# Pyroelectric Infrared Sensor

# （Model： RPTA-646-4）

# User’s Manual

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Zhengzhou Winsen Electronics Technology Co., Ltd

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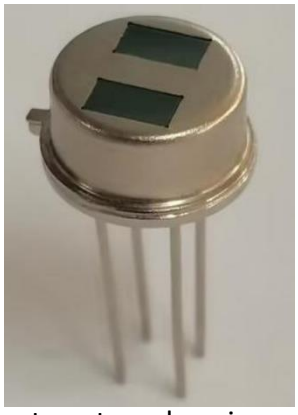
Please keep the manual properly, in order to get help if you have questions during the usage in the future.

**Zhengzhou Winsen Electronics Technology CO., LTD.**

# RPTA-646-4 Pyroelectric Infrared Sensor



Pyroelectric Infrared Sensor detects the infrared radiation by using the temperature-dependent feature. It suppresses theinterference caused by temperature change, adopts the method of dual sensing elements complementary which improves the stability of the sensor. The sensor has dual signal output and the product is widely used in safety device, burglar alarm, automatic door, auto light control and intelligent toys.

## Features:

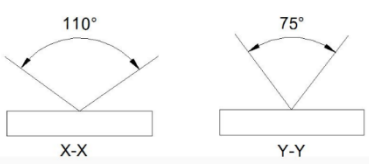
* High sensitivity and superior signal-to-noise ratio
* Adopting dual-sensing elements compensation structure, high resistance to external environment interference
* The components and amplifiers are all packaged in TO-5, saving users time in designing circuits and mounting them
* Excellent anti-interference performance. Due to the entire circuit being packaged in metal packaging, the electromagnetic shielding effect is good
* Interference filter with high cutoff depth and strong resistance to white light

## Applications

Security, intrusion alarm, indoor access management;
Smart Home;
Automatic lighting switch, safety door;
Intelligent office appliance.

## Parameters

**Table 1**

| | |
|---|---|
| Model No. | RPTA-646-4 |
| Standard Encapsulation: | TO-5 |
| Infrared receiving Electrode | 1×1. 5mm, 4 sensitive elements |
| Window Size: | 2×3.6×2.0mm |
| Receiving Wavelength: | 5～14μm |
| Transmittance | >75% |
| Output signal peak[Vp-p] | ≥3500mV |
| Sensitivity | ≥3200V/W |
| Detection Rate (D*): | 1.4 ×$10^{8}$ cm$Hz^{1/2}$/W |
| Noise peak[Vp-p]: | <80mV |
| Output balance degree: | <10% |
| Source Voltage: | 0.3～1.1V |
| Current | <25uA @Rs=47K |
| Working Voltage: | 3～15V |
| Working temperature: | -30～70ºC |
| Storage temperature: | -40～80ºC |
| Incidence angle map: |  |

## Dimension

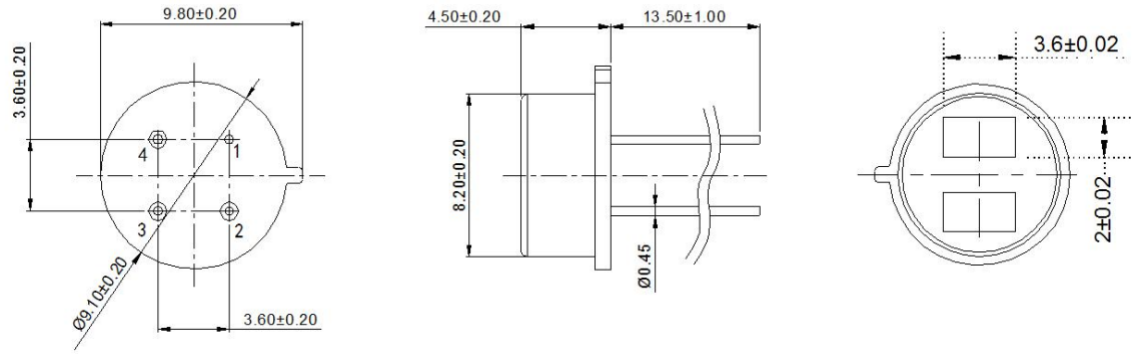



Fig 1 Sensor structure diagram

| Pin definition | |
|---|---|
| 1 | GND power ground |
| 2 | SA sensor signal output |
| 3 | VDD sensor working power supply positive |
| 4 | SB sensor signal output |

## Internal equivalent circuit

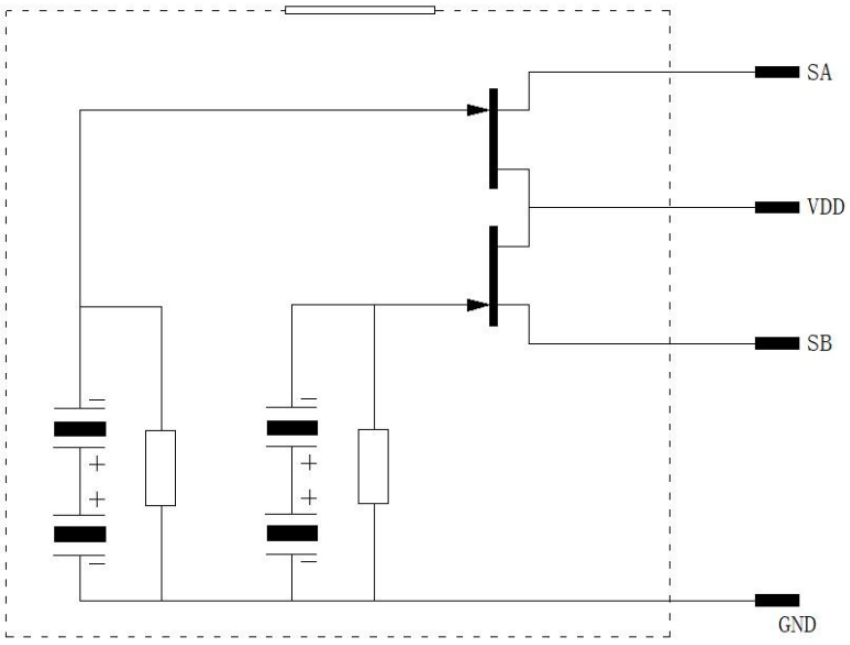



Figure 2 Internal equivalent circuit

## Testing Method

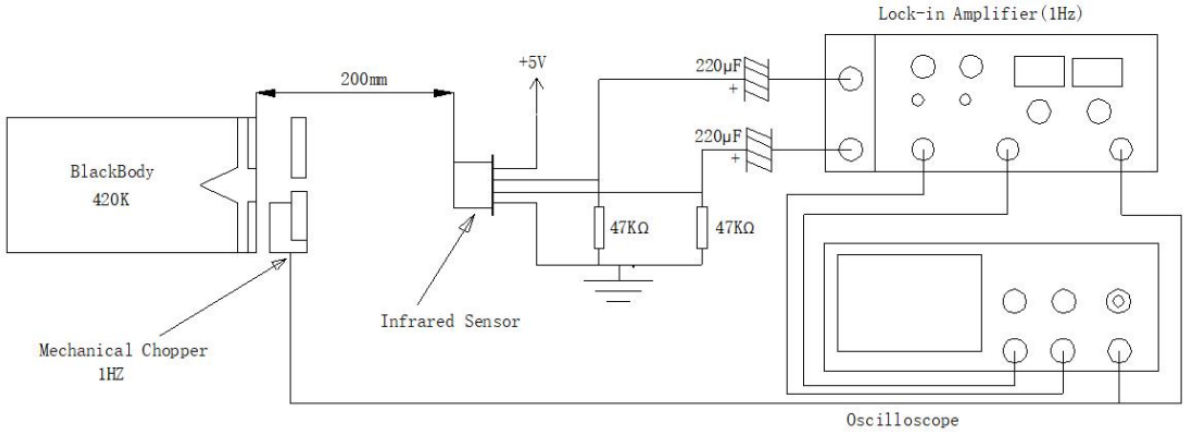



Fig 3 RPTA-646-4 Testing diagram

## Testing Conditions:

- ♦ Environment Temperature: 25ºC
- ♦ Blackbody temperature: 420K
- ♦ Modulation frequency 1HZ, 0.3～3.5HZ △f
- ♦ Magnification: 72.5 dB

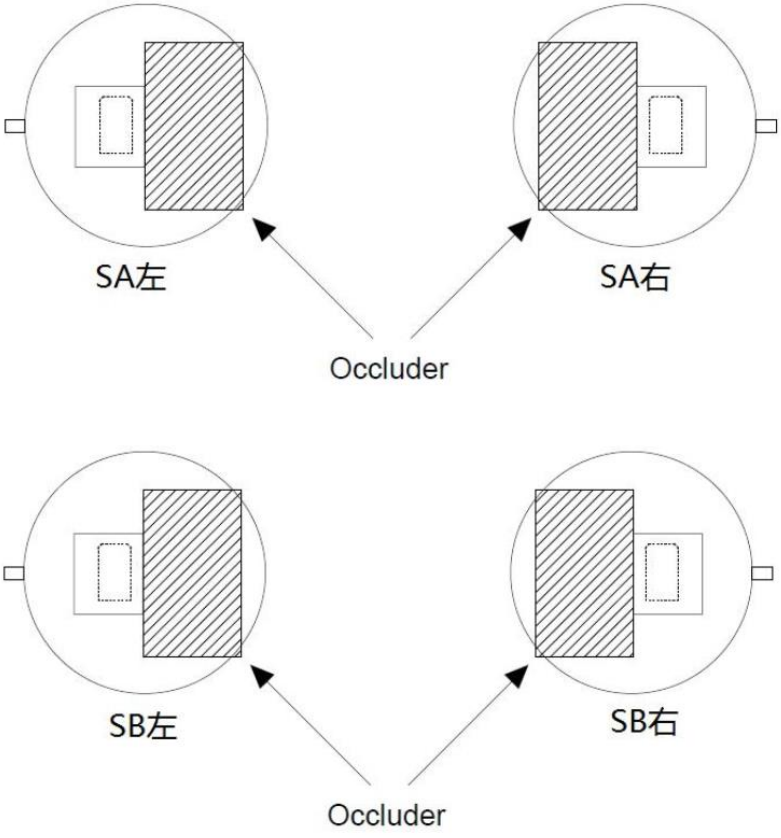
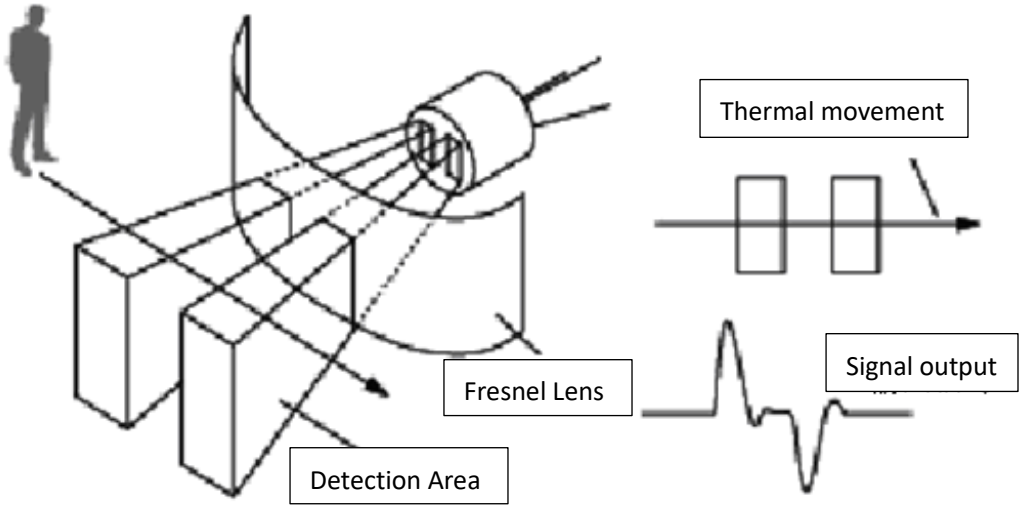
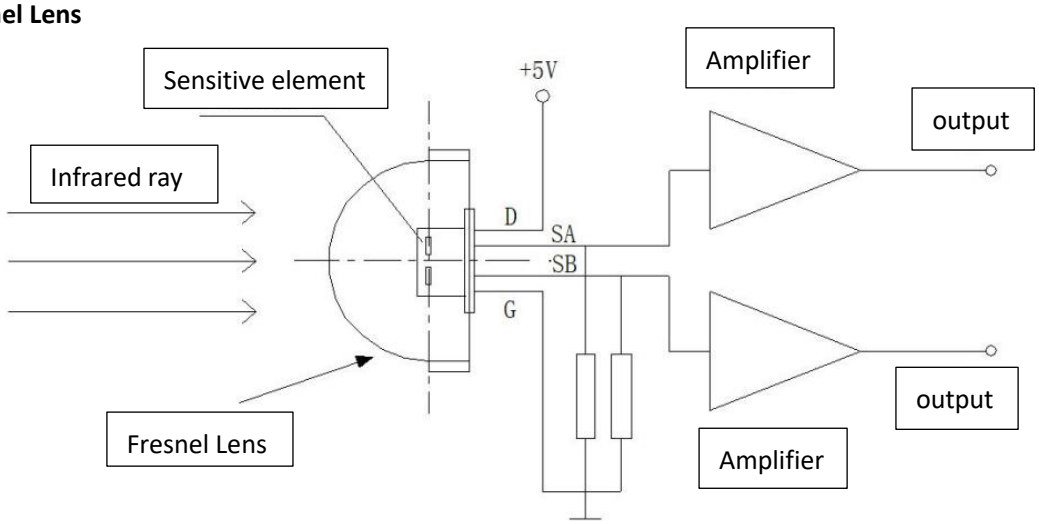



Fig 4 Signal SA, Signal SB defination

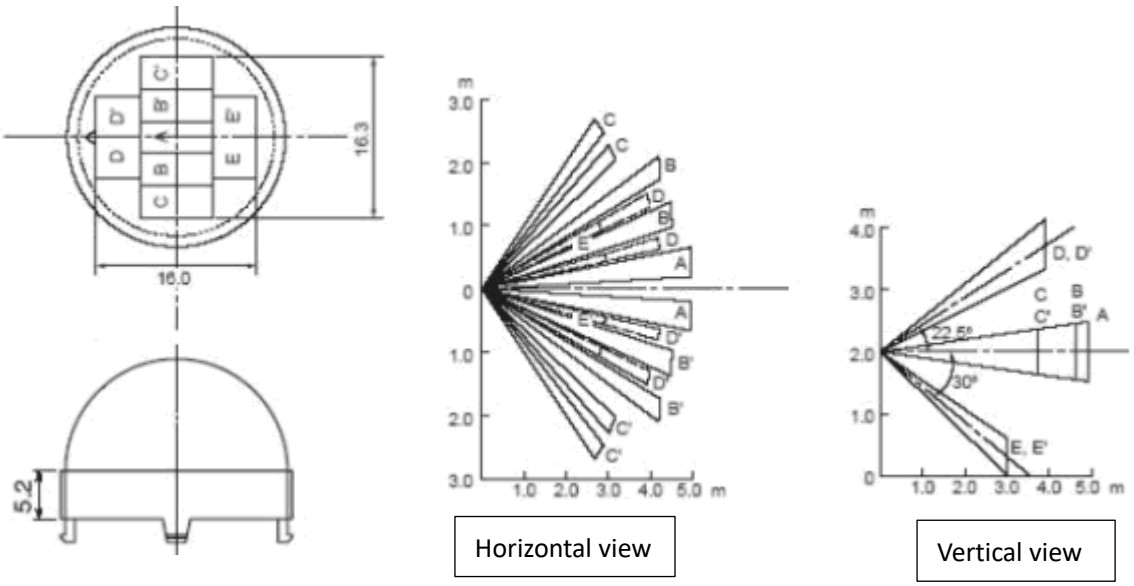
**Frequency Characteristic**




**Fresnel Lens**




**By using different Fresnel lens, the detection range and distance can be determined. According to customer's requirement, it can response to various detection range and distance.**



**Typical application circuit:**

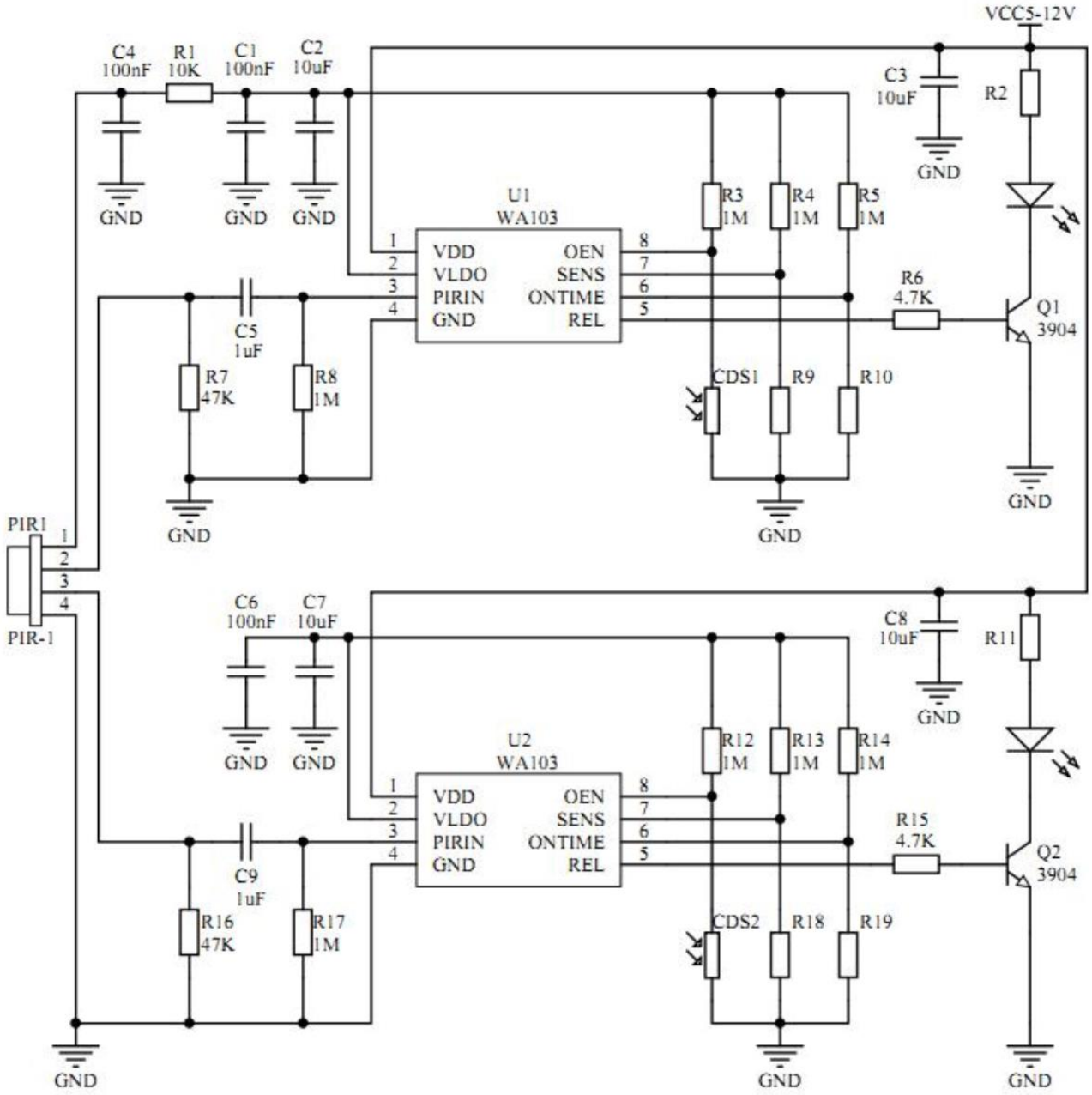
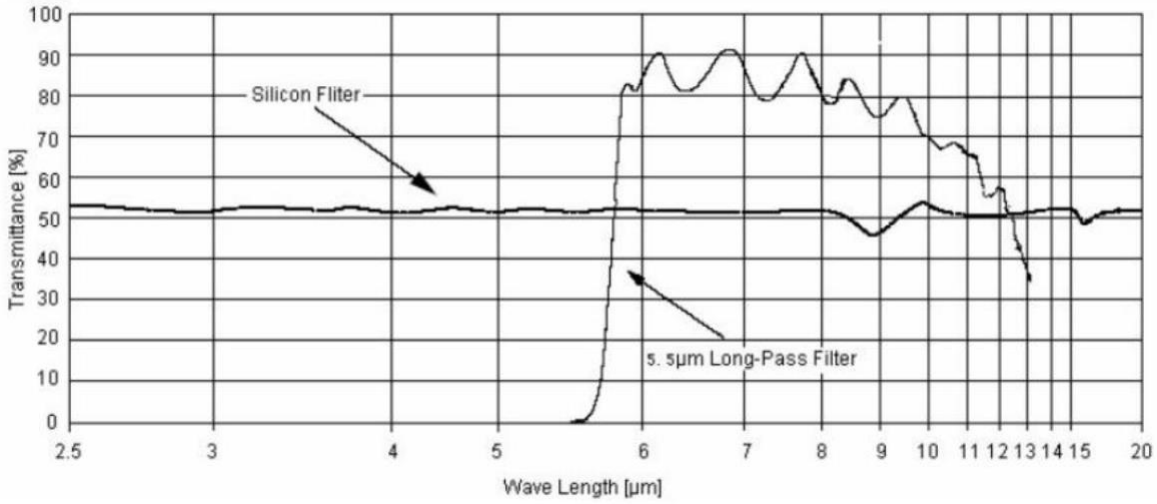



Fig 5 Typical application circuit

## The receiving wavelength of the window material:




**Note: This chart is typical 5um infrared filter, and the curve is the average value of infrared pass rate. This window material is a semiconductor wafer, which is processed by special vacuum coating.**

**Reliability Test**

| Test Items | Test Conditions | Criteria |
|---|---|---|
| **High Temperature** | 85ºC, for 500 hours | **After reliability testing, place the sensors in room temperature condition for 3hours, then test them again:**<br>**1. Appearance: no remarkable damage**<br>**2. Sensitivity: within 20% of initial sensitivity value (acceptable tolerance)**<br>**3. Noise: +100mV of initial value (max tolerance)** |
| **Low Temperature** | -40ºC, for 500 hours | |
| **Humidity** | 60ºC, 95%RH, for 500 hours | |
| **High Temperature Loading** | 85ºC, 5V applied, 47k load, for 48 hours | |
| **Heat Shock** | -10ºC, 30min ← → 50ºC, 30min*10 cycles | |
| **Anti-static** | 200p F, 0Ω, 200V | |
| **Vibration** | Apply vibration of amplitude of 1.5mm with 10 to 55Hz to each of 3 perpendicular directions for 60min | |
| **Lead Strength** | 1kg strain force along lead, 5sec | |
| **Drop Test** | Dropping from 750mm high, 3 times | |
| **Soldering Heat** | 260±5ºC, 10±1sec, dipping leads submerge into solder down to 3.0mm below stem | |
| **Hermetic Seal** | 125±5ºC FC-40, 20min | **No bubble visible** |

**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 add Rc filter circuit to the sensor's power supply side when design the circuits.(please take typical application circuits for R2,C8 and C9 as reference)**
7. **Please try to use hand soldering and make the soldering time as short as possible.**
8. **Please get electrostatic protective measures when using this product.**

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