

# Pyroelectric Infrared Radial Sensor



**TYPE: S16-L211D**

**NANYANG SENBA OPTICAL AND ELECTRONIC CO., LTD.**



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## Mini SMD Digital Pyroelectric Infrared Sensor

The product is a digital intelligent PIR sensor. It interfaces directly with up to two conventional PIR sensors via a high impedance different input. The PIR Signal is converted to a 15 bit digital value on chip. A LED output indicates whenever the PIR signal is above the selected threshold. The parameters for sensitivity and timing are set by connecting the corresponding inputs to DC voltages. The voltage levels on the inputs are converted to digital values with 7 bit resolution. All signal processing is performed digitally.

L211D is SMD package, including the settings for delay time.

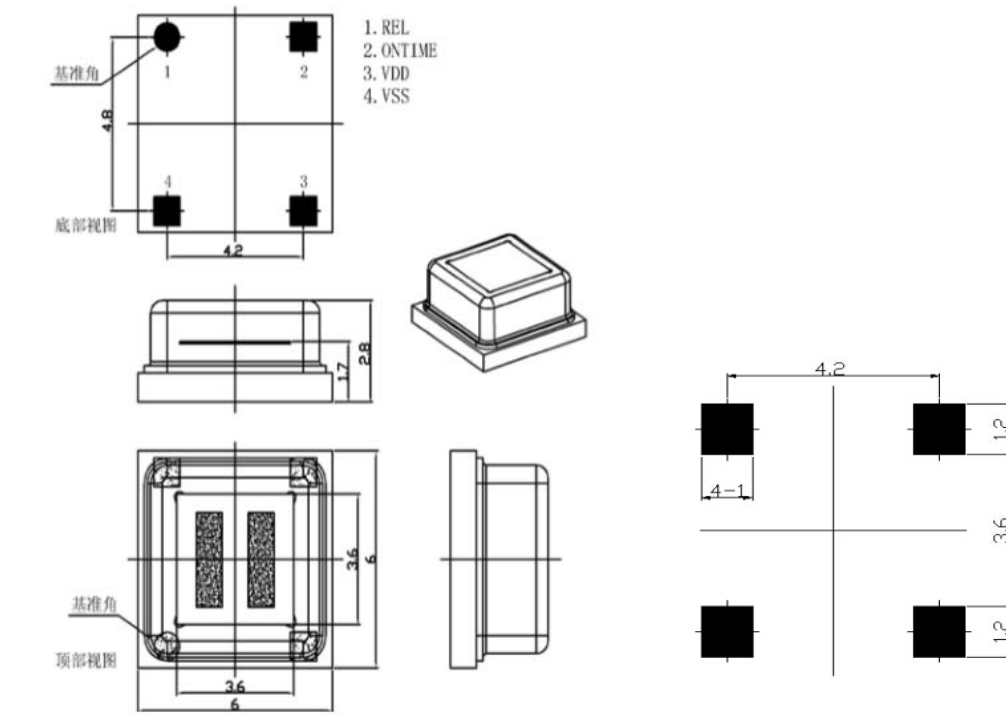
### ■ Features and Benefits

- Mini SMD with reflowed SMT
- Digital signal processing (DSP)
- Power adjustable, save more energy
- Built-in filter, high immunity to RFI
- Output time adjustable.
- Schmitt REL Output
- Low voltage, low power consumption

### ■ Applications

- PIR motion detection
- Intruder detection
- Occupancy detection
- Motion sensor lights
- Computer monitor
- Security system
- Automatic control

## ■ Dimension



Unit: mm

The chart of recommended welding plate

## ■ Technical Data

### 1. Maximum Ratings

| Characteristics             | Symbol           | Min. Value | Max. Value | Unit | Remarks |
|-----------------------------|------------------|------------|------------|------|---------|
| Supply Voltage              | V <sub>DD</sub>  | -0.3       | 3.3        | V    |         |
| Working Temperature         | T <sub>OT</sub>  | -30        | 70         | °C   |         |
| Storage Temperature         | T <sub>ST</sub>  | -40        | 80         | °C   |         |
| Max.current for pin         | I <sub>nto</sub> | -100       | 100        | mA   |         |
| Viewing angle               |                  | X=110°     | Y=90°      |      |         |
| Detection spectral response | λ                | 5          | 14         | μm   |         |

## 2.Working Conditions (T=25°C, Vdd=3V, Except other requirements)

| Characteristics                                 | Symbol            | Min. | Type | Max.            | Unit | Remarks                                |
|---|-------------------|------|------|-----------------|------|--|
| Supply Voltage                                  | V <sub>DD</sub>   | 2.7  | 3    | 3.3             | V    |  |
| Working Current                                 | I <sub>DD</sub>   | 12   | 15   | 20              | μA   |  |
| Sensitivity                                     | V <sub>SENS</sub> | 120  |      |                 | μV   | Non-adjustable                         |
| <b>Output REL</b>                               |                   |      |      |                 |      |  |
| Output Low Current                              | I <sub>OL</sub>   | 10   |      |                 | mA   | V <sub>OL</sub> <1V                    |
| Output High Current                             | I <sub>OH</sub>   |      |      | -10             | mA   | V <sub>OL</sub> >(V <sub>DD</sub> -1V) |
| Lock time                                       | T <sub>OL</sub>   |      | 2.3  |                 | s    |  |
| On-time   | T <sub>OH</sub>   | 2.3  |      | 4793            | s    |  |
| <b>ONTIME</b>                                   |                   |      |      |                 |      |  |
| Input voltage                                   |                   | 0    |      | V <sub>DD</sub> | V    | 0V to ¼ V <sub>DD</sub>                |
| Input Bias Current                              |                   | -1   |      | 1               | μA   |  |
| <b>Oscillator &amp; Band Pass Filter(BPF)</b>   |                   |      |      |                 |      |  |
| Band Pass Filter(BPF)<br>Low cut-off frequency  |                   |      |      | 7               | Hz   |  |
| Band Pass Filter(BPF)<br>High cut-off frequency |                   |      |      | 0.44            | Hz   |  |
| Oscillator frequency on Chip                    | F <sub>CLK</sub>  |      |      | 64              | kHz  |  |
| Interior Block Diagram                          |                   |      |      |                 |      |  |

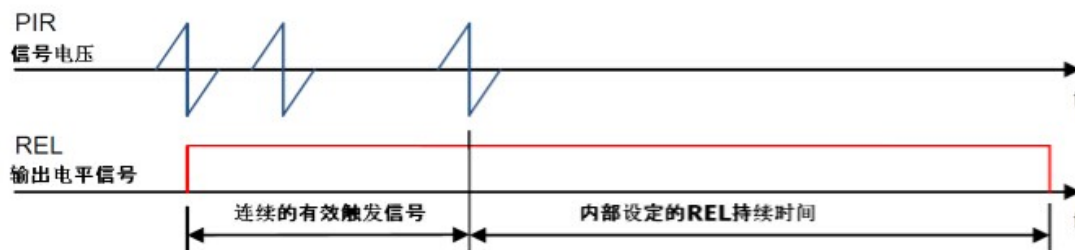
## ■ The Output Trigger Mode

When PIR signal is above the triggered threshold, there will be a count impulse inside. And when PIR sensor receives this impulse signal, it will think this signal as the second impulse. Once the second impulse was received within 4S, the PIR sensor will alarm, meanwhile, the REL pin will be triggered.

Besides, when the PIR signal is above 5 times of the triggered threshold, only one impulse is enough to trigger REL output as below. For multiple triggers, the delay time of REL output begins from the last valid trigger.



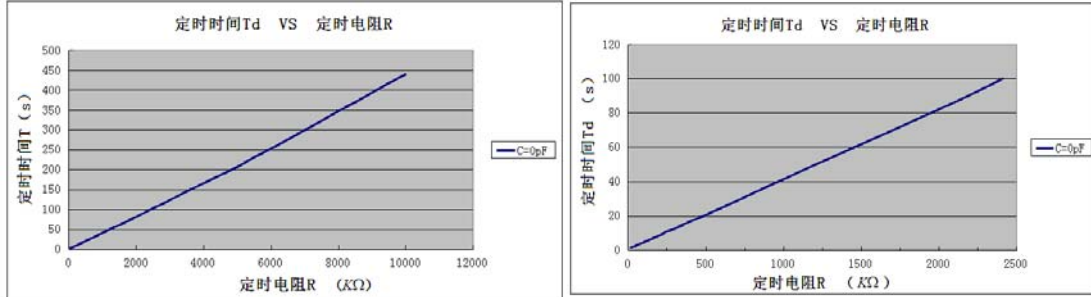
REL delay time



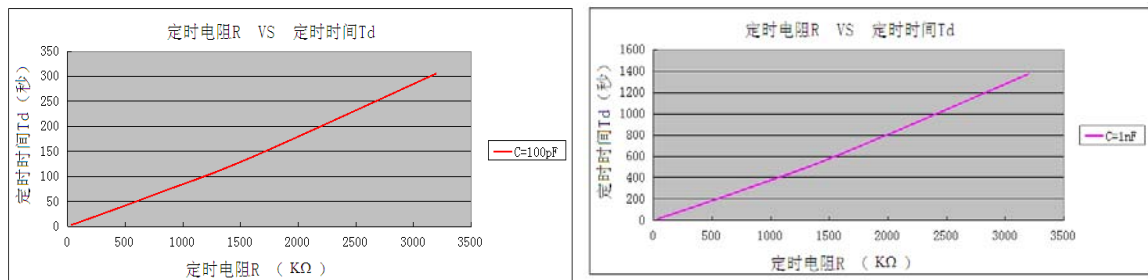
Multiple triggered signals Interior set delay time of REL output

## ■ ONTIME Setting

### 1. The Analog setting style for on-time

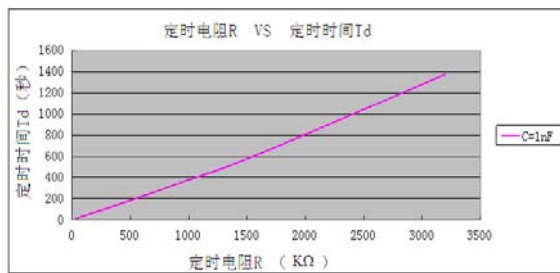


ONTIME PIN non-contact CapacitorThe Enlarged one



C=100pF

C=1nF



C=10nF

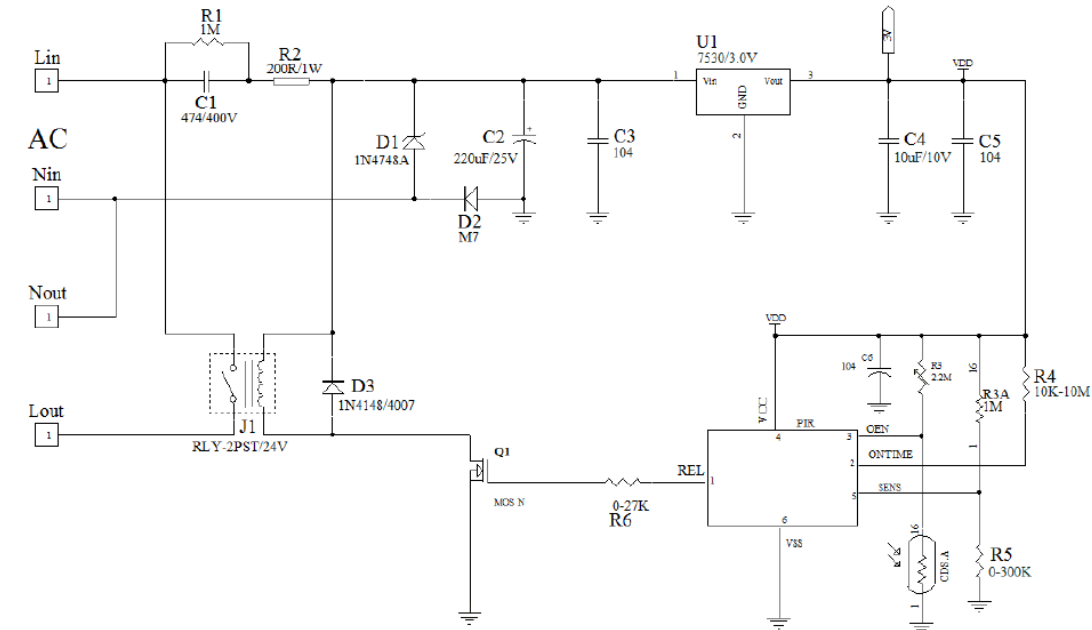
## 2. The Digital setting style for on-time

| 序号 | ONTIME 脚电压中心值<br>(VDD) | ONRIME 下分压电阻<br>RL (欧姆) (1%精度) | Time Td<br>(秒) |
|----|------------------------|--------------------------------|----------------|
| 0  | 1/64                   | 0K                             | 1.8            |
| 1  | 3/64                   | 51k                            | 3.6            |
| 2  | 5/64                   | 91k                            | 5.4            |
| 3  | 7/64                   | 127k                           | 7.2            |
| 4  | 9/64                   | 169k                           | 14.4           |
| 5  | 11/64                  | 215k                           | 29             |
| 6  | 13/64                  | 261k                           | 43             |
| 7  | 15/64                  | 316k                           | 58             |
| 8  | 17/64                  | 365k                           | 115            |
| 9  | 19/64                  | 430k                           | 230            |
| 10 | 21/64                  | 511k                           | 346            |
| 11 | 23/64                  | 576k                           | 461            |
| 12 | 25/64                  | 665k                           | 922            |
| 13 | 27/64                  | 750k                           | 1843           |
| 14 | 29/64                  | 845k                           | 2765           |
| 15 | 31/64                  | 953k                           | 3686           |

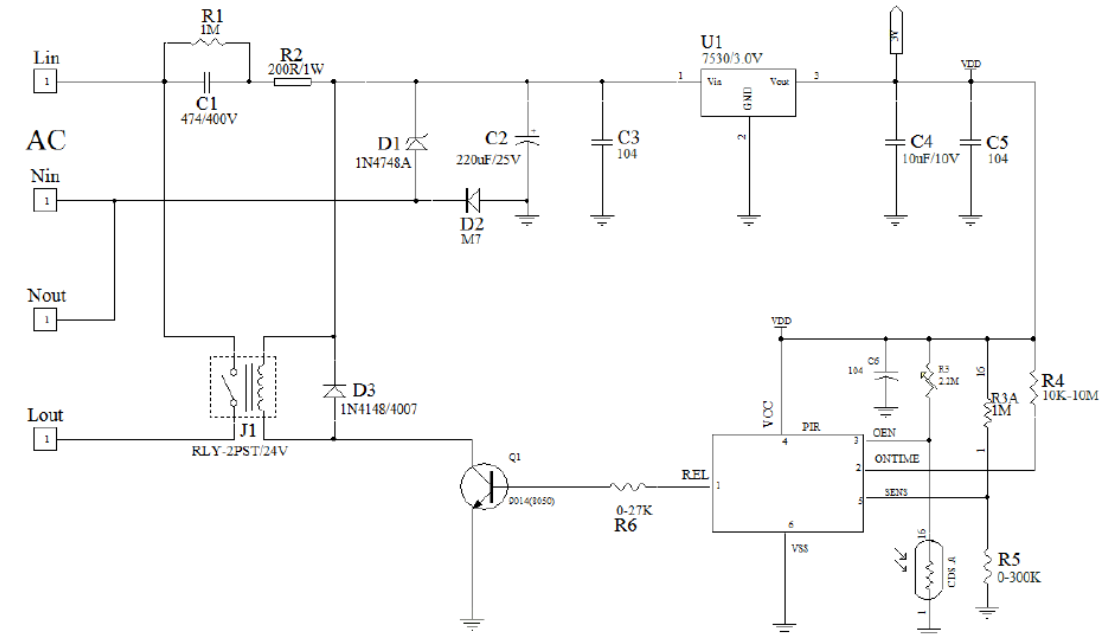
### ■ Reliable Test

| Type                  | Standard                           | OK         |
|-----------------------|------------------------------------|------------|
| Salt spray test       | GB/T 10125-2012                    | OK         |
| High temperature test | 100°C, 500 hours                   | OK         |
| Low temperature test  | -40°C, 500 hours                   | OK         |
| Humidity              | Relative humidity 95%, 500 hours   | OK         |
| Heat resistance       | 250°C, 10S                         | OK         |
| Vibration             | Frequency: 10Hz-55H, Time: 2 hours | OK         |
| Fall                  | 1m free fall                       | OK         |
| Air tightness         | Soaking in water of 21kpa, 1 hour  | NO bubbles |

■ Typical Application Circuit



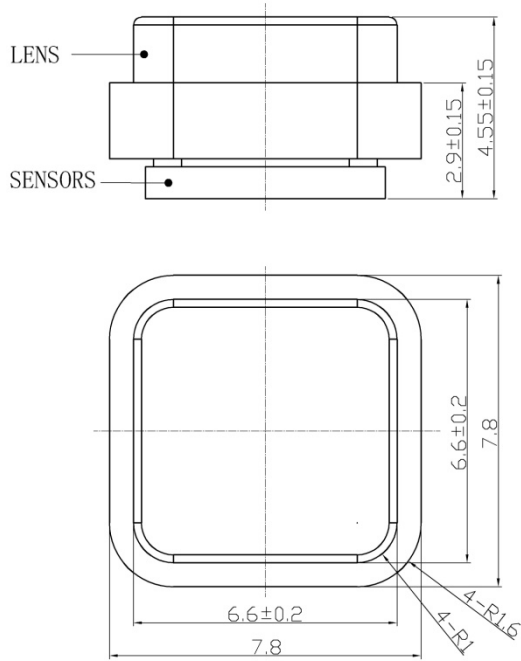
MOS Tube application





Triode application

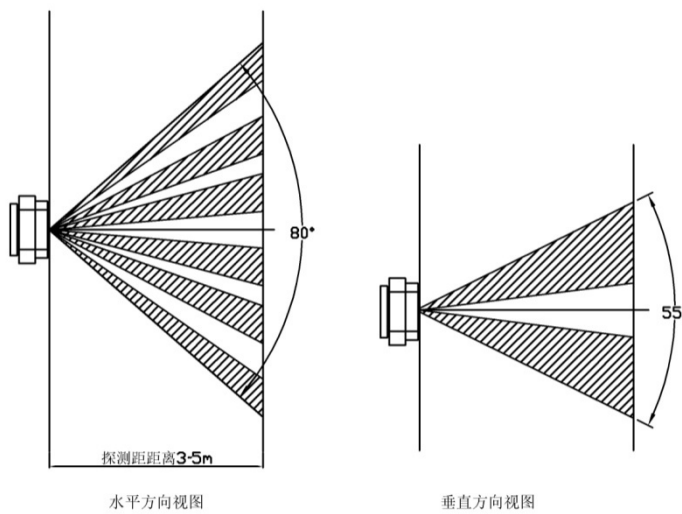
■ Fresnel lens for Mini SMD Digital Pyroelectric Infrared Sensors



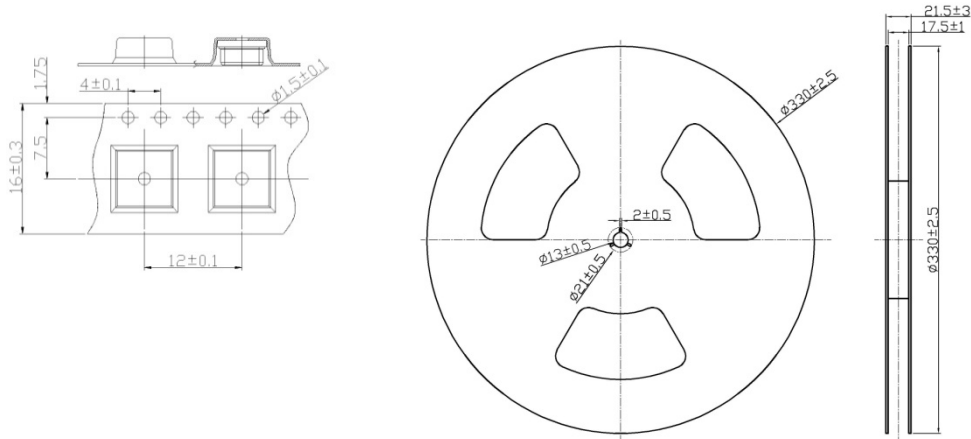
SB-F-011

Unit: mm

■ Field of View (with SB-F-011)



## ■ Package



Standard package: 1500pcs

## ■ Directions for Use

- The detection range is influenced by ambient temperature, detection target details, Fresnel lens size, etc.
- There are some sources may make a failure triggering, include small pets, car light, air-condition, etc.
- The welding temperature is 300°C 2-3 seconds.
- Do not touch the window by hand and the hard things directly. Wash by 100% absolute ethanol if need.
- Strong shake and static should be avoided.



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