SRWF-1E86
User manual
## Contend

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1. Module introduction

SRWF-1E86 is low power wireless data transceiver modules. It can be used for any standard or nonstandard user protocol. The below are SRWF-1E86 main features:

1. Adjustable transmitting power:
   Eight grade of transmitting power can be available: 1dBm, 2dBm, 5dBm, 8dBm, 11dBm, 14dBm, 17dBm, 20dBm. Default value is 20dBm.

2. Customized work frequency
   433/470/868/915MHz for your choice

3. High anti-interference and low BER(Bite Error Rate)
   Based on GFSK modulation, the high-efficiency forward error correction channel encoding technology is used to enhance data’s resistance to both burst interference and random interference.

4. Multi-Channel available
   Channel can be configured by both hardware and software. The default is by hardware.
   You can configure eight channels by hardware or 32 channels by software which meet the multiple communication combination modes.

5. Easy selection of three interface modes
   You can choose one of TTL/RS232/RS485 interfaces by adjusting the related hardware.

6. Baud rate configuration by hardware and software
   Baud rate can be configured by both hardware and software. The default is by hardware.
   Baud rate set to below value by hardware:
   1200/2400/4800/9600/19200bps. default is 9600bps.
   Baud rate set to below value by software:
   1200/2400/4800/9600/14400/19200/38400/57600 bps

7. Serial port data format definition
   Serial port data format can be configured by both hardware and software. The default is by hardware; it support eight bite data(8N1,7E1,7O1) and nine bite data(9N1, 8E1,8O1) and the default is 9bite data.

8. Supporting data frame with no length limit

9. High reliability with small size
   Single chip radio frequency integrated circuit and single MCU are used for less peripheral circuit, high reliability and low error bit rate
10. Multiple antennas available for your different demand

2. Application fields

SRWF-1E86 series modules can be used for below applications:
1. AMR-Automatic Meter Reading
2. Remote control in industry
3. Wireless solutions for weighing scale
4. Data collection of production line
5. Automation and control of medical/electronic equipment
6. Data communication in railway, oil well and wharf
7. Wireless smart control of lighting system
8. Wireless alarm and security system
9. Car alarm, tire pressure monitoring and four-wheel orientation
10. Wireless POS and PDA smart terminals
11. LED display screen for lane buoy or temporary station in open field
12. Automated non-stop billing system on freeway
13. Wireless sensor network
14. Bank queuing management system

3. Technical specification

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Unit</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Work temperature</td>
<td>°C</td>
<td>-40</td>
<td>25</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Work humidity</td>
<td>%</td>
<td>10%~90%</td>
<td></td>
<td></td>
<td>(relative humidity without condensation)</td>
</tr>
<tr>
<td>3</td>
<td>Power supply</td>
<td>V</td>
<td>+3.6~+6.0</td>
<td></td>
<td></td>
<td>DC</td>
</tr>
<tr>
<td>4</td>
<td>Work frequency</td>
<td>Mhz</td>
<td>433/868</td>
<td></td>
<td></td>
<td>Carrier frequency with 433/470/868/915MHz</td>
</tr>
<tr>
<td>5</td>
<td>Transmission power</td>
<td>dBm</td>
<td>1</td>
<td>20</td>
<td>20</td>
<td>Adjustable between 1~20 dBm</td>
</tr>
<tr>
<td>6</td>
<td>Transmitting current</td>
<td>mA</td>
<td>80</td>
<td>90</td>
<td>110</td>
<td>Positive correlation with transmitting</td>
</tr>
<tr>
<td></td>
<td>Receiving sensitivity</td>
<td>dBm</td>
<td>-111</td>
<td>-114</td>
<td>-118</td>
<td>power</td>
</tr>
<tr>
<td>---</td>
<td>----------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>---------------------</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>in open area</td>
</tr>
<tr>
<td>7</td>
<td>Receiving current</td>
<td>mA</td>
<td>30</td>
<td>35</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Sleep current</td>
<td>uA</td>
<td>6</td>
<td>10</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Transmitting distance(20dBm)</td>
<td>m</td>
<td>700</td>
<td>800</td>
<td>900</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Modulation</td>
<td></td>
<td>GFSK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Channel number</td>
<td></td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Dimension</td>
<td>mm</td>
<td>49.6</td>
<td>28.3</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

4. Outline and pin definition

The below is the outline of SRWF-1E86

![Figure1 SRWF-1E86 outline](image)

Pitch of ten-pin single-row connector in the left is 2.54mm. Pin definition is show in below table:
<table>
<thead>
<tr>
<th>No.</th>
<th>Signal type</th>
<th>Signal name</th>
<th>Signal direction</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power</td>
<td>GND</td>
<td></td>
<td>Power ground</td>
</tr>
<tr>
<td>2</td>
<td>Power</td>
<td>VCC</td>
<td></td>
<td>DC Power, 3.6V~6V</td>
</tr>
<tr>
<td>3</td>
<td>Signal</td>
<td>RXD</td>
<td>I</td>
<td>UART Receiving, 3V TTL.</td>
</tr>
<tr>
<td>4</td>
<td>Signal</td>
<td>TXD</td>
<td>O</td>
<td>UART transmitting, 3V TTL.</td>
</tr>
<tr>
<td>5</td>
<td>Power</td>
<td>GND</td>
<td>I</td>
<td>Power ground</td>
</tr>
<tr>
<td>6</td>
<td>Signal</td>
<td>A/TX</td>
<td>I</td>
<td>A of RS485 TX of RS232</td>
</tr>
<tr>
<td>7</td>
<td>Signal</td>
<td>B/RX</td>
<td>I</td>
<td>B of RS485 RX of RS232</td>
</tr>
<tr>
<td>8</td>
<td>Signal</td>
<td>SLP</td>
<td>I</td>
<td>Low level enable(&lt;0.6V), T &gt;1ms</td>
</tr>
<tr>
<td>9</td>
<td>Signal</td>
<td>RST</td>
<td>I</td>
<td>Low level enable(&lt;0.6V), T &gt;10us</td>
</tr>
<tr>
<td>10</td>
<td>Signal</td>
<td>MOD</td>
<td></td>
<td>Floating</td>
</tr>
</tbody>
</table>

5. Operation

5.1 Communication interface selection

5.1.1 TTL

TTL interface is showed as below

![TTL interface diagram]

Remarks: Keep other pins floating to avoid importing interference

5.1.2. RS485 interface

RS-485 is showed as below:
5.1.3 RS232 interface

RS-232 is showed as below:

5.2 Parameter configuration

You can configure the baud rate, data format, channel and transmitting of
SRWF-1E86. Baud rate, data format and channel can be configured by both hardware and software.

5.2.1 Parameter configuration by software

Software parameter configuration: Input the appointed command in serial port to configure. See the appendix one for the list of all commands.

5.2.2. Parameter configuration by hardware (Effective in the state of hardware configuration)

5.2.2.1 Configure channel

ABCD jumper wire of 2.00mm dual row straight pin header is used for configuring channels. You can configure sixteen channels by short connection of ABC jumper like below table before module power-on:

<table>
<thead>
<tr>
<th>Jumper ABCD</th>
<th>Channel number</th>
<th>433MHz</th>
<th>868 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABCD</td>
<td>0(ABCD no short)</td>
<td>433.521</td>
<td>868.129</td>
</tr>
<tr>
<td>ABCD</td>
<td>1</td>
<td>434.648</td>
<td>869.256</td>
</tr>
<tr>
<td>ABCD</td>
<td>2</td>
<td>435.775</td>
<td>870.383</td>
</tr>
<tr>
<td>ABCD</td>
<td>3</td>
<td>436.902</td>
<td>871.510</td>
</tr>
<tr>
<td>ABCD</td>
<td>4</td>
<td>438.029</td>
<td>872.637</td>
</tr>
<tr>
<td>ABCD</td>
<td>5</td>
<td>439.156</td>
<td>873.764</td>
</tr>
<tr>
<td>ABCD</td>
<td>6</td>
<td>440.283</td>
<td>874.891</td>
</tr>
<tr>
<td>ABCD</td>
<td>7</td>
<td>441.410</td>
<td>876.018</td>
</tr>
</tbody>
</table>
5.2.2.2 Configure baud rate

Shortcut of pad marked with 12, 24, 48, 96, 192 in the area with Baud in SRWF-1E86 board can configure 1200bps, 2400bps, 4800bps, 9600bps, 19200bps baud rate respectively.
5.2.2.3 Configure data format

E jumper of dual row straight pin header is used to configure data format; If E jumper is short, data format is 8 bite, if not, data format is 9 bite

5.3 Indicate light function

When module is power-on, TX, RX light will flash once and module will send its version information to serial port. You can check the basic information of module according to it. For example:

1E86(V11)
C=00(H)(433)
D=024(S),9n1(H)
P=17dBm

Remarks:
1E86 is the part number of SRWF-1E86, (V11) mean the version of module is V1.1.
C stand for channel, 00 is channel number,(H) mean channel selection by hardware is effective, 433 is working frequency
D stand for baud rate, 024 mean that current baud rate is 2400bps,(S) mean baud rate adjustment by software.
9N1 mean that data format is 9bite, (H) mean that data format
adjustment by hardware is effective

P stand for transmitting power, 17 mean that transmitting power is 17dBm.

When module is transmitting data by air, RX light will flash
When module is receiving data by air, TX light will flash

5.4 Time delay diagram

5.4.1. Sleep mode

SRWF-1E86 support sleep function, controlled by pin SLP, controlled by pin SLP. Normally SLP pin is in high level, but when is in low level, the module will start to sleep. The module will not work until RST pin is in low level, means reset, or the module is powered again. Please refer to below sleep/reset timing diagram.

5.4.2. Transmitting delay

There is time delay (Td) between the data received by RXD of module A and the final data transmitted by TXD of module B. Different data rate results in different delay time. Please check the below time delay diagram.

<table>
<thead>
<tr>
<th>Baud rate(bps)</th>
<th>Delay time(Td/ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>96</td>
</tr>
<tr>
<td>2400</td>
<td>48</td>
</tr>
<tr>
<td>4800</td>
<td>24.4</td>
</tr>
<tr>
<td>9600</td>
<td>12.2</td>
</tr>
<tr>
<td>14400</td>
<td>8.5</td>
</tr>
</tbody>
</table>
6. Receiving signal strength inspection

If you need inspect the receiving signal strength, then send READRSSI to serial port. Serial port will output the value of RSSI of last data frame. This value is absolute value. For example, reading of the byte is 45, then RSSI is -68dBm.

7. Available antenna

The below is the available antenna for SRWF-1E86: AT-1, AT-3, AT-4, AT-5 and so on. The working frequency of antenna supports 433, 470, 868 and 915. You can visit Sunray’s homepage to select more other antenna.
8. Technical support and after-sales service

1. Sunray will provide free technical support for your application and secondary development. Sunray assures one-year warranty period and provides lifelong maintenance service.

2. For the convenient configuration to SRWF-1E86, Customers can request it from sales after you purchased the modules.

3. After the successful configuration by software, the hardware configuration won’t work anymore. Module will only support software configuration.
### Appendix one: Command list for parameter configuration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Function</th>
<th>Command</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>Switch to hardware configuration to channel</td>
<td>HARDSETCHAN</td>
<td>Switch channel configuration from software to hardware</td>
</tr>
<tr>
<td></td>
<td>Switch to hardware configuration to channel</td>
<td>SOFTSETCHAN</td>
<td>Switch channel configuration from software to hardware</td>
</tr>
<tr>
<td></td>
<td>Set channel by software</td>
<td>SETCHAN=XX</td>
<td>Valid in status of software configuration; XX is the channel number to be set and its range is 00-31</td>
</tr>
<tr>
<td>Baud rate</td>
<td>Switch to hardware configuration to baud rate</td>
<td>HARDSETDATA RATE</td>
<td>Switch baud rate configuration from software to hardware</td>
</tr>
<tr>
<td></td>
<td>Switch to hardware configuration to baud rate</td>
<td>SOFTSETDATA RATE</td>
<td>Switch baud rate configuration from software to hardware</td>
</tr>
<tr>
<td></td>
<td>Set baud rate by software</td>
<td>DATARATE=XX X</td>
<td>Valid in status of software configuration ; XXX is baud rate to be set. 012/024/048/096/144/192/384/576</td>
</tr>
<tr>
<td>Data format</td>
<td>Switch to hardware configuration to data format</td>
<td>HARDSETDATA FORMAT</td>
<td>Switch data format configuration from software to hardware</td>
</tr>
<tr>
<td></td>
<td>Switch to hardware configuration to data format</td>
<td>SOFTSETDATA FORMAT</td>
<td>Switch data format configuration from software to hardware</td>
</tr>
<tr>
<td></td>
<td>Set data format by software</td>
<td>DATAFORMAT =X</td>
<td>Valid in status of software configuration; When X is 8, data format is 8bite; when 9, data format is 9 bite</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>---------------</td>
<td>----------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Transmitting power</td>
<td>Set transmitting power</td>
<td>SETPOWER=X X</td>
<td>XX is power level and is configured to 1/02/05/08/11/14/17/20dBm</td>
</tr>
<tr>
<td>RSSI</td>
<td>Read RSSI value</td>
<td>READRSSI</td>
<td>Output the absolute value of RSSI; If output is 0x32, RSSI is -50dBm</td>
</tr>
<tr>
<td>Version</td>
<td>Read version information</td>
<td>GETEDITION</td>
<td>See the version remarks in 7.3</td>
</tr>
</tbody>
</table>
Appendix two: Layout dimension