Digital Pyroelectric Infrared Sensor
（Model： RDA-226）

User’s Manual

Version: 1.3

Valid from: 2019-04-09

Zhengzhou Winsen Electronics Technology Co., Ltd

Statement

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.

RDA226 Digital Pyroelectric Infrared Sensor

Digital PIR sensor RDA-226, 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
* Low working voltage 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

Max Limit

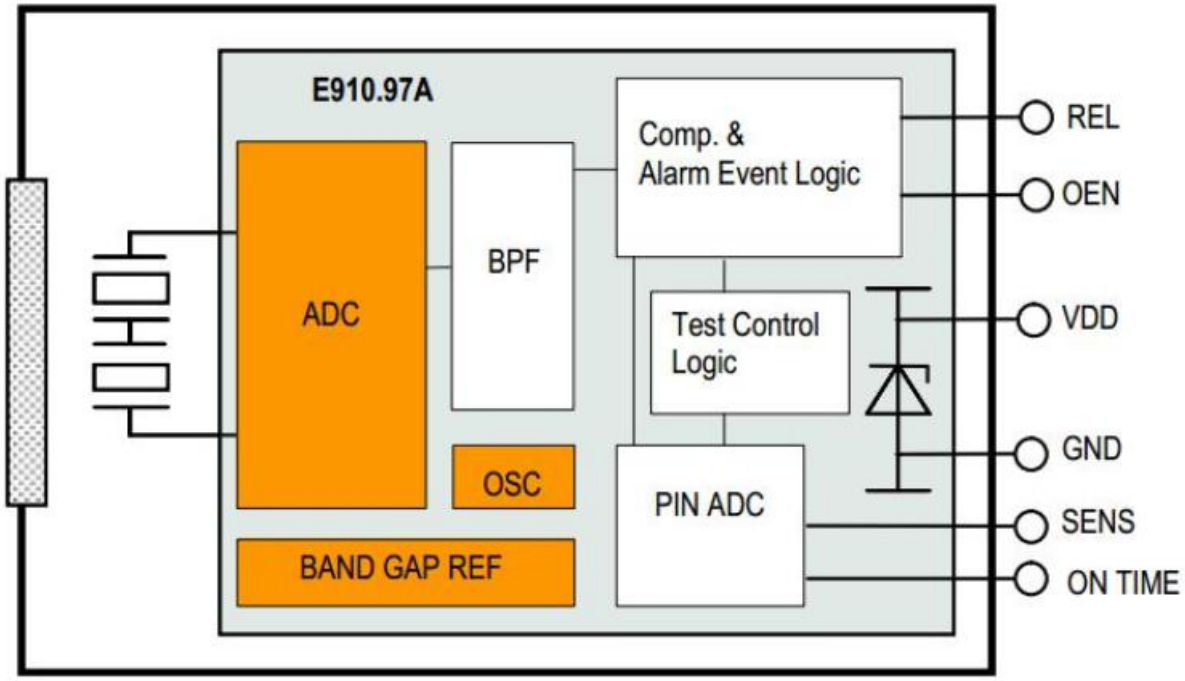
Parameter	Symbol	Min	Max	Unit	
Voltage	V_{DD}	-0.3	3.6	V	
Pin limit	I_{nto}	-100	100	mA	
Storage temperature	T_{ST}	-40	125	℃	

Working condition

Parameter	Symbol	Min	Typical	Max	Unit	Note
Working condition						
Voltage	V_{DD}	2.7	3	3.3	V	
Current	I_{CC}	12	15	20	uA	
Sensitivity	V_{SENS}	110		530	uV	adjustable
Temperature	W_{ST}	-20		85	℃	
Input enable						
High voltage	V_{IH}	80			$\%V_{DD}$	
Low voltage	V_{IL}			20	$\%V_{DD}$	
Current	I_I	-1		1	uA	
Output						
Low current	I_{OL}	-10			mA	
High current	I_{OH}			10	mA	
Block time			2.3		S	
Delay time	ON_{TIME}	2.3		4793	S	adjustable

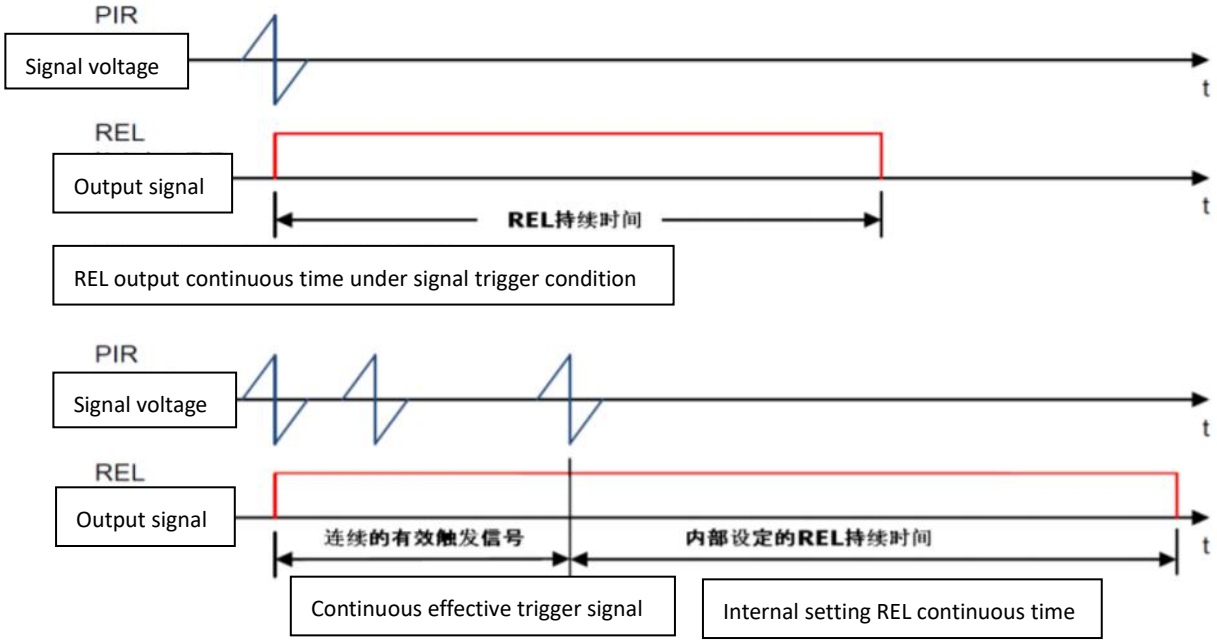
Input adjustment (sensitivity/delay time)						
Voltage input range		0		VDD	V	0V-1/4VDD
Input bias current		-1		1	uA	
Oscillators and filters						
Low filter cut-off frequency				7	Hz	
High filter cut-off frequency				0.44	Hz	
Chip oscillator frequency	F_{clk}			64	KHz	

Internal frame



Trigger mode

When the sensor receives a signal that exceeds the set threshold, a count pulse is generated internally. When the sensor receives the signal again, it generates a second count pulse. When two counts are generated within 2 seconds, the sensor gives high-level TTL output on REL pin.

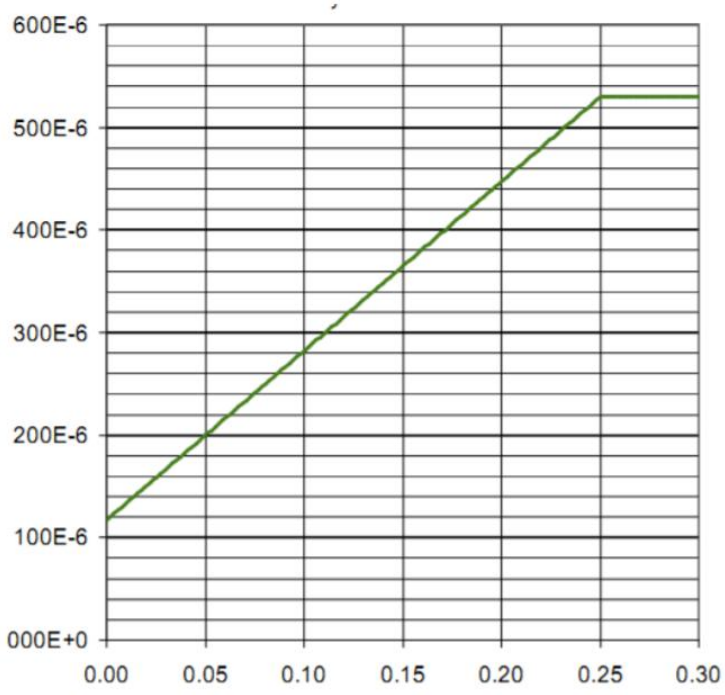


Sensitivity adjustment

The input voltage on SENS pin, determines the comparison threshold for the input signal. 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 1/4VDD, it would choose max threshold, sensitivity is the lowest, that is, the detection distance is minimal.

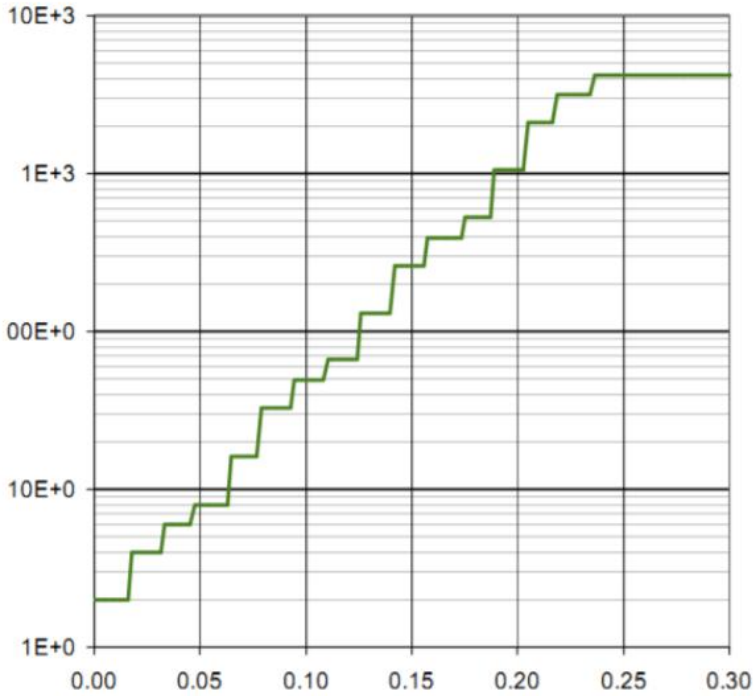
The sensing distance is not linear with the voltage on the SENS pin. With different Fresnel lenses, the sensitivity is different, and distance depends on actual measurement.



Comparison threshold with SENS input voltage

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. The relationship between output delay time and voltage, is as below for your reference. When the voltage value exceeds 1/4VDD, it would choose max delay time.

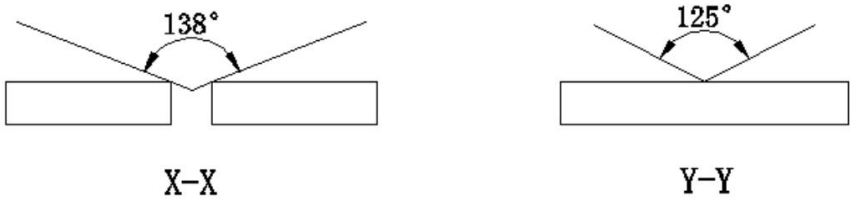


Pin voltage Step	Pin Voltage Center of step voltage value (V_{DD}*(step*2)+3)/128	ON Time $F_{osc\ Nom}$
0	3/128 or less	2.3 sec
1	(V_{DD} *2+ 3)/128	4.7 sec
2	(V_{DD} *4+ 3)/128	7.0 sec
3	(V_{DD} *6+ 3)/128	9.4 sec
4	(V_{DD} *8+ 3)/128	18.7 sec
5	(V_{DD} *10+ 3)/128	37 sec
6	(V_{DD} *12+ 3)/128	56 sec
7	(V_{DD} *14+ 3)/128	75 sec
8	(V_{DD} *16+ 3)/128	150 sec
9	(V_{DD} *18+ 3)/128	300 sec
10	(V_{DD} *20+ 3)/128	449 sec
11	(V_{DD} *22+ 3)/128	599 sec
12	(V_{DD} *24+ 3)/128	1198 sec
13	(V_{DD} *26+ 3)/128	2397 sec
14	(V_{DD} *28+ 3)/128	3595 sec
15	(V_{DD} *30+ 3)/128 or above	4793 sec

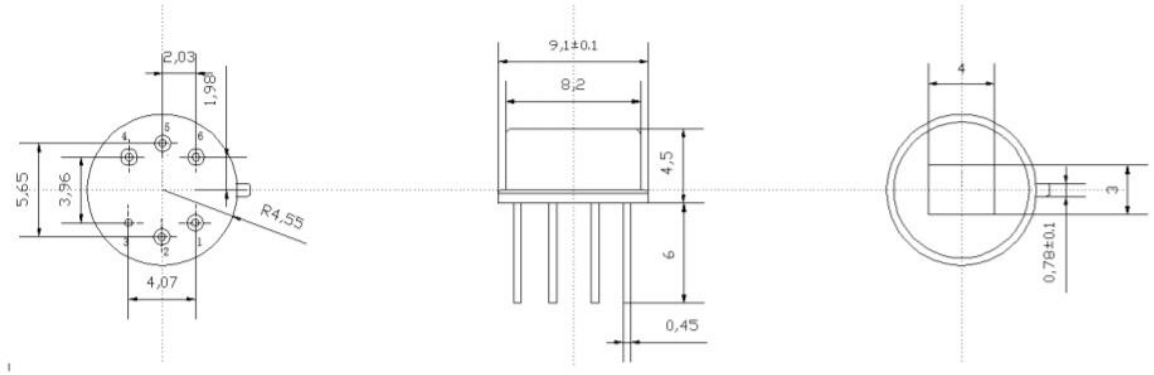
Typical value of delay time (based on typical application circuits)

No.	Ontime Voltage (VDD)	R3 Value (1% accuracy)	R10 Value (1% accuracy)	Delay Time (on time)
1	≤ 1/128	1M	OR	2.3 sec
2	3/128	1M	24K	4.7 sec
3	5/128	1M	39K	7.0 sec
4	7/128	1M	56K	9.4 sec
5	9/128	1M	75K	18.7 sec
6	11/128	1M	91K	37 sec
7	13/128	1M	110K	56 sec
8	15/128	1M	130K	75 sec
9	17/128	1M	154K	150 sec
10	19/128	1M	174K	300 sec
11	21/128	1M	196K	449 sec
12	23/128	1M	221K	599 sec
13	25/128	1M	243K	1198 sec
14	27/128	1M	267K	2397 sec
15	29/128	1M	294K	3595 sec
16	≥31/128	1M	316K	4793 sec

Sensor Detection Angle



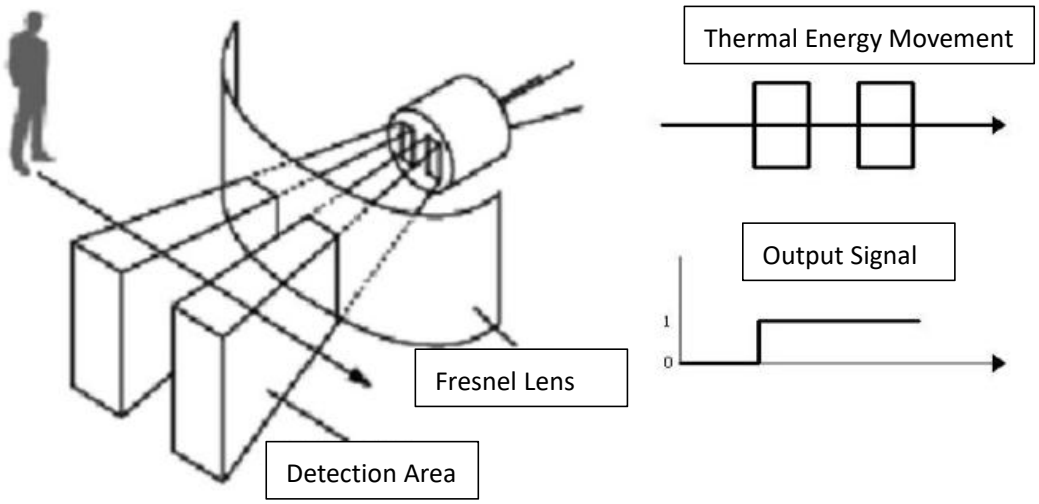
Component Structure (Unit: mm)



Pin Definition

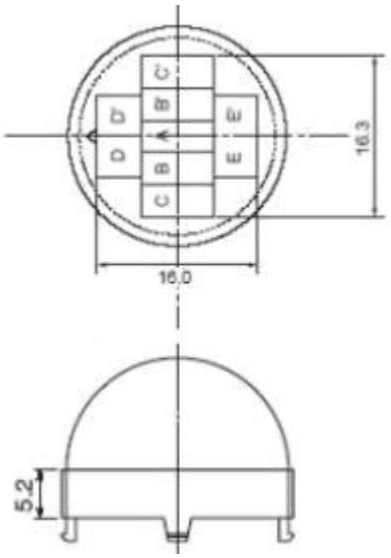
Item	Name	Definition
1	SENS	Sensitivity pin (0-1/4V_{DD}); 0- highest sensitivity; ≥1/4V_{DD}- Lowest sensitivity
2	OEN	photo-cell adjustment pin, OEN PIN (20% V_{DD}~80%V_{DD})
3	VSS	power ground
4	VDD	sensor power supply pin
5	REL	sensor output pin, TTL high/low level output
6	ONTime	delay time adjustment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

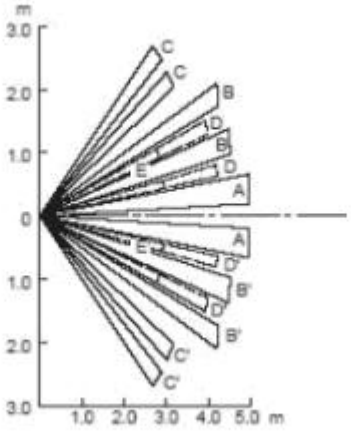
Frequency characteristics



Fresnel Lens:

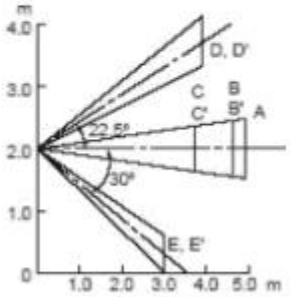
Fresnel Lens used, would determine the sensor's detection angle and distance, which can correspond to a variety of detection range and distance, according to customers' requirement.





水平视场图

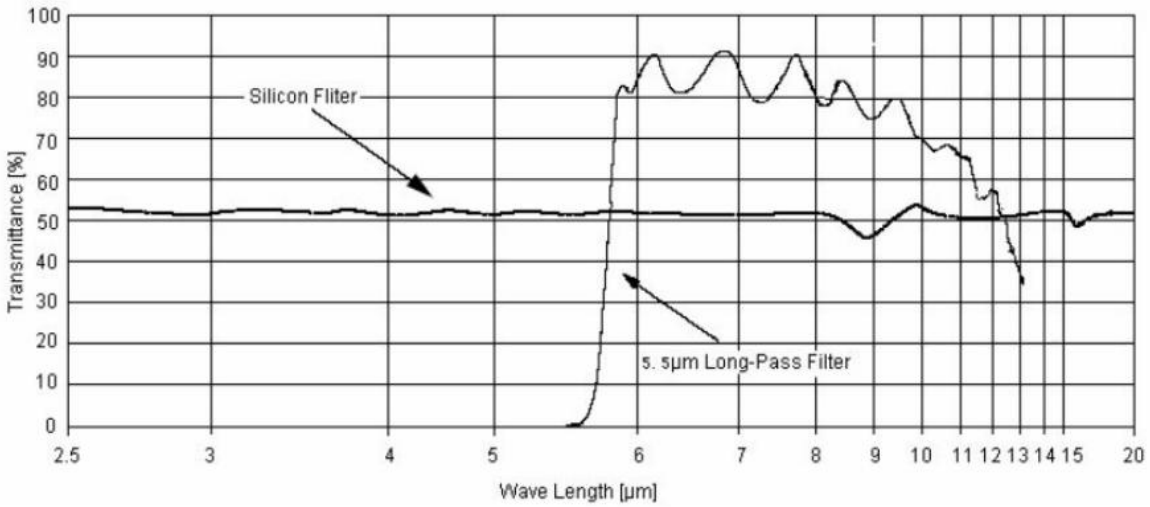
Horizontal Field of View



垂直视场图

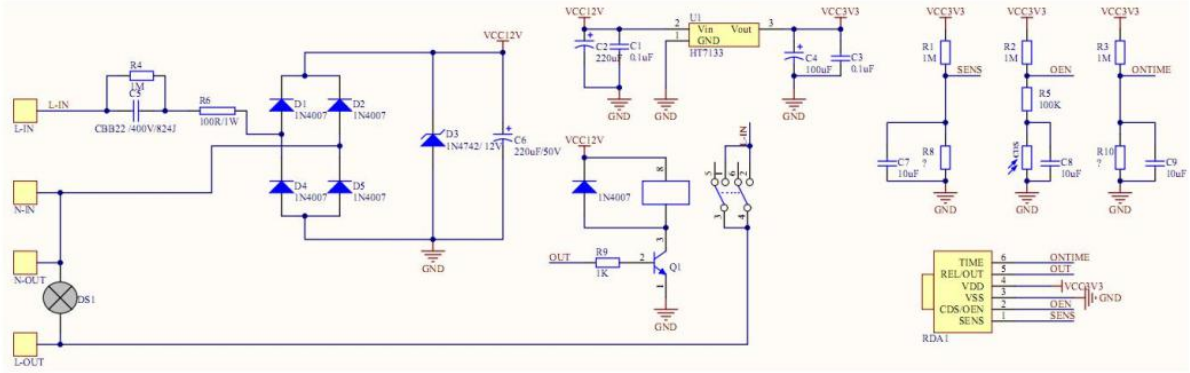
Vertical Field of View

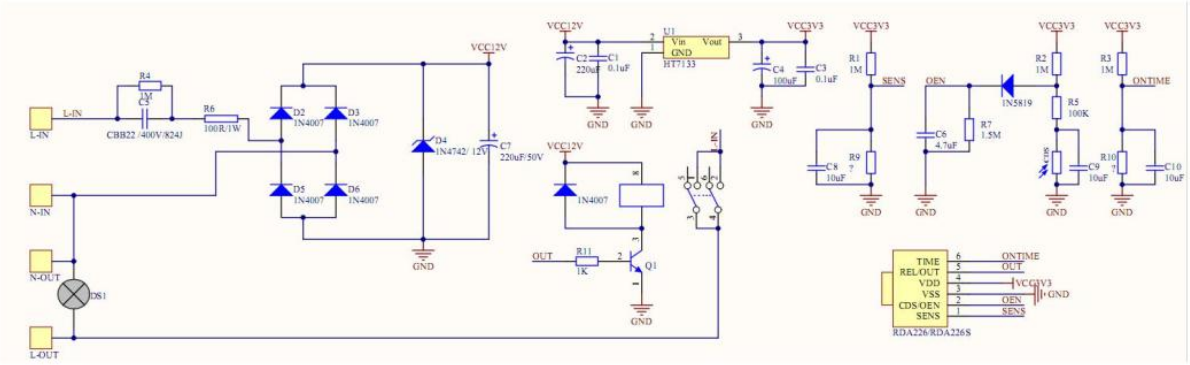
Wave Length



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

Application





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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