

# HX-DU1006D Wireless data transceiver

## User Manual

Version: V1.0



# CONTENTS

|                                                          |    |
|----------------------------------------------------------|----|
| 1 SUMMARY .....                                          | 4  |
| 1.1 Frequency Range.....                                 | 4  |
| 1.2 Operating Mode .....                                 | 4  |
| 1.3 Application .....                                    | 4  |
| 2 INSTALLATION DESIGN .....                              | 5  |
| 2.1 Installation of Radio .....                          | 6  |
| 2.2 Main Power Supply (3.3 Vdc).....                     | 6  |
| 2.3 Data Interface Connector .....                       | 7  |
| 3 RADIO MODEM CONFIGURATION AND DIAGNOSTIC COMMANDS..... | 8  |
| 3.1 Errors Messages .....                                | 9  |
| 3.2 Initialize Configuration .....                       | 9  |
| 4 TROUBLESHOOTING .....                                  | 10 |
| 5 TECHNICAL SPECIFICATIONS .....                         | 10 |

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## Antenna Installation Warning

1. Any antenna only can be installed and maintained by professional technician. Please make sure that the radio station is closed when you maintain or work nearby the antenna.
2. In general, data transmitter module will be connected to a directional (high-gain) antenna. Under normal circumstance, only the professional technicians can close to the antenna area, anyone can't touch the antenna or close to 0.6m in diameter range of the antenna.

**Antenna Gain vs Safe distance recommended**

|                                  | Antenna Gain |          |             |
|----------------------------------|--------------|----------|-------------|
|                                  | 0–5 dBi      | 5–10 dBi | 10–16.5 dBi |
| <b>The minimum safe distance</b> | 0.6m         | 1.06m    | 2.3m        |

The product's antenna gain is 3.5dBi.

## 1 Summary

This manual is the installation and operating instructions of HX-DU1006D wireless data transceiver. HX-DU1006D is a universal wireless data transceiver module, adopted compact、modular plat-shaped structure, which is very suitable for designer-users to integrate RTUs、PLCs、banking automation equipments or similar devices.



Figure 1 HX-DU1006D Data transceiver

### 1.1 Frequency Range

HX-DU1006D operating frequency range is 410MHz~470MHz, frequency of transmitting and receiving can be set by programming.

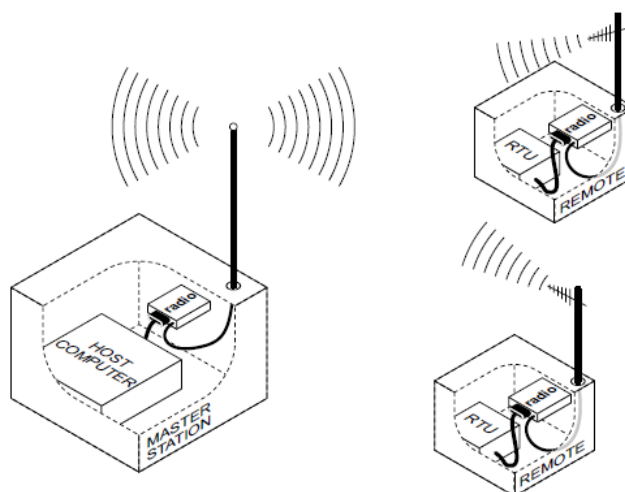
### 1.2 Operating Mode

Half-duplex mode is sending data for master transmitter input, receiving data if no input. When HX-DU1006D operates in half-duplex mode, emission will be started when data appears.

**Note:** HX-DU1006D does not support duplex operating (Such as transmitting and receiving simultaneously).

### 1.3 Application

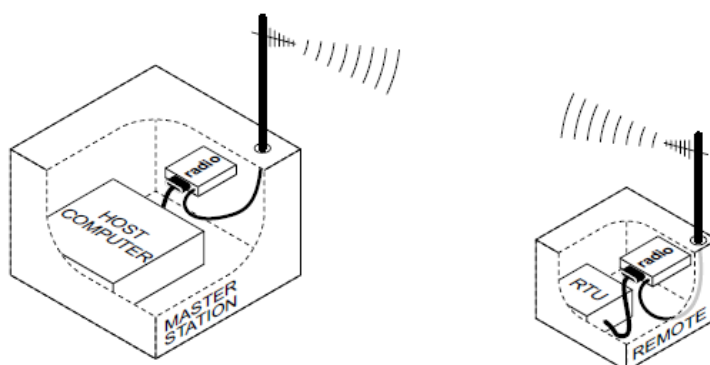
Radio modem apply to point to multi-point and point to point and other applications, one point to multi-point (MAS) is the most common application of radio, which consists of a central master station and several related remote units, like figure 2. MAS network supply communication between a central host and remote terminal units (RTUs) or other data acquisition equipments. As to computer equipments, the radio operating is transparent, so, radio transmitting data as its original form, there is no change in the data format.



**Figure 2 MAS one point to multi-point network**

### **Point to point system**

In the case of licensed, HX-DU1006D can be configured as point to point system, which consists of two radios: one on the host, and the other on remote terminal units, detailed as figure 3. Data transmitting between two points of this system can set up simplex or half-duplex communication connection.



**Figure typically point to point connection**

## **2 Installation design**

This radio has two connection ports: one is the board to board connector which supplies the data interface and DC power line; another is the 50ohm RF connector. To get a good connection, the RF connector and board to board connector should be applied some pressure. Figure 4 shows the external connection interface of radio modem.

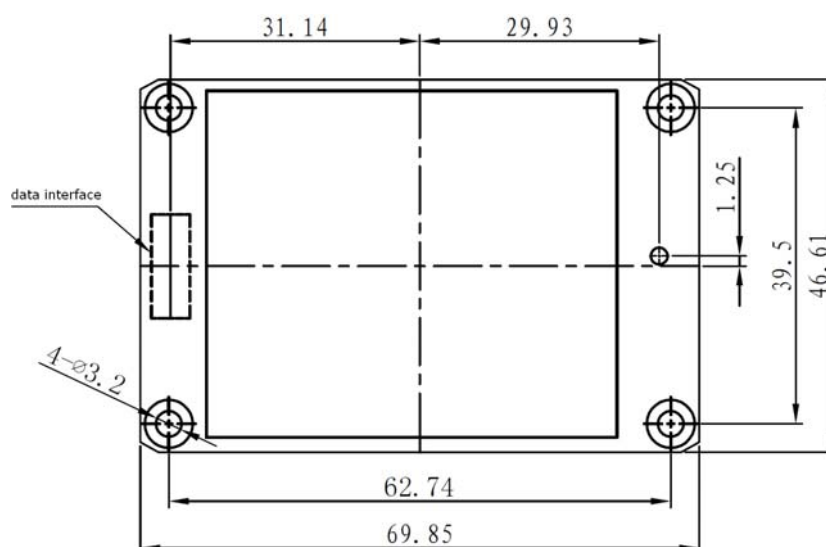


**Figure 4 external connection interface**

All circuits of radio modem are masked in a shielded box, to reduce interference to nearby products. Transmitter can be set as transmitting 1W RF output power, so in order to reducing the RF interference to nearby electronic equipments, carefully choosing and designing the RF transmission path is very important.

## 2.1 Installation of Radio

Figure 5 shown the installation dimension of data transceiver module, firmly fitted the radio modem onto the mounting surface of user system by holes on radio modem 4 corners (no fasteners supplied).



**Figure 5 Radio Modem installation dimension**

## 2.2 Main Power Supply (3.3 Vdc)

### DC Power Supply

HX-DU1006D can operate with any 3.3V power supply, which comes from data interface connector with good filtered. The power must supply 1.5A current at least and featured with current-limiting, even if you make radio modem operating on low power mode (0.5W).

Note: HX-DU1006D only applies to negative grounding system; there is no fuse or reverse polarity protection on PCBA.

Power supply positive must be provided by 23、 24、 25、 26、 27、 28 pin, data and power grounding should be connected to 1、 5、 7、 9、 19、 20、 21、 22 and 30 pin.

## 2.3 Data Interface Connector

Normally, data interface level is TTL; refer to figure 6 and Table 4, which is the detailed description of interface connector. Some pins of data interface connector use for factory testing, only connect the possible pins for using, improper connection may cause damage to the radio.

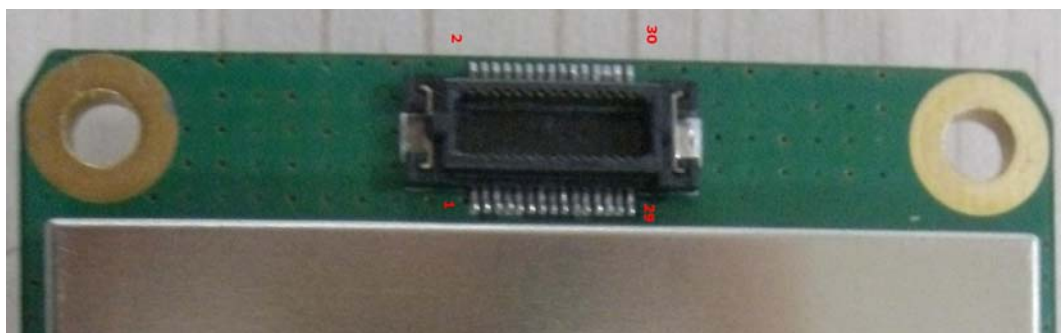


Figure 6 Data Interface Connector

Table 3 Definition of data interface connector pin

| Pin No. | Function  | Description                                                         |
|---------|-----------|---------------------------------------------------------------------|
| 1       | GND       | Ground for signal and power                                         |
| 2       | NC        | No connection                                                       |
| 3       | RXD       | Received data from external device                                  |
| 4       | NC        | No connection                                                       |
| 5       | GND       | Ground for signal and power                                         |
| 6       | RX Clock  | RX Clock for SPI                                                    |
| 7       | GND       | Ground for signal and power                                         |
| 8       | TX Clock  | TX Clock for SPI                                                    |
| 9       | GND       | Ground for signal and power                                         |
| 10      | NC        | No connection                                                       |
| 11      | Config_EN | L:Command configuration mode;<br>H:Data transmission mode           |
| 12      | RSSI      | Received signal strength indicator(0.5-2.5V)                        |
| 13      | T/RX SW   | TX/RX mode switch<br>TX mode output H level, RX mode output L level |
| 14      | TXD       | Sent data to external device                                        |
| 15      | NC        | No connection                                                       |
| 16      | NC        | No connection                                                       |
| 17      | NC        | No connection                                                       |

|    |     |                             |
|----|-----|-----------------------------|
| 18 | VCC | Regulated 3.3V DC           |
| 19 | GND | Ground for signal and power |
| 20 | GND | Ground for signal and power |
| 21 | GND | Ground for signal and power |
| 22 | GND | Ground for signal and power |
| 23 | VCC | Regulated 3.3V DC           |
| 24 | VCC | Regulated 3.3V DC           |
| 25 | VCC | Regulated 3.3V DC           |
| 26 | VCC | Regulated 3.3V DC           |
| 27 | VCC | Regulated 3.3V DC           |
| 28 | VCC | Regulated 3.3V DC           |
| 29 | NC  | No connection               |
| 30 | GND | Ground for signal and power |

### 3 Radio Modem Configuration and diagnostic commands

Radio modem configuration and diagnostics achieved by data interface connector, commands are controlled by PC or a dedicated terminal equipment. For final user, an EIA/RS-232 to TTL conversion circuit is needed to control the radio modem. Radio modem must be removed from user's equipments or installed modules when configuration or diagnostics.

Special tools can be used for setting the radio modem before final installation.

Note: In order to entry configuration mode, the Config\_EN pin (11 pin of data connector) should be set to "L" or GND. And in normal mode, this pin should be pulled up or floated.

Table 4 listed every command entities and a simple functional description. Programming information is displayed in square brackets, command names followed. If you want to input a command, type the command first, and then press the button of "ENTER"

As to programming command, pressing space button after commanding, and then pressing the corresponding information or parameter values, press "ENTER" button finally.

**Table 4 Command Set**

| Command                                                  | Function                                                                                                                          |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Transmitting Frequency Setting Command</b><br>TX[XXX] | Set TX Frequency: TX+Space+Frequency Value+Enter<br>Query TX Frequency: TX+Enter                                                  |
| <b>Receiving Frequency Setting Command</b><br>RX[XXX]    | Set RX Frequency: RX+Space+Frequency Value+Enter<br>Query RX Frequency: RX+Enter                                                  |
| <b>Baud Rate Setting Command</b><br>BAUD[XXX]            | Set Baud Rate: BAUD+Space+Baud Rate Value+Enter<br>Query Baud Rate: BAUD+Enter                                                    |
| <b>Power Setting Command</b><br>PWR[XXX]                 | Set the Power Level: PWR+Space+Power Level+Enter<br>Query the Power Level: PWR+Enter<br>Note: Power level has two kinds: H and L. |

|                                                                          |                                                                                            |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| <b>Protocol Setting Command</b><br><b>PRT[XXX]</b>                       | Set the Protocol Type: PRT+Space+Protocol Name+Enter<br>Query the Protocol Type: PRT+Enter |
| <b>Software Version Query</b><br><b>Command</b><br><b>SREV [XXX]</b>     | Software Versions Query: SREV+Enter                                                        |
| <b>Serial Number Query</b><br><b>SER[XXX]</b>                            | Serial Number Query: SER+Enter                                                             |
| <b>Frequency Lower Limit</b><br><b>Query Command</b><br><b>FLOW[XXX]</b> | Frequency Range Lower Limit Query: FLOW+Enter                                              |
| <b>Frequency Upper Limit</b><br><b>Query Command</b><br><b>FUPP[XXX]</b> | Frequency Range Upper Limit Query: FUPP+Enter                                              |

### 3.1 Errors Messages

Errors Messages may occur in the processing of terminal interface listed as below:

**UNKNOWN COMMAND**—unrecognized command. Please refer to the command description in the command using information.

**INCORRECT ENTRY**—command format or parameter values are incorrect. Please refer to the command description in the command using information.

**ACCESS DENIED**—command can't be completed successfully, this command may be allowed by final user.

### 3.2 Initialize Configuration

Some basic setting steps of radio configuring into user's products as below, in most cases, these steps are sufficient to complete the installation. These steps assume that radio modem is already installed into user's system or product, also connected the data interface and antenna interface well.

- 1、The radio modem is installed into user's system or product, and connect data interface and antenna interface well;
- 2、Connected to a terminal radio modem via interface of user's product (serial setting: asynchronous@ 38400 W/8N1);
- 3、Enable radio modem configuration mode (pin 11 of radio modem data interface grounding);
- 4、Checking the configuration parameter of radio modem via serial terminal command (refer to command set);
- 5、Checking and setting RF transmitting and receiving frequencies;
- 6、Checking and confirming the communication protocol type.

**Note:**

Operating frequency always is not be set when in factory, users need to set the possible transmitting and receiving frequency via serial command, but the radio modem must be programmed according to the operating frequency licensed by users.

- 8、Disconnect pin 11 of data interface to ground;
- 9、Connect the data interfaces of data equipment and radio modem for testing.

## 4 Troubleshooting

Doing some simple checks in advance is a good habit, under normal operating conditions; the radio modems must meet the basic requirements as below:

- Appropriate and stable power supply;
- Reliable connections (RF, data, power supply);
- Reasonably arranging the antenna system to achieve a good strength of receiving signal;
- The correct operating parameters of programmed radio modem (frequency、serial port baud rate、air baud rate、 power level、 protocol type, etc.);
- Interfaces of radio modem and data equipments connected correctly.

## 5 Technical Specifications

| General specification      |                  |                 |
|----------------------------|------------------|-----------------|
| Item                       | Specification    |                 |
| Frequency range            | 410~470MHz       |                 |
| Operating Mode             | Half-duplex      |                 |
| Channel spacing            | 12.5KHz          |                 |
| Modulation type            | GMSK、4FSK        |                 |
| Operation voltage          | 3.3V             |                 |
| Power dissipation(Typical) | High power level | 3.3W @3.3V      |
|                            | Low power level  | 2.7W @3.3V      |
|                            | Receiver         | 0.5W @3.3V      |
| Frequency stability        | ≤±1.0ppm         |                 |
| Size                       | 70×47×11mm       |                 |
| Weight                     | 88g              |                 |
| Temperature(operation)     | -40~+70℃         |                 |
| Temperature(storage)       | -40~+85℃         |                 |
| Antenna port               | IPEX or MMCX     |                 |
| Antenna impedance          | 50ohm            |                 |
| Data interface             | 30pin 0.5mm      |                 |
| Transmitter                |                  |                 |
| Item                       | Specification    |                 |
| RF output power            | High level       | 30±1dBm@DC 3.3V |
|                            | Low level        | 27±1dBm@DC 3.3V |

|                              |                                              |
|------------------------------|----------------------------------------------|
| Power stability              | $\pm 1\text{dB}$                             |
| Harmonics                    | $< -30\text{dBm}$                            |
| <b>Receiver</b>              |                                              |
| <b>Item</b>                  | <b>Specification</b>                         |
| Sensitivity                  | $-115\text{dBm}@BER 10^{-3}, 9600\text{bps}$ |
| Co-channel rejection         | $> -12\text{dB}$                             |
| Adjacent channel selectivity | $> 52\text{dB}@25\text{KHz}$                 |
| <b>Modem</b>                 |                                              |
| <b>Item</b>                  | <b>Specification</b>                         |
| Data Link rate               | 19200bps 9600bps 4800pbs                     |
| Modulation type              | GMSK、4FSK                                    |

#### FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an controlled environment.

This equipment should be installed and operated with minimum distance 60cm between the radiator & your body

Only service personnel have access to the programming capabilities.

The end users in all these cases must not be able to program the radios

This Licensed transmitter is approved as a module for installation into the final devices providing this FCC criteria is met:

1. The final device is designed for mobile or fixed operation.
2. The maximum antenna gain to allow compliance with RF exposure requirement that is listed on the Grant of Certification must be followed.
3. If the label of the module is not visible on the final device, the final device should contain the following text: "Contains FCC ID:2ACRAHX-DU1006D"