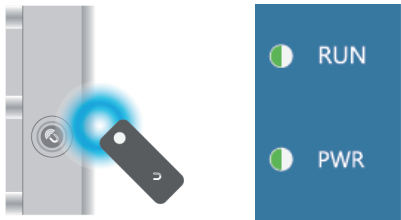


4.3.1 Configure Communication Address
Trigger Configuration Mode via the magnetic suction switch.
Input: AT+ADDR=X (X Range: 0 - 65535 in decimal)
Response: OK
Query Device Address
Input: AT+ADDR?
Response: addr:X (X Range: 0 - 65535 in decimal)
OK

4.3.2 Wired Serial Port Parameter Configuration
The IOT9062 supports configuring parameters for the business interfaces, including baud rate, data bits, stop bits, and parity. Refer to the AT Command section for detailed instructions.
Entering Configuration Mode
Input: AT+UART=X,115200,8,N,1
Response: OK
X=0 for RS232
X=3 for RS485
Query Wired Serial Port Parameters
Input: AT+UART?
Response: RS232: baud: 9600, dataBit: 8, check: N, stop: 1
RS485: baud: 9600, dataBit: 8, check: N, stop: 1

44.3.3 Channel Scanning
The IOT9062 supports channel scanning functionality, allowing the retrieval of RSSI or noise information for the current channel.
Entering Configuration Mode
Input: AT+RSSI
Response: rssi:-50, noise:-110 (Received last effective signal strength of -50dBm, with a noise level of -110dBm)

4.4 Configuration Tool
The IOT9062 can be configured using a DTU configuration tool on a PC.
Connect the DTU to the PC via the USB interfaces; the PC will recognize the serial port.
Open the DTU configuration tool and select the IOT9062 model.

4.4.1 Wired Configuration



1. IOT9062 enters the configuration mode;

2. Select RS232\RS485 serial port in <Wired Configuration> - <Serial Port Type> column in DTU Config tool;

3. Select the corresponding <Baud Rate>, <Check Bit>, <Stop Bit> parameters and click Config to take effect;

## 4.4.2 Wireless Configuration



1. Enter Configuration Mode on the IOT9062.
2. Click on "<One-Key Query Information>" to retrieve all current wireless parameters of the device.
3. Choose the desired "<Frequency Point>", then click "<Configure>" to apply the settings.
4. Select the desired "<Rate>", then click "<Configure>" to activate it.
5. Choose the "<Transmit Power>" you need, then click "<Configure>" to confirm the setting.
6. Input the "<Local Address>" for this device. The default value is 0, ranging from 0 to 65535, used for directed transmissions. Click "<Configure>" to make it effective.
7. "<Signal Value>" displays current useful signal and current noise. Click "<One-Key Query Information>" to refresh.

   Note: Devices must have the same "<Frequency Point>" and "<Rate>" for wireless communication to work.

## 4.4.3 Other Configurations

1. Put the IOT9062 into Configuration Mode.

2.Click on "<Restore to Factory>". This action will reset the device's configurations to factory settings. You'll need to reopen the serial port.

3.Click on "<Upgrade>", select the device's upgrade software package, and proceed with the upgrade. The upgrade package needs to be provided by the original manufacturer.

4.4.4 Query Version

1. Access Configuration Mode on the IOT9062.

2. Click on "<Query Version>" to check the current MCU and communication module versions of the DTU.



4.4.5 Sending Data

1. Put the IOT9062 into broadcast or directed transmission mode.
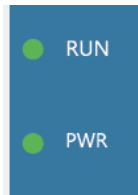


2. Enter the transparent data or the data intended for directed transmission into the input box. Click "<Send>", and the data will be broadcasted or sent in the specified direction. Similarly, if the receiving end receives the data, it will be outputted from the serial port.

5. Precautions:

(9) Do not supply power to the device TPUNB port before installing the antenna.

(10) Avoid supplying power to the device during installation.

(11) Place the device in a well-ventilated area.

(12) Avoid placing the device in environments with temperatures exceeding specified limits.

(13) Install the device away from high-voltage cables.

(14) Keep the device away from strong thunderstorms and intense electric field environments.

(15) Ensure the device is securely fixed after installation.

(16) Keep the antenna end away from metal surfaces or walls after installation.

## 6. Command Classification Explanation

Commands are represented using ASCII code strings, with three distinct formats outlined as follows:

| Execution Format | at+<Command> <CR> <LF> |
|---|---|
| Query Format | at+<Command>?<CR> <LF> |
| Configuration Format | at+<Command>= <Parameter1>[,Parameter2]...[,ParameterN]<CR><LF> |

Each command supports at least one format (see detailed specifications for each command).

Format guidelines:

1. Commands start with "at+", ending with <CR><LF> (Carriage Return Line Feed, hexadecimal values are 0x0D 0x0A, represented as "\r\n" in C language).
2. <>: Indicates a mandatory part;
3. []: Indicates an optional part;
4. Commands and parameters are case-insensitive.

The return format of command execution varies depending on the command and mainly falls into the following categories:

| Return Formats | Description: |
|---|---|
| < OK > < CR > < LF > | - Indicates success, commonly seen in the return of execution and configuration commands. |
| < ERROR > < CR > < LF > | - Indicates failure, commonly seen in the return of execution and configuration commands. |
| < ERROR, 1 ><CR> < LF > | - Indicates that the input command cannot be recognized. |
| < ERROR,2 > < CR > < LF > | - Indicates that the command can be recognized, but the input parameters are invalid, often seen in the return of configuration commands. |
| < ERROR,4 > < CR > < LF > | - Indicates the device is busy. |
| Parameter 1 > [ Parameter 2 > ... < Parameter n > ] < CR > < LF > OK Parameter n] <CR> < LF > OK <CR> < LF | - Indicates the return of query-type commands. |

Where <CR> is the carriage return character and <LF> is the line feed character (0x0D 0x0A in hexadecimal, represented by "\r\n" in C).

### 6.1 AT instruction set
### 6.1.1 Query device ESN

| Command Description | View Gateway ESN |
|---|---|
| Command Format | AT+EUI?\r\n |
| Command Response | Success: <ESN number>\rOK\r\n |
| Query Example | Send: AT+EUI?\r\n Return: FF0100002ED3\rOK\r\n |

### 6.1.2 Restarting the Device REBOOT

| Command Description | Reboot Gateway |
|---|---|
| Command Format | AT+REBOOT\r\n |
| Command Response | Success: OK\r\n |
| Remark Explanation | Return OK, System Reboot Now |
| Query Example | Send: AT+REBOOT\r\n Return: System Reboot Now... \rOK\r\n |

### 6.1.3 Querying the Software version VER

| Command Description | View Software Version |
|---|---|
| Command Format | AT+VER?\r\n |
| Command Response | Success: <Software Version>\rOK\r\n |
| Query Example | Send: AT+VER?\r\n Return: V1.1.5_T210318_6e71359d\rOK\r\n |

### 6.1.4 Restoring factory default DEF

| Command Description | Factory Reset Command |
|---|---|
| Command Format | Command: AT+DEF\r\n |
| Command Response | Success Response: OK\r\n |
| Remark Explanation | Upon successful setting, the gateway will reboot. |
| Query Example | Example:- Sent: AT+DEF\r\n   - Received: OK\r\n |

### 6.1.5 Setting Frequency FREQ
(1) Query the current frequency point

| Query Format | AT+FREQ? |
|---|---|
| Query Response | <Current Frequency>\r\nOK\r\n |
| Parameter Description | None |
| Remark Explanation | None |
| Query Example | Sent: AT+FREQ?\r\n Received: 470.110MHz\r\nOK\r\n |

 (2) Change frequency points

| Command Description | Module Configuration for Transmitting and Receiving Frequencies |
|---|---|
| Setting Format | Command: AT+FREQ=<Freq Index>\r\n |
| Command Response | Invalid parameter: ERROR,2\r\n |
| Parameter Description | <Freq Index>: Frequency Serial Number. Frequency calculation formula: FREQ = 410110 + <Freq Index> * 200 |
| Remark Explanation | Configuration takes immediate effect upon successful setup. |
| Configuration Example | To set the receiving frequency to 470.11MHz: Sent: AT+FREQ=300 \n |

### 6.1.6 Setting Air Interface Rate
(1) Query the current air interface rate

| Query Format | AT+SYMBOL? |
|---|---|
| Query Response | <Current Air Interface Rate>\r\n |
| Parameter Description | None |
| Remark Explanation | None |
| Query Example | Sent: AT+SYMBOL?\r\n |

### 2. Modify the Settings

| Command description | The device sets the air interface rate |
|---|---|
| format | AT+SYMBOL=< Air rate serial number >\r\n |
| Command return | Invalid argument: ERROR,2\r\n |
| Parameter description | Air speed number:<br>0:1.2 KBPS<br>1:2.4 KBPS<br>2:4.8 KBPS<br>3:9.6 KBPS<br>4:19.2kbps<br>6:76.8 kbps |
| remarks | There is no |
| Configuration example | If you want to set the air rate to 19.2Kbps:<br>Send: AT+SYMBOL=4\r\n<br>Return: OK\r\n |

Scan the code to download the driver file

# Warranty card

customer information

| model | |
|---|---|
| date of purchase | |
| customer phone number | |
| customer address | |
| dealer | |
| dealer address | |
| dealer phone number | dealer stamp valid |

Warranty record

| repair frequency | date | failure | treatment measures | maintenance number |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |