



Digital Pyroelectric Infrared Sensor (Model: RDB226S)

User's Manual

Version: 1.3

Valid from: 2022-05-20

Zhengzhou Winsen Electronics Technology Co., Ltd

Statement

This manual copyright belongs to Zhengzhou Winsen Electronics Technology Co., LTD. Without the written permission, any part of this manual shall not be copied, translated, stored in database or retrieval system, also can't spread through electronic, copying, record ways.

Thanks for purchasing our product. In order to let customers use it better and reduce the faults caused by misuse, please read the manual carefully and operate it correctly in accordance with the instructions. If users disobey the terms or remove, disassemble, change the components inside of the sensor, we shall not be responsible for the loss.

The specific such as color, appearance, sizes &etc, please in kind prevail.

We are devoting ourselves to products development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on optimized using way are welcome.

Please keep the manual properly, in order to get help if you have questions during the usage in the future.

Zhengzhou Winsen Electronics Technology CO., LTD.

RDB226S Digital Pyroelectric Infrared Sensor

Digital PIR sensor RDB226S, is an integrated design of sensitive element and signal processing chip, packaged sensitive element and IC chip into sensor shield. Sensitive element transfer the human movement signal to high-precision digital chip for data processing. Then the sensor gives digital signal for easy using.

Features:

- * High-precision AD signal process
- * Differential signal input mode, anti-interference ability
- * Sensitivity, delay time, and light adjustment function
- * Enable pin controls the sensor output
- * Wide voltage power supply(1.8~4.5V) and power consumption
- * Digital TTL signal output



Applications

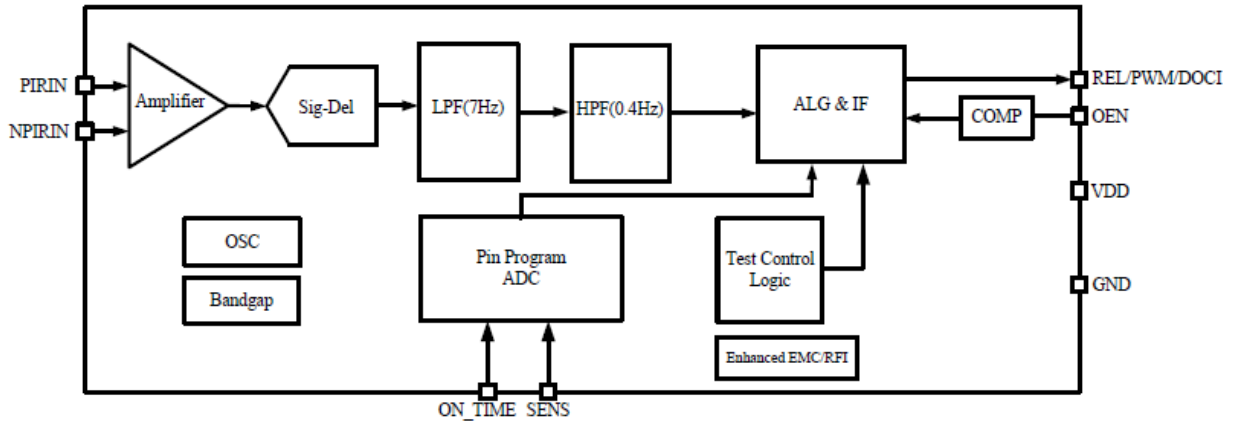
Security product
 Human body induction toys
 Human body induction lamps, and switches
 Industrial automation control
 Smart home
 IOT terminals
 Intelligent appliance

Technical Parameter

1. Working condition(T=25°C)

| Parameter | Symbol | Min | Typical | Max | Unit | Note |
|----------------------------|---------------------|-----|---------|------|------|-------------------------|
| Working condition | | | | | | |
| Voltage | VDD | 1.8 | 3.0 | 4.5 | V | Power supply mode |
| Current | IDD | | 10 | | uA | 10uA @3V@25°C |
| Sensitivity | VSENS | 104 | | 515 | uV | |
| Storage temperature | Tst | -40 | | 125 | °C | |
| Working Temperature | Twk | -25 | | 85 | °C | |
| ONTIME&SENS&OEN | | | | | | |
| SENS, ONTIME Input | | 0 | | VDD | | |
| SENS, ONTIME Input Current | | | | 20 | nA | Pull-down current |
| OEN Input Low LEL | V _{IL_OEN} | | | 0.6 | V | |
| OEN Input High LEL | V _{IH_OEN} | 1.2 | | | V | |
| Output Pin(REL) | | | | | | |
| Output drive current | I _{REL} | -5 | | 5 | mA | |
| Block time | | 1.0 | 2.0 | 3.0 | S | |
| Delay time | ON _{TIME} | 1 | | 3600 | S | 16 levels of adjustment |

2. Internal frame



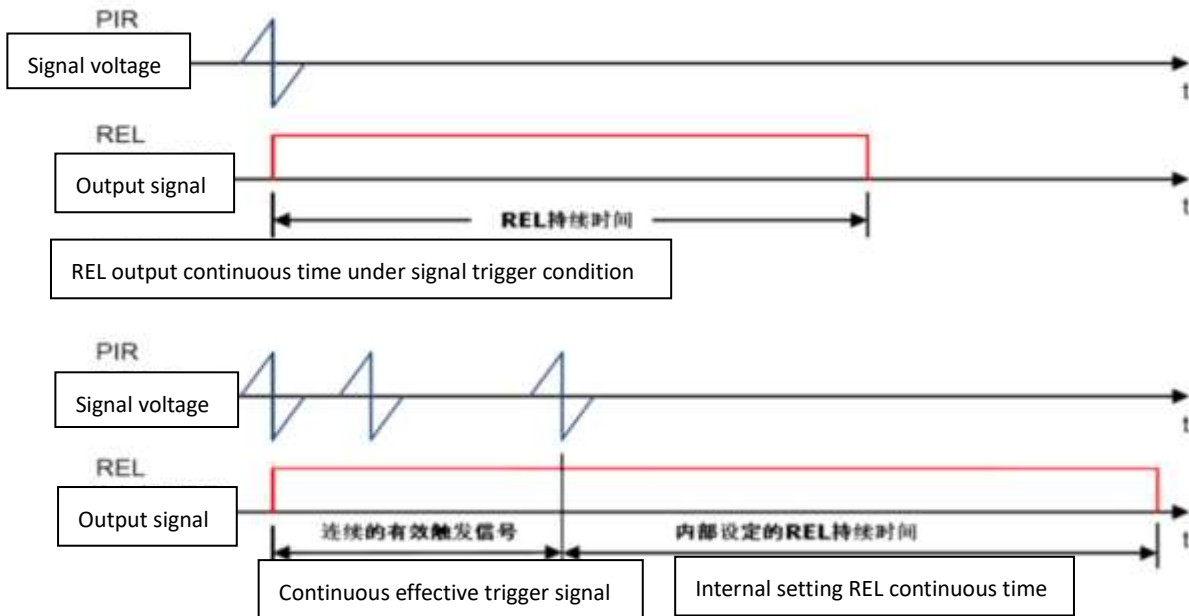
3. Trigger mode

In the normal detection condition, the following two conditions are valid:

- (1) When the signal amplitude successively exceeds the positive and negative thresholds within 4S ;
- (2) The signal amplitude exceeds 5 times the threshold;

After the sensor is effectively triggered, the REL pin gives output and maintains a high level for a certain period of time. The output high level time can be adjusted by the voltage divider resistor of the ONTIME pin. During the high level output period, if the effective trigger signal is detected again, the output high time is recalculated.

Remark: The sensor has warm-up time. After power on, the REL pin outputs high level for 10 seconds and low level for 2 seconds. Warm-up time has nothing to do with ONTIME



4. Delay time adjustment

The delay time is the high-level TTL output duration time when sensor reaches the comparison threshold. The input voltage of ONTIME pin, determines the duration of output signal. Each time a trigger signal is received, the delay time is recalculated.

Relationship between ONTIME pin voltage, delay time and voltage divider resistance:

| Item | Corresponding pin voltage range | Center value of Pin voltage | Duration time (Second) | Pull-up resistor (ohm) | Theoretical pull-down resistor(ohm) | Recommended pull-down resistor(ohm) |
|------|---------------------------------|-----------------------------|------------------------|------------------------|-------------------------------------|-------------------------------------|
| 1 | (0~8/256) *VDD | 1*VDD/64 | 1 | 1M | 16k | GND |
| 2 | (9/256~16/256) *VDD | 3*VDD/64 | 5 | 1M | 49k | 47k |
| 3 | (17/256~24/256) *VDD | 5*VDD/64 | 10 | 1M | 85k | 82k |
| 4 | (25/256~32/256) *VDD | 7*VDD/64 | 15 | 1M | 122k | 120k |
| 5 | (33/256~40/256) *VDD | 9*VDD/64 | 20 | 1M | 164k | 160k |
| 6 | (41/256~48/256) *VDD | 11*VDD/64 | 30 | 1M | 208k | 205k |
| 7 | (49/256~56/256) *VDD | 13*VDD/64 | 45 | 1M | 255k | 261k |
| 8 | (57/256~64/256) *VDD | 15*VDD/64 | 60 | 1M | 306k | 300k |
| 9 | (65/256~72/256) *VDD | 17*VDD/64 | 90 | 1M | 362k | 360k |
| 10 | (73/256~80/256) *VDD | 19*VDD/64 | 120 | 1M | 422k | 430k |
| 11 | (81/256~88/256) *VDD | 21*VDD/64 | 180 | 1M | 488k | 487k |
| 12 | (89/256~96/256) *VDD | 23*VDD/64 | 300 | 1M | 561k | 560k |
| 13 | (97/256~104/256) *VDD | 25*VDD/64 | 600 | 1M | 641k | 620k |
| 14 | (105/256~112/256) *VDD | 27*VDD/64 | 900 | 1M | 730k | 750k |
| 15 | (113/256~120/256) *VDD | 29*VDD/64 | 1800 | 1M | 829k | 820k |
| 16 | (121/256~128/256) *VDD | 31*VDD/64 | 3600 | 1M | 940k | 1M |

5. Sensitivity adjustment

The SENS pin sets comparison threshold of different signals, by setting different voltages through an external resistor network.

When connected to ground, the sensor comparison threshold is the lowest, sensitivity is highest, that is, detection distance is the farthest.

When the input voltage is over 1/2VDD, it would choose max threshold, sensitivity is the lowest, that is, the detection distance is minimal.

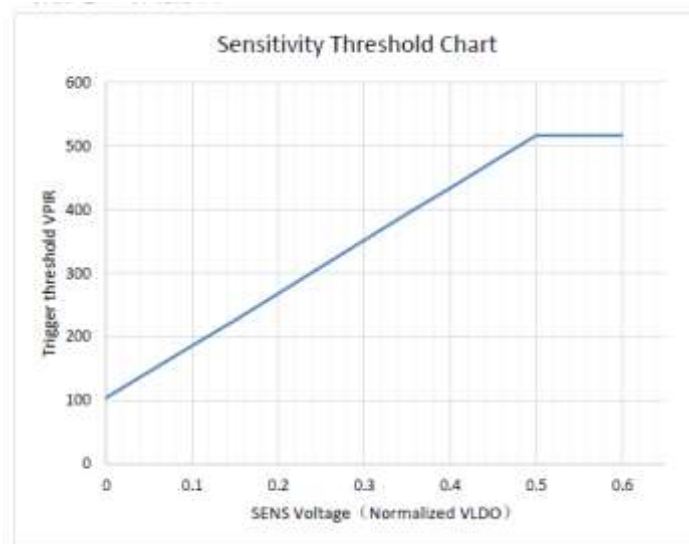
The sensing distance is not linear with the voltage on the SENS pin. With different Fresnel lenses, the sensitivity is different, and distance depends on actual measurement.

Relationship between sensitivity threshold and resistance network:

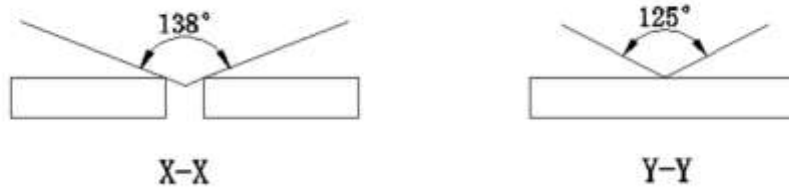
| | | |
|-----------------------|----------------------|------------------------|
| Sensitivity threshold | Pull-up resistor ohm | Pull-down resistor ohm |
|-----------------------|----------------------|------------------------|

| | | |
|-------|----|------|
| 104uv | 1M | GND |
| 141uv | 1M | 47k |
| 186uv | 1M | 110k |
| 230uv | 1M | 180k |
| 264uv | 1M | 240k |
| 309uv | 1M | 330k |
| 368uv | 1M | 470k |
| 400uv | 1M | 560k |
| 438uv | 1M | 680k |
| 515uv | 1M | 1M |

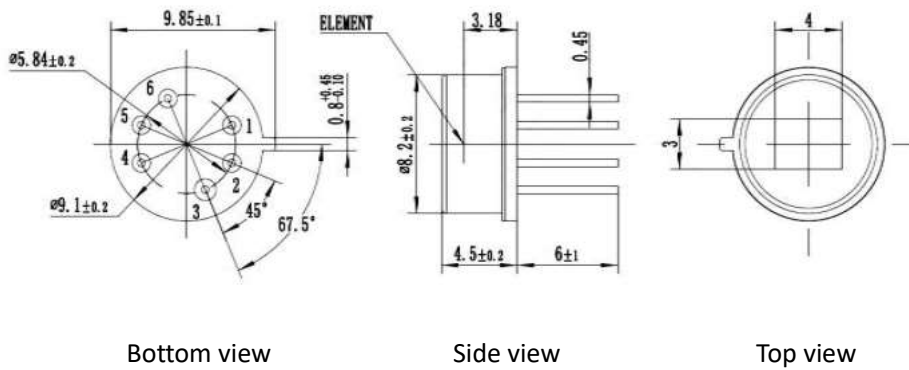
The relationship between SENS pin voltage and threshold



Sensor Detection Angle



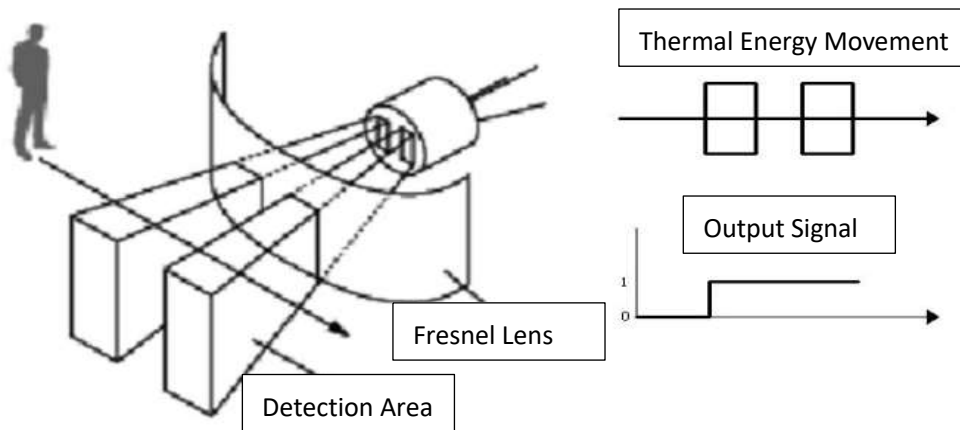
Component Structure (Unit: mm)



Pin Definition

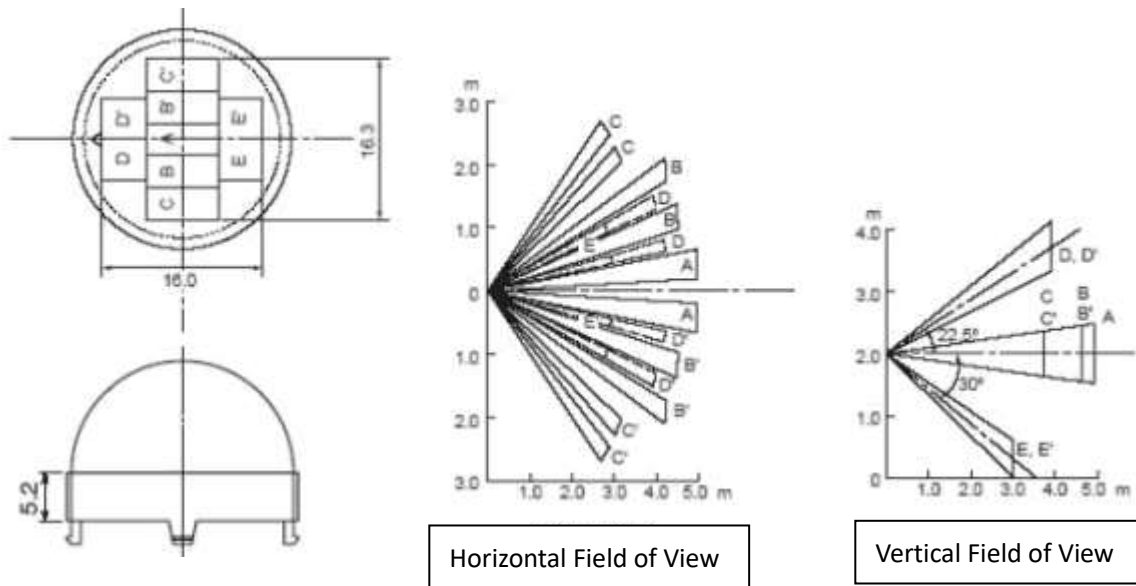
| Item | Name | Definition |
|------|--------|--|
| 1 | SENS | Sensitivity pin (0-1/2V _{DD}); 0- highest sensitivity; $\geq 1/2V_{DD}$ - Lowest sensitivity |
| 2 | OEN | photo-cell adjustment pin, OEN PIN (20% V _{DD} ~80%V _{DD}) |
| 3 | VSS | power ground |
| 4 | VDD | sensor power supply pin |
| 5 | REL | sensor output pin, TTL high/low level output |
| 6 | ONTime | delay time adjustment pin, 16 level option, the delay time is recalculated after each trigger |
| Note | | Select 0, it's recommended using a resistor to pull down to ground. Select high level, it's recommended pulling up to high level with resistor. |

Frequency characteristic

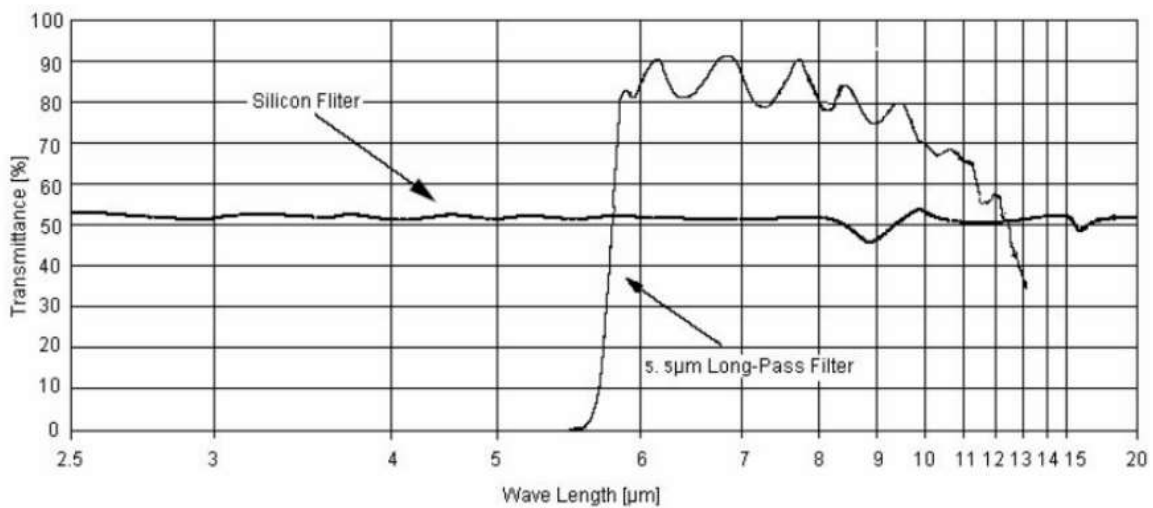


Fresnel Lens:

Fresnel Lens used, would determine the sensor's detection angle and distance, which can correspond to a variety of detection range and distance, according to customers' requirement.

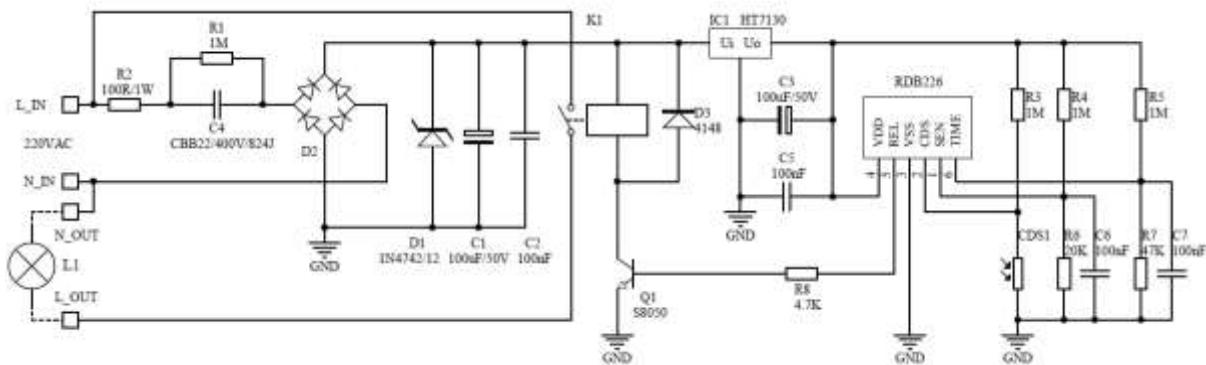


Wave Length



Note: The graph shows a typical 5μm infrared filter reference, and the curve is the average of infrared pass rate. The window material is a special vacuum coating of semiconductor wafers.

Typical Application circuit



Cautions:

1. The sensor’s parameter is obtained by standard testing condition after 1 minute’s settling time.
2. Please pay attention on Sensor’s window direction, must combine with Fresnel lens to get a perfect detecting angle.
3. Sensors detecting distance is affected by ambient temperature, moving objects’ temperature, Fresnel lens, Amplifier amplification factor, the comparator threshold voltage setting...etc. please take a comprehensive consideration of various parameters when using the sensors.
4. Please do not touch the window area to avoid damaging to the optical filter.
5. Please handle the sensor with care when using it.
6. Please try to use hand soldering and make the soldering time as short as possible. Soldering temperature should be less than 350°C, and soldering time be less than 3 seconds.
7. Please get electrostatic protective measures when using this product, as applying static electricity of ±100V or more may damage the sensor.

Note: To keep continual product development, we reserve the right to change design features without prior notice.

Zhengzhou Winsen Electronics Technology Co., Ltd
Add: No.299, Jinsuo Road, National Hi-Tech Zone, Zhengzhou 450001 China
Tel: +86-371-67169097/67169670
Fax: +86-371-60932988
E-mail: sales@winsensor.com
Website: www.winsen-sensor.com