# FC-211SP (V5.1)Micropower Data RF Module

# USER MANUAL


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## Ⅰ. Features of FC-211/SP Micropower Data RF Module

**1. ISM frequency band, requiring on application of frequency point.**

Carrier frequency is 433MHz, also capable of providing 868MHz/915MHz carrier frequency.

**2. High anti-interference and low BER(Bit error Rate)**

Based on the FSK modulation mode, the high-efficiency FEC channel encoding technology is used to enhance data's resistance to both burst interference and random interference

**3. Long transmission distance**

Within the range of visibility and the antenna height >2m, the reliable transmission distance >800m(BER=$10^{-6}$/2400Bps).

**4. Three interface modes, convenient for setting and use**

FC-211SP can provide three transparent interfaces: TTL/RS232/ RS485, but the user should customize only one of the above before purchasing. The interface data rate is 1200/2400/4800/9600Bps optional and its format is 8N1/ 8E1/ 8o1 user-defined.

**5. Multi-channel**

The standard FC-211/SP configuration provides 8 channels. If the user needs, it can be extended to more channels, meeting the multiple communication combination mode of the user.

**6. Large data buffer**

FC-211SP can transmit more than 750 bytes long data frames at one time .if the RF data rate is greater than the interface rate, it can transmit more than 200K bytes data frames.

**7. Intelligent data control and transparent data transmission.**

FC-211SP works in a semi duplex communication mode. The user doesn't need to prepare excessive programs but receive/transmit the data from the interface.FC-211/SP will automatically complete the other operations such as transmission/receiving conversion in the air, control, etc.

**8. Low power consumption**

Receiving current is <28mA, transmitting current is <70mA, and sleep current is <3uA.(TTL interface used)

**9. High reliability, small and light convenient embedding**

Single chip RF integrated circuit and single chip MCU are used for lessened peripheral circuits, high reliability, and low failure rate.

## Ⅱ. Application of FC-211/SP Micropower Data RF Module

◆ FC-211/SP Micropower Data RF Module is suitable for:
◆ Wireless data transmission.
◆ Wireless meter reading

◆ Automatic data collecting system
◆ Industrial remote control and remote measurement
◆ Building automation, safety and security, powerhouse equipment wireless monitor, entrance control system

## Ⅲ. How to use FC-211/SP Micropower Data RF Module

### 1. Interface sketch map

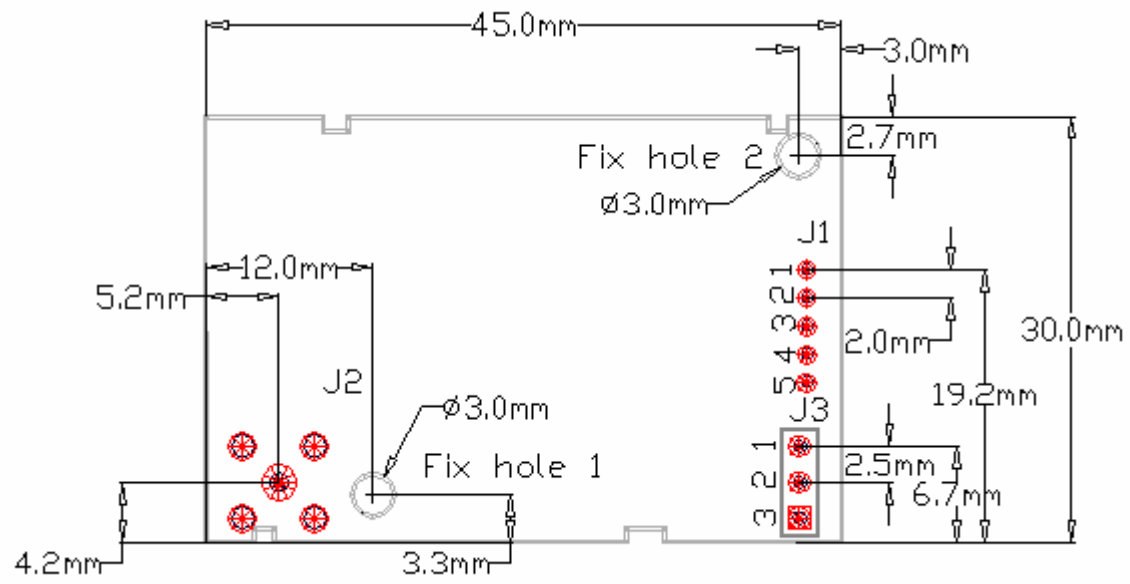



Fig1.FC-211/SP **Interface sketch map(View from the back of PCB v5.1)**

### 2. Dimension and weight

Size：45mmX30mmX10mm
Weight：10g（antenna excluded）

### 3. Definition ofFC-211/SP interface.

**J1: User interface**

Pin 1: 5.0±0.5V(3V optional)
Pin 2: GND
Pin 3: RXD：serial data receiving end (RS485 A)
Pin 4: TXD：serial data transmitting end (RS485 B)
Pin 5: IDLE：power-saving mode selection (IDLE mode), hung or Low level takes effect.，high level (3.0V ) is for active mode.

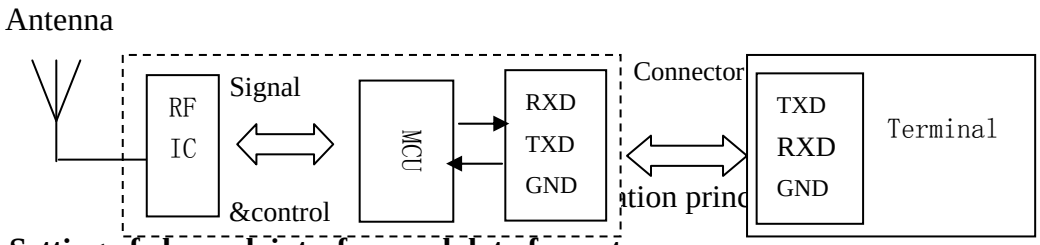
**J2: Antenna interface**

**J3: User interface**

Pin1: Green light
Pin 2: Power supply
Pin 3: Red light

### 4. Connection with the terminal

FC-211SP can provide TTL/RS232/RS485 interface. Please select one interface mode while purchasing the product.




**5. Setting of channel, interface and data format**

**1).Setting or reading parameters**

User can set or read the serial port data rate, air data rate, channel number and address code.

Parameter setting or reading can be done with software FC211SP.EXE in our delivered CD.

**Command frame format:**

Table 1.

| Command frame header | Frame length | Command word | Check sum |
|---|---|---|---|

Command frame header：55H AAH
Frame length = Command word length +1
Command word：less than 8 bytes
Check sum (2 bytes)： Frame length +command data 1+…+command data n
All of the command word expressed in hex.
Table 2. Command frame format：

| Command type | Frame header | Frame length | Command word | Check sum | Remarks |
|---|---|---|---|---|---|
| Channel No. | 55 AA | 06 | 07 XX 00 00 00 | | XX: 01-08 |
| Air data rate setting | 55 AA | 04 | 20 05 XX | | XX=00：2400； 20：1200；30：4800；40：9600 |
| Power-saving mode setting | 55 AA | 04 | 58 00 XX | | XX= 00: mode 1<br>22: mode 2 |
| Power-saving mode reading | 55 AA | 04 | 59 00 00 | | Return：59 00 XX |
| Address code setting | 55 AA | 04 | 32 XX XX | | XXXX：4 bytes BCD (0000-9999) |
| Interface data rate setting | 55 AA | 03 | 28 XY | | X=0：no check；X=2：odd check；X=3：even check； Y=0： 9600； Y=1：4800；Y=2：2400；Y=3：1200；Y=4：600；Y=6： 19200 |
| Channel reading | 55 AA | 03 | 24 00 | | Return ： 24 XX |
| Air data rate reading | 55 AA | 03 | 23 00 | | Return：23 XX |
| Address code reading | 55 AA | 04 | 26 00 00 | | Return：26 XX XX |
| Correct setting response | 55 AA | 02 | 20 | 00 22 | |
| Wrong setting response | 55 AA | 02 | 21 | 00 23 | |

**2). Channel and Frequency**

Table3. Corresponding frequency of 1~8 channels

| Channel No. | Frequency | Channel No. | Frequency |
|---|---|---|---|
| 1 | 432.8000MHZ | 2 | 432.9000MHZ |
| 3 | 433.0000MHZ | 4 | 433.1000MHZ |
| 5 | 433.2000MHZ | 6 | 433.3000MHZ |
| 7 | 433.4000MHZ | 8 | 433.5000MHZ |

**5. Low power consumption (sleep) function ofFC-211/SP**

**The module keeps active (receiving /transmitting) when Pin IDLE (Pin 5 of J1) is high. It will enter into sleep mode if pin IDLE keeps hung or low while its receiving /transmitting stops for 5s.**

(1). In sleep mode one, CPU stops working ,but the periphery receiving circuit of the module alternates between work(standby reception status) and sleep status. The ratio of work/sleep time is 1/200. It can be waked up by the following two cases:

A. If pin IDLE jumps high or the module receives any data from the interface, the module will wake up, then it will send wakening command to wake up other sleeping modules. The module can receive/transmit data from/to air after an interval of 1s, but just after 20ms its interface can handle data. The consumption current is less than 3μA(special requirement for hardware) if the reliable transmission distance is required up to 350m, and the consumption current is less than 5mA if the reliable transmission distance is required up to 800m.

B. The module can be waked up by wakening command from air, and it can receive/transmit data promptly after being waked up.

(2). In sleep mode two, All the peripheral circuit is powered down and CPU is out of work with the least consumption of less than 1.5uA.If the interface has any data(00 is optimal) or IDLE keeps high, the module will exit from this mode but will not receive the first byte of data correctly. A low pulse should be sent to wake up CPU on pin RXD. After at least 10ms for CPU startup, the correct transmission is ensured.

**Note: Pin IDLE connects to high level in default case. Low power consumption mode is disabled. The function should be declared if user needs.**

## Ⅳ. Technical specification of FC-211/SP

Table 4. Technical specification

| | | | |
|---|---|---|---|
| 1 | Carrier frequency | 428.00～433.50MHZ | |
| 2 | Modulation mode | FSK | |
| 3 | RF power | ≤30mW | |
| 4 | Sensitivity | -116dBm | |
| 5 | Sleep current | <3uA/TTL ， <0.3mA/RS485 ， <3 mA/RS232 | |
| 6 | Transmitting current | <70mA/TTL ， <70mA/RS485 ， <75 | |

| | | | |
|---|---|---|---|
| | | mA/RS232 | |
| 7 | Receiving current | <27mA/TTL， <27mA/RS485， <30 mA/RS232 | |
| 8 | RF data rate | 1200/2400/4800/9600Bps | Set by user |
| 9 | Interface data rate | 1200/2400/4800/9600Bps | Set by user |
| 10 | Interface data format | 8E1/8N1/8O1 | Set by user |
| 11 | Power supply | DC 5±0.5V | |
| 12 | Temperature | -25℃～60℃ | |
| 13 | Working humidity | 10%～90% RH, non-condensing | |
| 14 | Dimensions | 45mm×30mm×10mm | |

## Ⅴ.Factory default setting and Accessories.

Factory default setting

| | |
|---|---|
| Channel No. | 1 |
| Interface data rate | 9600bps |
| RF data rate | 9600bps |
| Check | no check |

Accessories

| | |
|---|---|
| User's manual | 1 pcs |
| 5-core port | 1 |
| 433MHz/SMA antenna | optional |
| CD | 1 |