Digital Pyroelectric Infrared Sensor (Model： RDB226)

User’s Manual

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Zhengzhou Winsen Electronics Technology Co., Ltd

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Zhengzhou Winsen Electronics Technology CO., LTD.

RDB226 Digital Pyroelectric Infrared Sensor

Digital PIR sensor RDB226, 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(1.5~4.5V) 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. Max Limit

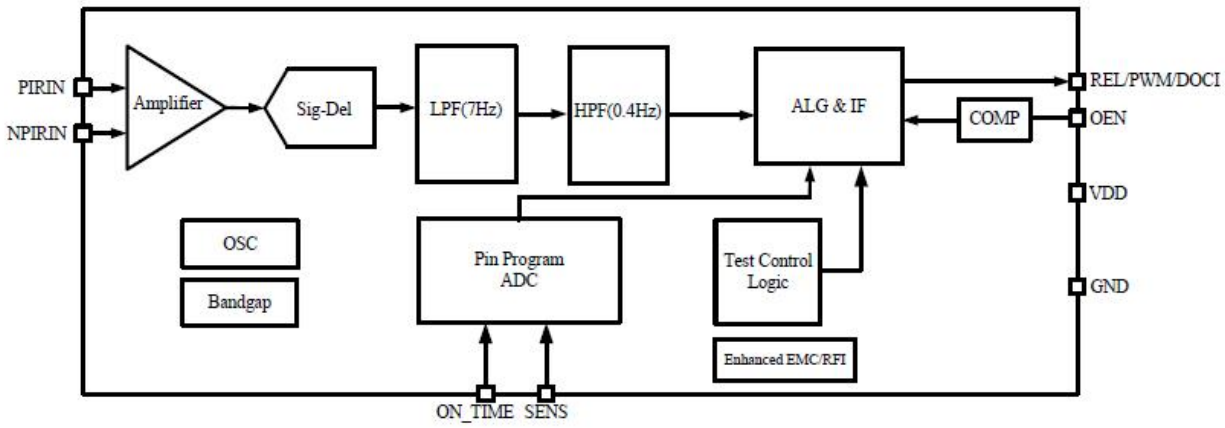
Parameter	Symbol	Min	Max	Unit	Note
Voltage	V_{DD}	-0.3	4.5	V	25℃
Pin Voltage		-0.3	V_{DD}+0.3	V	25℃
Storage temperature	T_{ST}	-40	125	℃	

2. Working condition(T=25℃)

Parameter	Symbol	Min	Typical	Max	Unit	Note
Working condition						
Voltage	VDD	1.5	3.0	4.5	V	Power supply mode
Current	IDD		10		uA	10uA @3V@25℃
Sensitivity	VSENS		104		uV	
Temperature	WST	-25		85	℃	
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)						

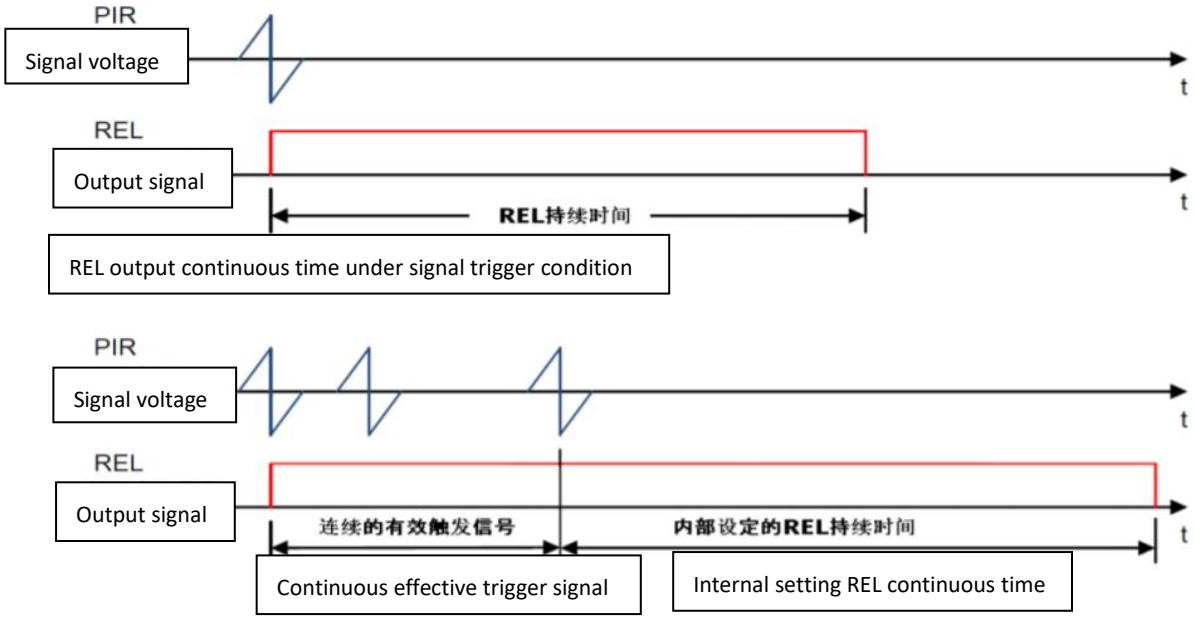
Output drive current	I_{REL}	-5		5	mA	
Block time			2.0		S	
Delay time	ON_{TIME}	1		3600	S	16 levels of adjustment
Oscillators and filters						
Low filter cut-off frequency				7	Hz	
High filter cut-off frequency				0.4	Hz	
Chip oscillator frequency	F_{CLK}			32	KHz	
Chip oscillator error	F_{CLK_Err}	-1000		1000	Ppm/K	-20~80℃

3. Internal frame



4. 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



5. 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

6. 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.

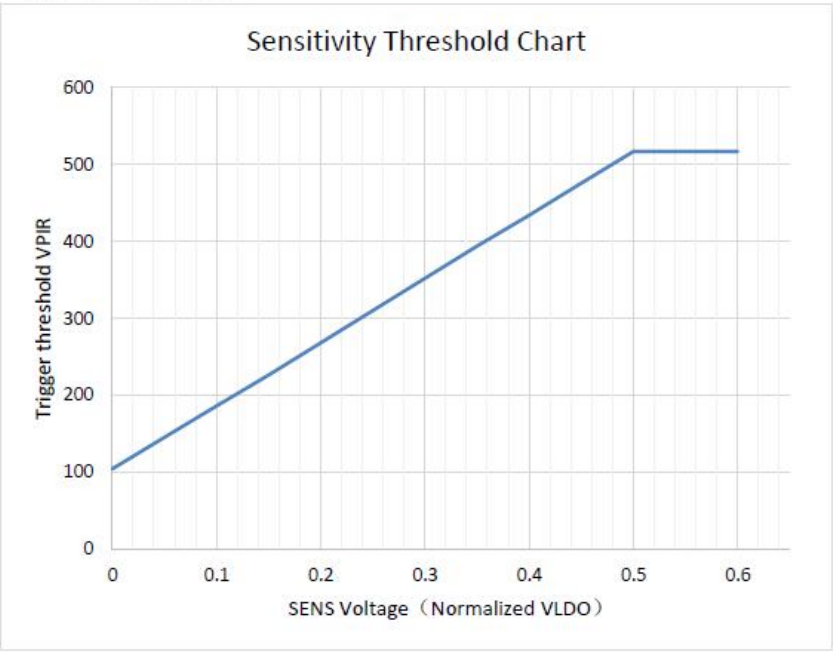
When the input voltage is over 1/2VDD, it would choose max threshold, sensitivity is the lowest, that is, the detection distance is minimal.

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.

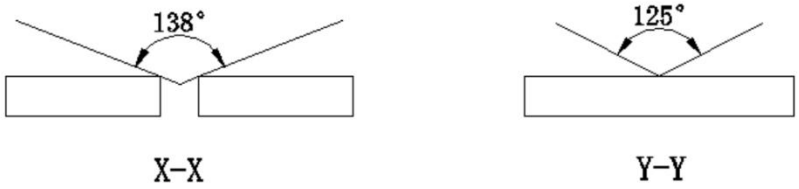
Relationship between sensitivity threshold and resistance network:

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

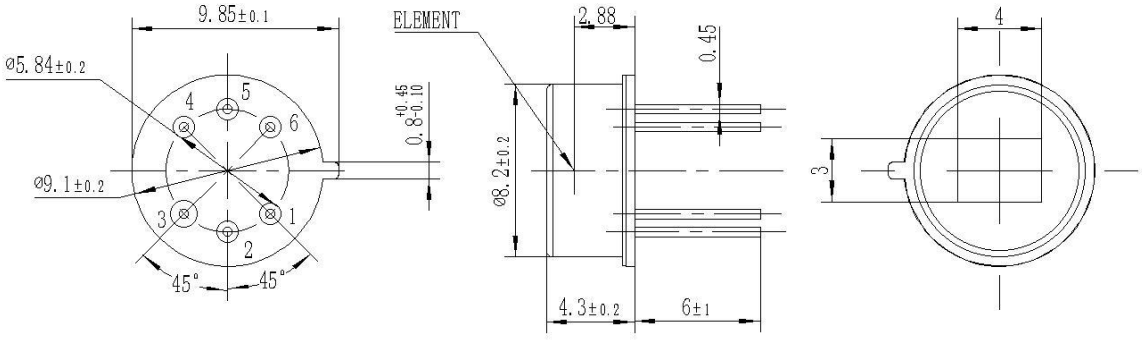
The relationship between SENS pin voltage and threshold



Sensor Detection Angle



Component Structure (Unit: mm)

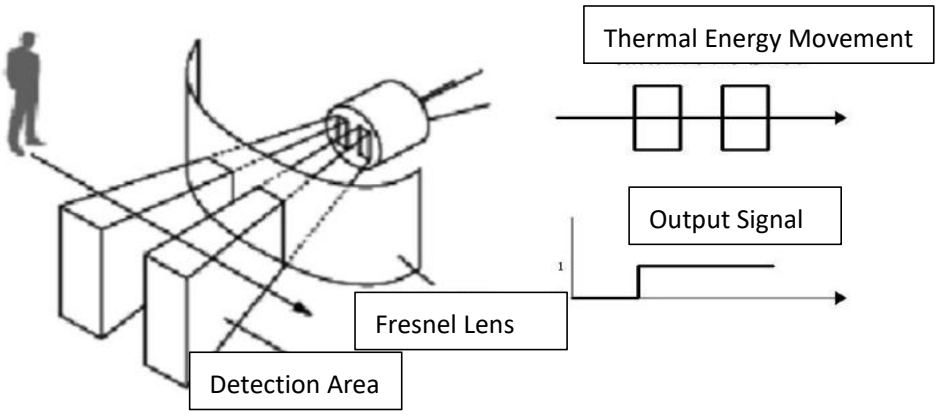


Bottom view Side view Top view

Pin Definition

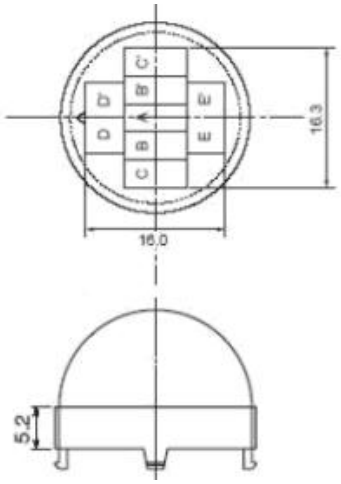
Item	Name	Definition
1	SENS	Sensitivity pin (0-1/2V_{DD}); 0- highest sensitivity; ≥1/2V_{DD}- Lowest sensitivity
2	OEN	photo-cell adjustment pin, OEN PIN (20% V_{DD}~80%V_{DD})
3	VSS	power ground
4	VDD	sensor power supply pin
5	REL	sensor output pin, TTL high/low level output
6	ONTime	delay time adjustment 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.

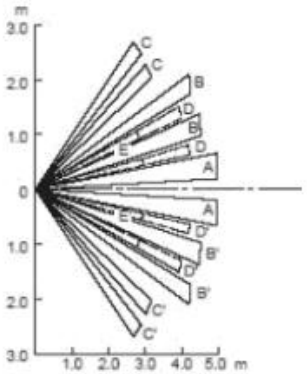
Frequency characteristic



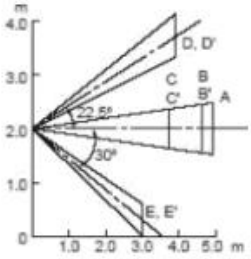
Fresnel Lens:

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.



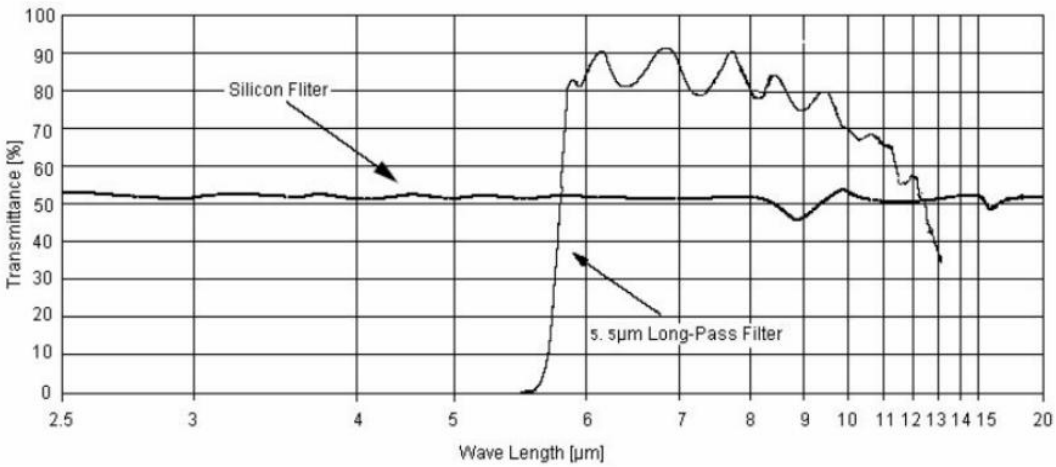


Horizontal Field of View



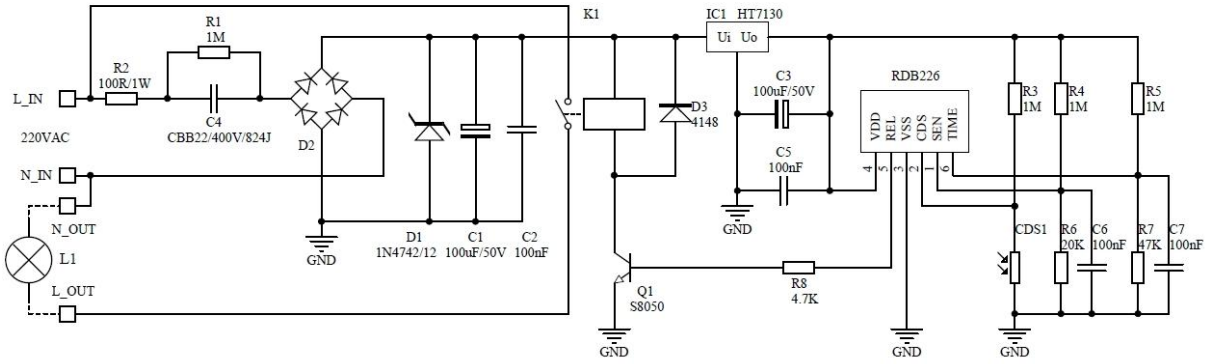
Vertical Field of View

Wave Length



Note: The graph shows a typical 5~14um 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.

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