Digital Pyroelectric Infrared Sensor

（Model： RDA224-F）

User’s Manual

Version: 1.0

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Zhengzhou Winsen Electronics Technology Co., Ltd

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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.

RDA224-F Digital Pyroelectric Infrared Sensor

Digital PIR sensor RDA224-F, 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
* Delay time adjustment function
* Low working voltage2.2V-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 appliances

Technical Parameters

Max Limit

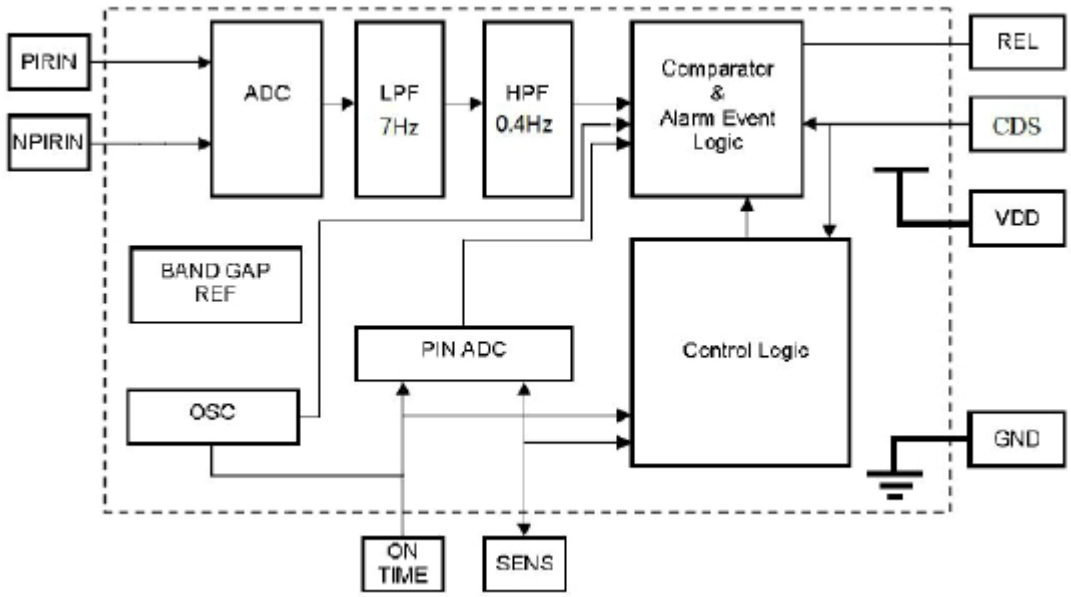
Parameter	Symbol	Min	Max	Unit	Note
Voltage	VDD	0.3	5.5	V	25℃
Output voltage	VOUT	VSS-0.3	VDD+0.3	V	25℃
Storage temperature	TST	-40	125	℃	

Electrical Parameters (unless otherwise noted: T=25°C, VDD=3.0V)

Parameter	Symbol	Min	Typical	Max	Unit	Note
Working condition						
Voltage	V_{DD}	2.2	3.0	5.0	V	Power supply mode
Current	I_{DD}	8.0	10	15	uA	V_{DD}=3V, no load
Temperature	T_{st}	-20		+70	℃	
Analog input pin (ONTIME)						

ONTIME Input range	V_{IN}	V_{SS}-0.3		V_{SS}+0.3		
ONTIME Input Current				20	nA	Pull-down current
Output Pin (REL)						
Max Output Drive Current	I_{REL}			10	mA	VDD=5V
REL outputs high level	V_{OH}			2.7	V	VDD=3V,IOH=10mA
REL outputs low level	V_{OL}	0.3			V	
Block time			2.0		S	
Delay time	ON_{TIME}	2		3600	S	16 Level adjustment (non-linear)
Oscillators and filters						
Low filter cut-off frequency	F_{LPF}			7	Hz	
High filter cut-off frequency	F_{HPF}	0.4		0.44	Hz	

Internal frame



Trigger mode

Under normal detection, the following conditions are met, the sensor can be effectively triggered, and the REL pin outputs a high level and maintains it for a preset period of time:

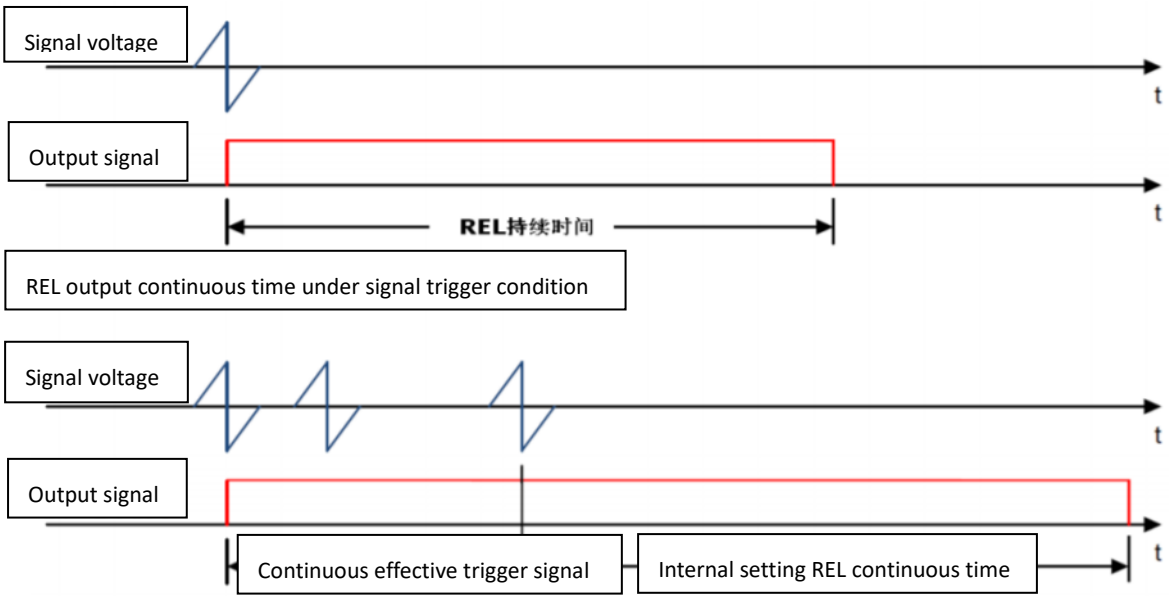
(1) When the signal amplitude exceeds the positive and negative threshold values successively within 4S;

(2) The signal amplitude exceeds the 5-bit threshold;

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

Note: The sensor has a warm-up function, after power-on, the REL pin outputs a high level for 2 seconds and a low level for 2 seconds, after which it detects normally, and the warm-up time has nothing to do with the length of the ONTIME.

Translated with www.DeepL.com/Translator (free version)



Delay time adjustment

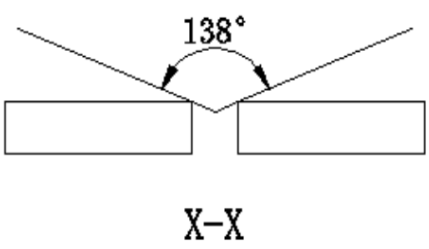
The delay time is the duration of the output high level after the sensor reaches the

comparison threshold. The input voltage of the ONTIME pin determines the time that the REL pin maintains a high level after the sensor is triggered, and the delay time will be recalculated every time a trigger signal is received. Refer to the following table for the relationship between the delay time, the pin voltage and the voltage divider resistor.

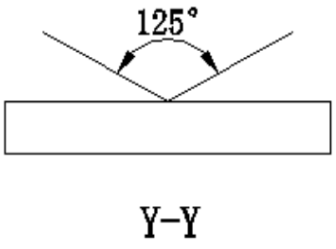
Please refer to the following table for the relationship between delay time, pin voltage and voltage divider resistor:

No.	Pin Voltage Intermediate Value	Duration	Pull Down Resistor Theoretical Value ohm	Pull Down Resistor Recommended Value ohm
1	1*VDD/64	2S	0K	0K
2	3*VDD/64	5S	49K	51K
3	5*VDD/64	10S	85K	91K
4	7*VDD/64	15S	123K	130K
5	9*VDD/64	20S	164K	160K
6	11*VDD/64	30S	208K	220K
7	13*VDD/64	45S	255K	270K
8	15*VDD/64	60S	306K	330K
9	17*VDD/64	90S	363K	360K
10	19*VDD/64	120S	422K	430K
11	21*VDD/64	180S	488K	510K
12	23*VDD/64	300S	561K	560K
13	25*VDD/64	600S	641K	680K
14	27*VDD/64	900S	730K	750K
15	29*VDD/64	1800S	829K	820K
16	31*VDD/64	3600S	939K	1M

Sensor Detection Angle

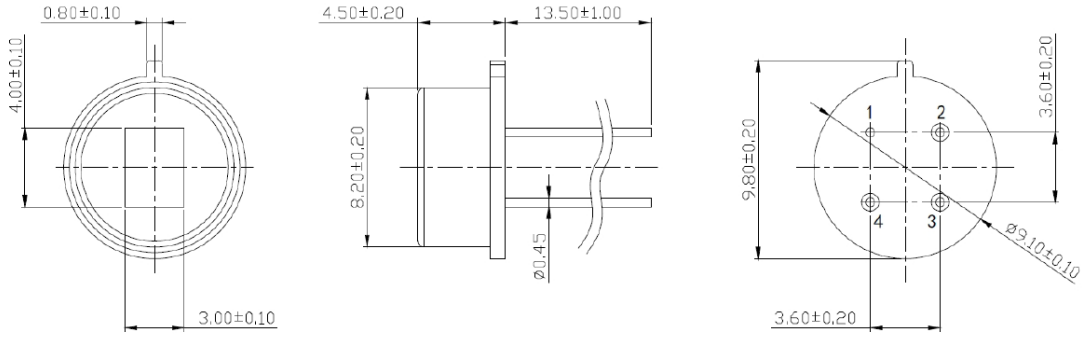


X-X



Y-Y

Structure (Unit: mm)



Top view Side view Bottom view

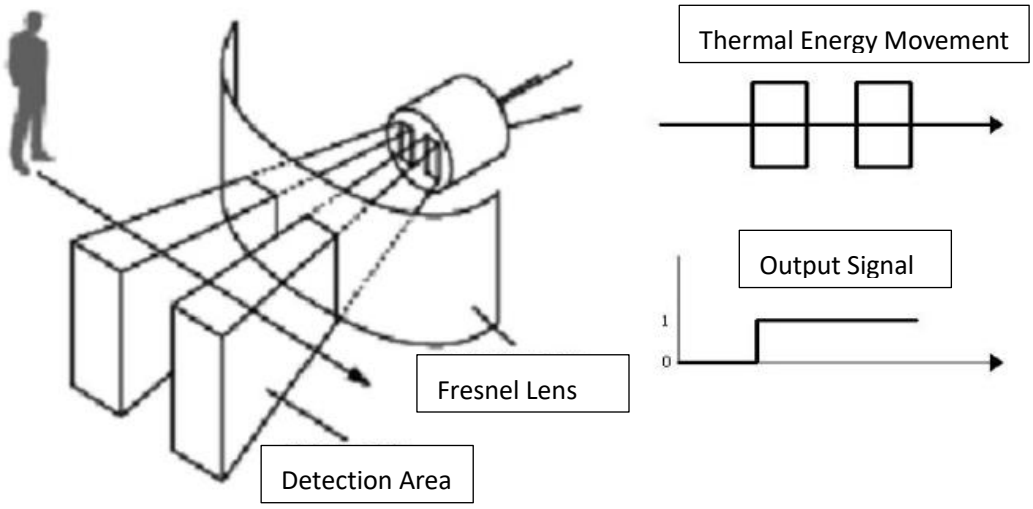
Pin Definition

Item	Name	Definition
1	VSS	power ground
2	ONTIME	Delay time adjustable pin (0-1/4V_{DD}); 0- Shortest delay time; ≥1/4V_{DD}- Longest delay time
3	VDD	sensor power supply pin
4	REL	Sensor output pin, TTL high/low level output
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.

Product Picture:

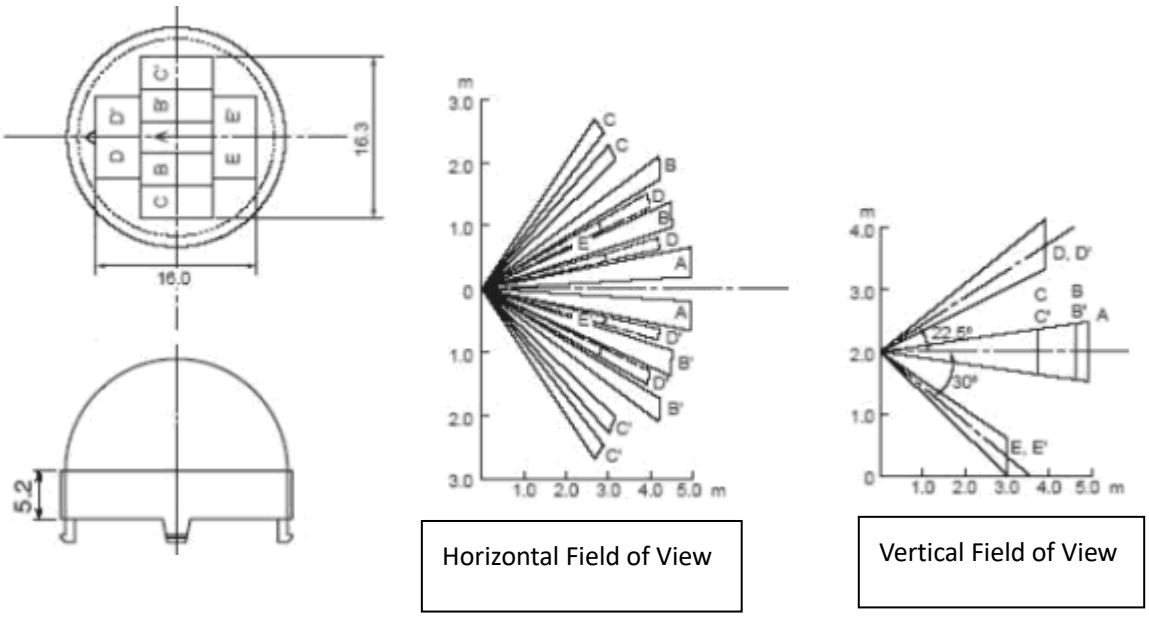


Frequency characteristics



Fresnel Lens:

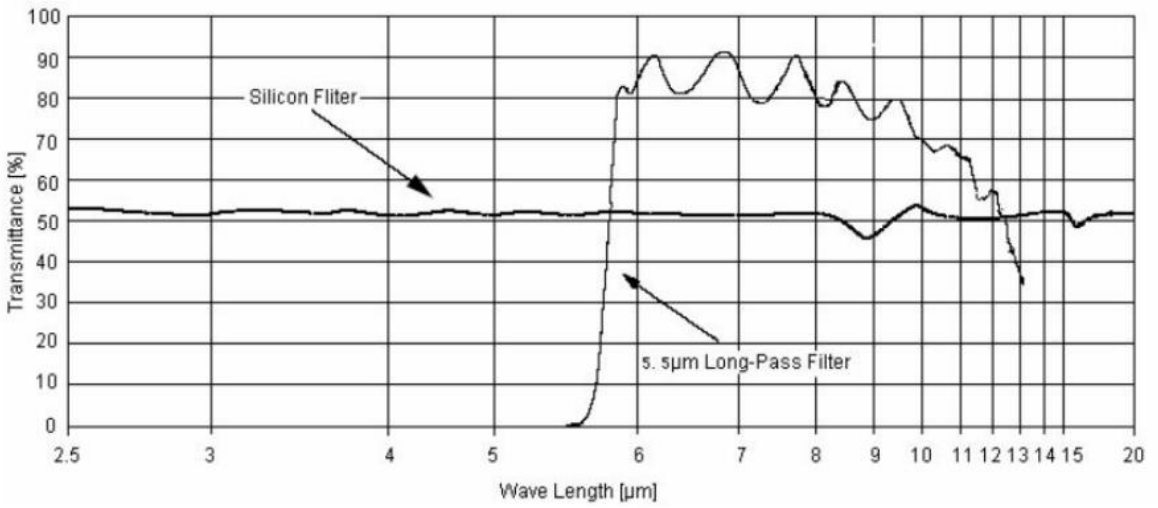
Fresnel Lens used, would determine the sensor's detection angle and distance, which can correspond to a variety of detection range and distance, according to customers' requirement.



Horizontal Field of View

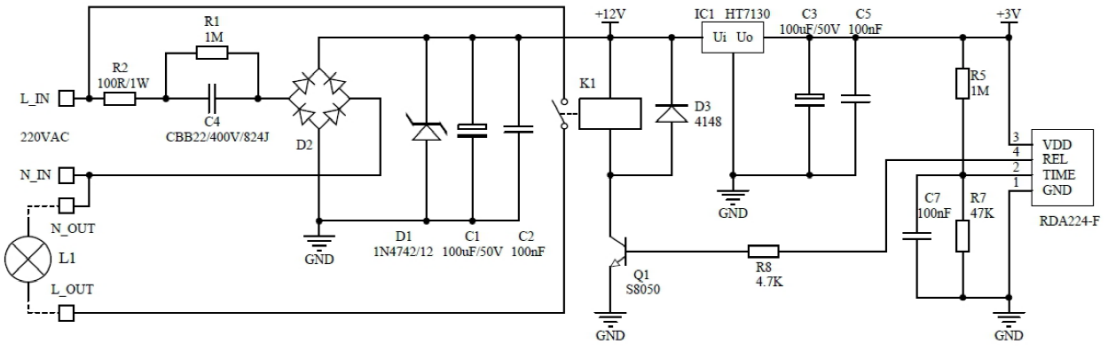
Vertical Field of View

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.

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

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