DTECH

LORA wireless serial data transceiver

Product manual

LORA wireless serial data transceiver

1. Overview

This product is a LORA wireless data transmission transceiver, using LORA spread spectrum modulation transmission, high performance, high reliability, high stability As well as low-power wireless data transmission mode, it provides high-performance and low-cost solutions for complex environments such as on-site installation and wiring.

LORA is a long-distance wireless communication scheme, the most prominent feature is long distance and low power consumption, breakthrough before the need for relay To solve the coverage scenario, the product adopts the wireless 410MHz band for wireless data transmission by default, and the supported wireless frequency band range In 410MHz-510MHz, the transmission distance reaches 4 kilometers, LORA and GPRS, 4G compared to it does not need to access the network monthly fee(no need to apply for frequency band), and the distance is farther than WIFI and ZIGBEE. So LORA in small data long distance industrial serial communication LoRa has been more and more widely used, and LORA has excellent performance in both coverage and power consumption, and its application scenarios in the Internet of Things are also more and more extensive.

At the same time, this product can realize one-to-one, one-to-many, or many-to-many data transmission, without distinguishing between the transmitter and the receiver.

This product provides a standard signal interface, which can be used directly through the LORA wireless function for the following application scenarios.

① Wireless meter reading, such as: smart meters, smart water meters, smart gas meters, heat meters, etc.;Slow change of physical quantities (temperature, water pressure, PM2.5, electromagnetic sensor) ultra-low power sensor;

③ Wireless alarm (smoke detector, thermal infrared);

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

⑤ Industrial applications Industrial control machine tools, industrial automation instruments, remote irrigation equipment, access control, security control system, highway weighbridge Data transmission, commercial cash register and other equipment connection;

2.Second, product features:

(1) With fixed point transmission, transparent transmission, air wake up function, internal automatic subcontracting transmission.

(2) Communication distance: The distance increases by 3-5 times, which is the most intuitive feeling, the original 410MHz wireless products are difficult to cover the dead corner,LORA can be fully covered, which is the ultimate solution for users who encounter 410MHz communication unreliability.

(3) LORA demodulation technology can still correctly demodulate data under noise, and the sensitivity can reach -120dBm.

(4) Communication distance description:

Test environment	Test distance	Product function description
Unobstructed communication	About 4Km	Direct empty mine local communication
Urban roads spread in straight lines	About 800m	It depends on the actual use environment
Cities have buildings that obscure the environment	About 500m	It depends on the actual use environment
Inside the building	Wear 5 floors around	It depends on the actual use environment

catalogue

1. Product features

●TPUNB point-to-point communication protocol

● Support 410MHz ~ 510MHz band

● Ultra remote coverage

●AT command configuration

● Built-in guard dog, never crash

● Support serial firmware upgrade

● Support USB/RS485/RS232 interface

2. Product overview

LORA is a multi-functional TPUNB wireless data transmission device (TPUNB a long -distance wireless transmission technology) that works

The frequency band is 410MHz to 510MHz. Use USB/232/485 interface to send and receive data, lowering the threshold of wireless applications,Can be one-to-one, one -to-many data transmission. TPUNB has strong anti-interference ability, and the communication distance can reach 4000m (open vision Distance, antenna gain 3dBi, height greater than 2m, 2.4Kbps baud rate). LORA DTU has three different interfaces, The following table:

Product name	port
IOT5060(JX)	USB interface
IOT5060A(JX)	RS485 interface
IOT5060B(JX)	RS232 interface

Table 2-1 Technical specifications of DTU devices

Wireless parameter	
Operating frequency	410.11~510.11MHz

Number of radio channels	500
Maximum transmit power	20±1 dBm
Receiving sensitivity	-120dBm
Modulation mode	S-FSK
Orifice speed	KBPS for 1.2/2.4/4.8/9.6/19.2/76.8
Antenna interface	SMA-K
Maximum number of bytes transferred	1280
Wire parameter	
Baud rate	2400/4800/9600/19200/38400/57600/115200bps
Data bit	8
Stop bit	1、1.5、2
Check bit	None、Even、Odd
Hardware parameter	
Service interface	USB / RS485 / RS232
Power source	USB interface power supply DC 5V
Operating voltage	DC 5V
Working current	50mA (average current)
Operating temperature	-20 ~ 85℃
Working humidity	<95%RH

2.2. Product interface

Table 2-2 Lists the device interfaces

Serial number	port	Interface type	remark
1	Service port	USB/RS485/RS232	Data transfer port
2	Setup	Button	Press and hold for more than 5 seconds to restore factory Settings
3	Power interface	Micro USB	RS485/RS232 interface versions of DTU have this interface
4	TPUNB Antenna	SMA (female)	

3. Quick Start

3.1 Product Parameter Configuration

To realize data sending and receiving between two LORA Dtus, the IOT5060 configuration must meet the following conditions:

- Same air rate
- Same frequency

In this example, the following default parameters are used (no configuration is required) :

argument	DTU-A	DTU-B
Orifice speed	19.2Kbps	19.2Kbps
frequency	410.11MHz	410.11MHz

3.2. Data sending and receiving test

1. The IOT5060 and IOT5060 are connected to the PC through the USB interface, and the PC will recognize the two serial ports;
2. Start the two IOT5060 configuration tools, double-click the configuration tool file, and select the LORA model
3. Select the serial port number and click the button to open the serial port

Figure 3-1 Diagram 1 of the DTU configuration tool

4. The device enters transparent transmission mode

Figure 3-2 DTU configuration tool 2

5. Data sending and receiving test:

IOT5060: Enter HI TPUNB and click Send.

Figure 3-3 Diagram 3 of the DTU configuration tool

IOT5060: The data sent by IOT5060 can be received in the data box.

Figure 3-4 DTU Configuration tool 4

4, TPUNB DTU function

4.1USB Port Definition

Use the standard USB typeA interface to connect to a computer or other USB device.

4.2RS232 Interface Definitions

The standard DB-9 interface can be used to connect to the device via RS232.

4.3 Definition of the RS485 Interface

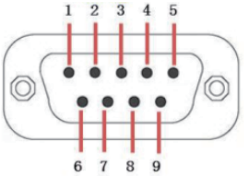

Figure 4-1 Ports of the DB-9

Table 4-1 RS485 pins

lead	1	2	3	4	5	6	7	8	9
RS485	A	B	-	-	GND	-	-	-	5V

4.4 Configuring Tools

LORA can be configured using the DTU configuration tool on a PC.

●IOT5060 connects to PC through USB interface, PC will recognize the serial port;

● Open the IOT5060 configuration tool and select the LORA model.

4.4.1 Cable Configuration

Figure 4-2 Cable configuration diagram

1. Select < Configuration Mode >.
2. In Cable Configuration, select serial port parameters.
3. Click < Cable Configuration >, the serial port will automatically close;
4. Open the serial port again, and you can use the new serial port parameters for data transmission.Note: The < Query baud rate > button can query the current baud rate of the device.

4.4.2 Wireless Configuration

Figure 4-3 Schematic diagram of wireless configuration

1. Select < Configuration Mode >.
2. Click < one-key query information > to query all the current wireless parameters of the device;
3. < Frequency > Select the desired frequency and click < Configuration > to take effect;
4. < Rate > Select the desired rate and click < Configuration > to take effect;
5. < Transmit Power > Select the power to be sent and click < Configure > to take effect;
6. < Local address > Enter the address of the device. The default value is 0 and the value ranges from 0 to 65535.Click < Configuration > to take effect;
7. < Signal value > can display the current useful signal and the current background noise, click < one-key query information > can refresh >.Note: < frequency > and < rate > must be the same device to communicate wirelessly.

4.4.3 Other Configurations

Figure 4-4 Other configurations

1. Select < Configuration Mode >.
2. Tap Restore Factory Defaults. The device Settings are restored to factory defaults and the serial port needs to be turned on again.
3. Click Upgrade > and select the upgrade package of the device. The software upgrade package must be provided by the original manufacturer.

4.4.4 Transparent transmission

Figure 4-5 Schematic diagram of transparent transmission

1. Select < Transparent Send >.
2. Enter transparent data in the input box.
3. Click < Send >, and the data will be broadcast. If the receiver receives the data, it will be output from the serial port.

4.4.5 Sending on demand

Figure 4-6 Schematic diagram of on-demand transmission

1. Select < Send on Demand >;
2. Enter the receiver address in < Send Address >;
3. Enter the sent data in the input box.
4. Click < Send >, the data will be sent out, and the data received by the receiver of the corresponding address will be output from the serial port.

4.5AT Command Configuration

LORA can enter AT mode and execute AT instructions. (AT instruction see AT instruction detailed description section)

Enter the AT mode as follows:

Enter: +++

Return to: OK

If the IOT5060 returns OK, it indicates that the IOT5060 enters the AT mode and can execute the AT command to configure parameters.

4.6 Transparent Data transmission

The default configuration of LORA is in data transparent mode. After the input of data by the service interface, it is sent wirelessly directly and received wirelessly by the receiver After the data is directly output in the service interface.

To enter data transparent mode in AT mode:

Enter: AT+EXIT=1

Return to: OK

4.7 Data Directional Transmission

LORA supports data directed transmission mode, the first two bytes of data for the address of the target device, only the address of the device can match

Receive correctly.

To enter the data directional transmission mode in AT mode:

Enter: AT+EXIT=2

Return to: OK

Directional transmission:

Sender (address 2) :

Input: 000111223344 //hex Input

Data 0x11 0x22 0x33 0x44 is sent to the device with address 1

Receiving end (address 1) :

Output: 0002BC11223344

0x0002 indicates the sender address, 0xBC indicates the received signal strength RSSI (int8), and the rest is data

4.8 On-Demand broadcasting and broadcasting

LORA supports one-to-one and one-to-many wireless communication, mainly through device addresses. The device will only receive broadcast addresses or from

Body address data. The instructions for configuring the device address are as follows:

Enter: +++ // To enter AT mode

Return to: OK

4.8.1 On-demand data

Directional transmission mode:

Sender (address 2) :

Input: 000111223344 //hex Input

Data 0x11 0x22 0x33 0x44 is sent to the device with address 1

Receiving end (address 1) :

Output: 0002BC11223344

0x0002 indicates the sender address, 0xBC indicates the received signal strength RSSI (int8), and the rest is data

AT mode:

Sender (address 2) :

Enter: AT+SEND=1,4,11223344

Send data to device with address 1 0x11 0x22 0x33 0x44

Receiving end (address 1) :

Output: +NNMI:1,4,11223344,-60

Where 1 represents the sender address, 4 represents the length of the received data, 11223344 represents the data, and -60 represents the signal strength

4.8.2 Broadcasting Data

Transparent mode:

Input: 11223344 //hex Input

Broadcast Send Data 0x11 0x22 0x33 0x44

Directional transmission mode:

Input: 000011223344 //hex Input

Broadcast Send Data 0x11 0x22 0x33 0x44

4.9 Channel Scanning
LORA supports the channel scanning function, which can obtain the rssi or bottom noise information of the current channel.
Enter: +++ // To enter AT mode
Return to: OK

Input: AT+RSSI?
Return: rssi:-50, noise:-110 // The last effective signal received was -50dBm and the base noise was -110dBm

4.10 Setting Serial Port Parameters
LORA supports the configuration of business interface parameters, including baud rate, data bit, stop bit, and parity bit. Instructions are detailed in the AT Instructions section.
Enter: +++ // To enter AT mode
Return to: OK

Input: AT+UART=115200,8,N,1
Return to: OK

4.11LED light function
LORA has two LED lights, green LED for data reception and yellow LED for data transmission.

4.12 Button Function
LORA has the Setup button, which has the following functions:

AT mode:
Enter: AT+SEND=0,4,11223344
Broadcast Send Data 0x11 0x22 0x33 0x44

Table 4-2 Key functions

Key action	Feature
Short press	Device restart
Long press 5s	The two lights will flash three times to restore the device to factory Settings

5.1 Description of Command Categories

The command uses an ASCII character string in three formats, as follows:

Execution format at+< command ><CR><LF>

Query format at+< command >? <CR><LF>

Configuration format at+< command >=< Parameter 1>[, parameter 2]... [, parameter n] <CR><LF>

Each command supports at least one type (see the command description for details).

Format description:

1, the command begins with "at+",<CR><LF> (carriage return newline, hexadecimal value is 0x0D 0x0A, C language

End with "\r\n");

2, <>: indicates the part that must be included;

3, []: indicates the optional part;

4. Commands and parameters are case insensitive.

The return format of command execution varies from command to command, and mainly includes the following formats:

Return format description

<OK><CR><LF> indicates success, and is commonly seen in the return of execution and configuration commands

<ERROR><CR><LF> indicates a failure, which is common in the return of execution and configuration commands

<ERROR,1><CR><LF> indicates that the input command is not recognized

<ERROR,2><CR><LF> indicates that the command can be recognized but the input parameters are invalid, which is common in the return of configuration commands

<ERROR,4><CR><LF> indicates that the device is busy

< parameter 1>[,< parameter 2>,...

< parameter n>]<CR><LF>OK

<CR><LF> indicates the return of the query command

Where <CR> is a carriage return character and <LF> is a newline character (0x0D 0x0A in hexadecimal and "\r\n" in C).

5.2AT instruction set

5.2.1 Querying an ESN

Command description	Viewing the gateway ESN
Command format	AT+EUI? \r\n
Command return	Success: <ESN number >\rOK\r\n
Query example	Send: AT+EUI? \r\n Return: FF0100002ED3\rOK\r\n

5.2.2 Restarting the Device REBOOT

Command description	Restart gateway
Command format	AT+REBOOT\r\n
Command return	Success: OK
remarks	Return OK, and the system restarts automatically
Query example	Send: AT+REBOOT\r\n Return: System Reboot Now... \rOK\r\n

5.2.3 Querying the Software version VER

Command description	View the software version
Command format	AT+VER? \r\n
Command return	Success: < Software version >\rOK\r\n
Query example	Send: AT+VER? \r\n Returns: V1.1.5_T210318_6e71359d\rOK\r\n

5.2.4 Restoring Factory default DEF

Command description	factory data reset.
Command format	AT+DEF\r\n
Command return	Success: OK
remarks	The gateway restarts after the configuration is successful
Query example	Send: AT+DEF\r\n Return: OK\r\n

5.2.5 Entering Transparent Transmission Mode

Command description	Enter transparent mode
Command format	AT+EXIT=1\r\n
Command return	Success: OK
Query example	Send: AT+EXIT=1\r\n Return: OK\r\n

5.2.6 Entering the Directed Transfer Mode

Command description	Enter the directed transmission mode
Command format	AT+EXIT=2\r\n
Command return	Success: OK
Query example	Send: AT+EXIT=2\r\n Return: OK\r\n

5.2.7 Setting Frequency FREQ

(1) Query the current frequency

Query format	AT+FREQ?
Query return	< current frequency >\r\n\OK\r\n
Parameter description	There is no
remarks	There is no
Query example	Send: AT+FREQ? \r\n Return: 470.110MHz\r\nOK\r\n

(2) Modify the Settings

Command description	The module sets the frequency points for transmitting and receiving
format	AT+FREQ=<Freq Index>\r\n
Command return	Invalid argument: ERROR,2\r\n
Parameter description	<Freq Index> : frequency number. The frequency calculation formula is: FREQ = 410110 + <Freq Index> * 200
remarks	The configuration takes effect immediately.
Configuration example	If you want to set the receiving frequency to 470.11MHz: Send: AT+FREQ=300 \r\n Return: OK\r\n

5.2.8 Setting the Transmit Power PWR

(1) Query the current transmit power

Query format	AT+PWR?
Query return	Tx Power:< current transmit power >\r\n
Parameter description	There is no
remarks	There is no
Query example	Send: AT+PWR? \r\n Returns: 0 dbm\r\nOK\r\n

(2) Modify the Settings

Command description	Set transmit power
format	AT+PWR=<Power>\r\n
Command return	Invalid argument: ERROR,2\r\n
Parameter description	Power: indicates the transmit power set by the gateway. The value ranges from 0 to 20
remarks	The configuration takes effect immediately
Configuration example	If you want to set the transmit power to 15dbm: Send: AT+PWR=15\r\n Return: OK\r\n

5.2.9 Setting the Air Interface Rate

(1) Query the current air interface rate

Query format	AT+SYMBOL?
Query return	< Current air rate >\r\n
Parameter description	There is no
remarks	There is no
Query example	Send: AT+SYMBOL? \r\n Return: 19.2 kbps@9.6 khz\r\nOK\r\n

(2) Modify the Settings

Command description	A 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	The port rate number is 0:1.2kbps 1:2.4kbps 2:4.8kbps 3:9.6kbps 4:19.2kbps 6:76.8 kbps
remarks	There is no
Configuration example	If you want to set the air rate to 19.2Kbps: Send: AT+SYMBOL=4\r\n Return: OK\r\n

5.2.10 Sending Data SEND

Command description	Data transmission
Command format	AT+SEND=<addr>,<len>,<data>\r\n
Command return	Work: OK\r\n Invalid parameter: ERROR,2\r\n Set busy: ERROR,4\r\n
Parameter description	addr: target address. 0 indicates broadcast len: length of the data to be sent (decimal string format). The maximum length is 1280 bytes. data: data to be sent (hexadecimal string format)
remarks	AT mode, after receiving the correct data, the receiver will output \r\n+NNMI:<len>,<data>\r\n in the AT serial port
Configuration example	SEND: AT+SEND= 0,5,0102030405\r\n Return: SENT OK\r\n The receiver will output \r\n+NNMI:3,5,0102030405,-60\r\n

5.2.11 Setting Serial Port Parameters

(3) Query the serial port parameters

Query format	AT+UART?
Query return	UART:< baud rate >,< data bit >,< check bit >,< stop bit > \r\n
Parameter description	There is no
remarks	There is no
Query example	Send: AT+UART\r\n Return: UART:115200,8,N,1\r\nOK\r\n

(4) Modify the Settings

Command description	Setting serial port parameters
format	AT+UART=< baud rate >,< data bit >,< check bit >,< stop bit >\r\n
Command return	Invalid argument: ERROR,2\r\n
Parameter description	Baud: 2400/4800/9600/19200/38400/57600/115200 bits: 7/8 check digit: N/E/O stop bit: 0/1/2 (1, 1.5, 2)
remarks	After the configuration is successful, the device restarts and takes effect
Configuration example	To set the serial port baud bit 115200, data bit 8, no check, stop bit 1: Send: AT+UART=115200,8,N,1\r\n

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Product Warranty Card

Customer Information

Model：	
Date of purchasel：	
User telephone：	
User address：	
Distributor：	
Agency address：	
User telephone：	Dealer stamp valid

Intenance Records

Repair times	Date	Fault	Treatment measures	Repair work NO.