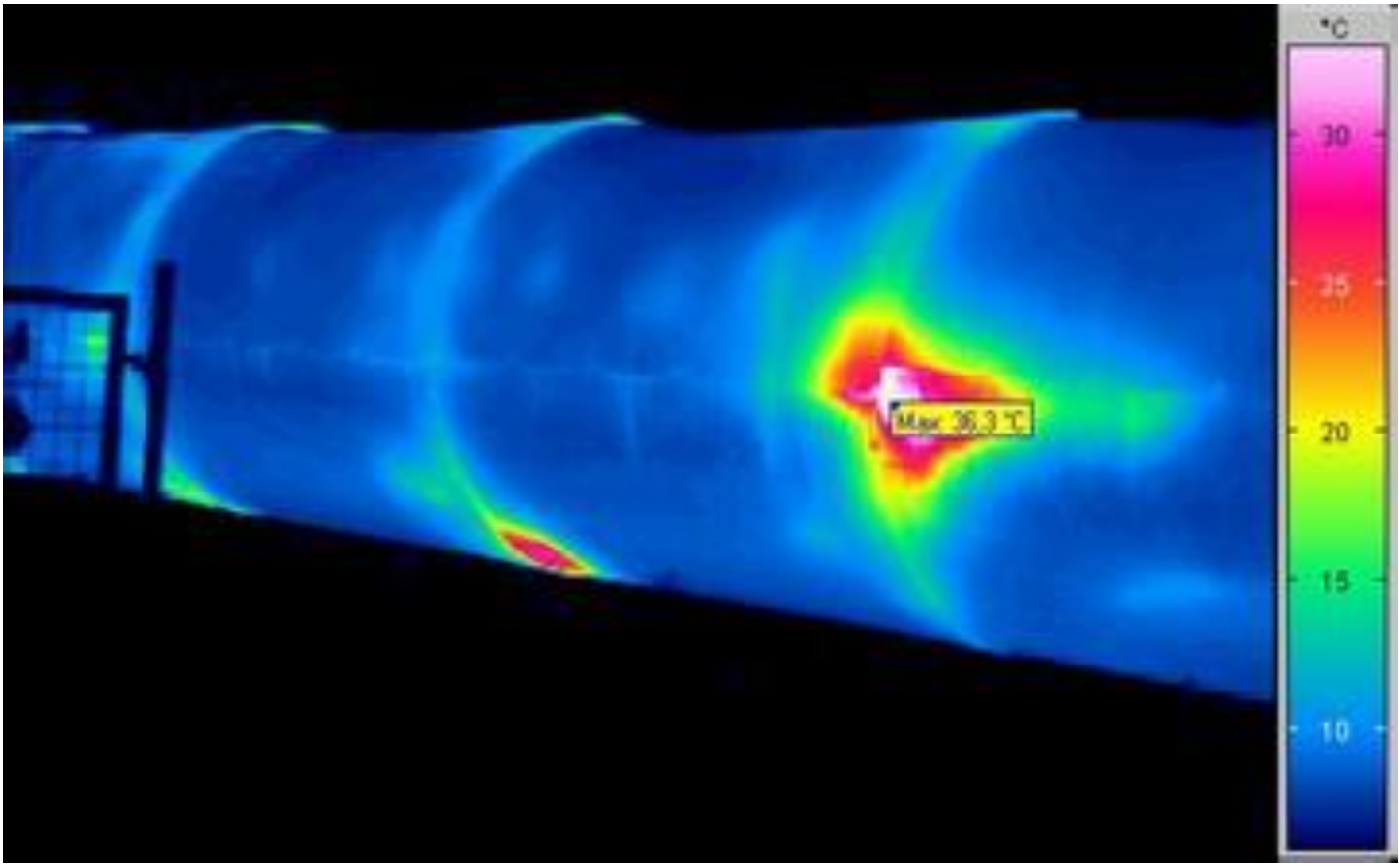
Tranesen Optoelectronics

Catalog of PIR sensor



Creating values for All

Tranesen Optoelectronics Co, Ltd

Company profile

- Tranesen is focusing on design, manufacturing and sales of pyroelectric sensor (PIR) and optical communication assembly parts.
- Tranesen was established in 2015, separated from LJV group.
- Tranesen's vision: Do everything with lots of cares and treat everyone with sincerities.
- Tranesen's purpose: To become the most valuable partner in the electronics business of the world.

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Tranesen Optoelectronics

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Selection guidance

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Smart				16
TO5/T68 series				17

Recommend
Optional

Infrared Basics

Infrared Basics

All solid bodies when having temperatures abovethe absolute zero (-273 C) emit electromagnetic waves. The range of longer wave lengths beyond the visual spectrum is referenced as infrared radiation. The scientist Wilhelm Wien (1864 -1928) has described the relation between a solid body’ s temperature and its emitting peak wave length by following equation:

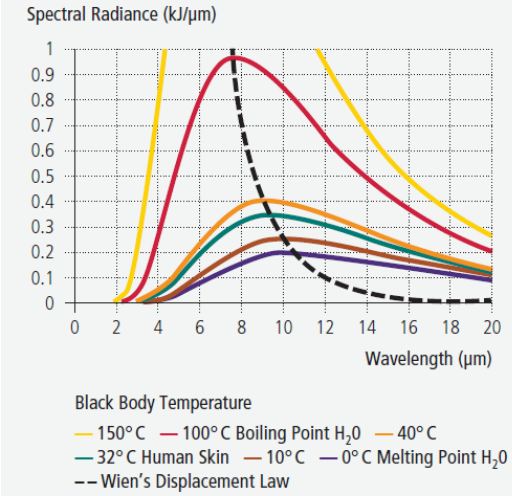
λmax =2898 / T

T: Temperature in K, λ: Wavelength in μm

Using this law we can calculate the specific peak emission wave length of any material or body: A human body, of a surface temperature of approx. 35° C or 308 K calculates into a peak wavelength of 9.4 μm; a cat of 38° C temperature into 9,3 μm. According to Max Planck (1858 - 1947) the intensity curve of all emitted wave lengths for a solid body is rather broad. For our example above this means we cannot distinguish human from the cat by their infrared spectrum.

For various temperatures of an ideal black body radiator the intensity curves of radiated energy versus wave length are shown in right.

辐射能量与波长



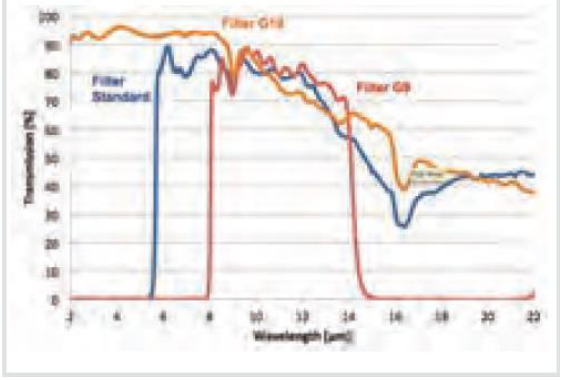
Pyroelectric sensors

With detectors for the infrared spectrum there are two major classes by their physical principles: Photon Detectors and Thermal Detectors. Photon detectors convert radiation directly into electrons, Thermal Detectors receive radiation, transfer it to raising temperature of the sensing material which changes it’ s electrical property in response to the temperature rise. Photon detectors such as Photodiodes and Phototransistors range from visible to near infrared, Thermal Detectors have a broad response from below visible light up to over 100 μm. Fitted with special infrared windows as spectral filters they work in the mid to far infrared range without ambient visible light interference.

Infrared filters

The spectral sensitive range of the detectors is defined by a filter window. Common applications in infrared reference wavelengths from 2 to 20 μm. Infrared windows for pyrometric applications are defined for the atmospheric window 5-14μm, which is our standard filter window. Long range pyrometers apply a sharp cut-on/cut-off window of 9-14μm (G9) as below.

带宽滤波器



Narrow band filters

Filter Type	Application	CWL	HPB
G1	CO	4.64 µm	180 nm
G2	CO2	4.26 µm	180 nm
G2.2	CO2	4.43 µm	60 nm
G2.5	CO2	4.33 µm	160 nm
G2.6	N2O	4.53 µm	85 nm
G3	CO+CO2	4.48 µm	620 nm
G4	NO	5.3 µm	180 nm
G5	HC	3.35 µm-3.4 µm	190 nm
G5.1	HC	3.46 µm	163 nm
G5.2	HC	3.28-3.31 µm	160 nm
G5.3	HC	3.09 µm	160 nm
G5.5	HC	3.32-3.34 µm	160 nm
G5.6	HC	3.42 µm-3.451 µm	160 nm
G5.7	HC	3.30-3.32 µm	160 nm
G5.9	HC	3.375 µm-3.4 µm	190 nm
G7.1	R12	11.3 µm	200 nm
G7.2	R134a	10.27 µm	210 nm
G7.3		12.4 µm	180 nm
G20	Reference	3.95 µm	90 nm

For the special application of Gas sensing by infrared absorption we offer narrow band filters to detect specific gas absorption lines. The appropriate row band optical filters enable detection of Carbon Monoxide, Carbon Dioxide, Natural Gasand other environmental gases, as well as some technical gases.

Optical properties

With respect to optical parameters of Detectors and Sensors, there are some interesting items to be mentioned: the optical bandwidth, transmission and blocking characteristics of the optical filter and, as major selection criteria, the sensor field of view, and performance of the detector within the field of view. The corresponding charts are given for the various sensors and types.

Pyroelectric Sensors

热释电效应

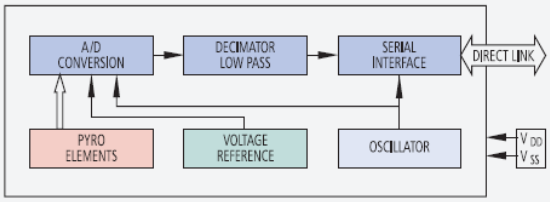
Since ancient times the pyroelectric effect has been known as a property of ferroelectric materials. It is based on a specific behavior of dielectric materials, the phenomenon of a permanent electrical polarization. When changing temperature of such materials, this polarization will increase, or decrease, we observe a charge displacement.
This pyroelectric effect is the basic principle for detectors that can recognize temperature variations. The characteristic value for the permanent polarization, called pyroelectric coefficient, disappears above the Curie point. The Curie temperature limits the operation temperature range for such detectors.

Sensor design

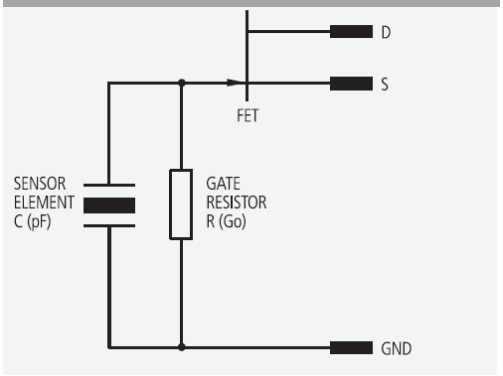
Within our detectors, a thin slice of pyroelectric material is fitted with electrodes to form a capacitor. Incoming radiation will generate extremely low levels of thermal energy, so the pyroelectric current flow is rather small. It needs a circuit to convert this small current into a convenient signal. The traditional analog detectors apply a high ohmic resistor and a special low-leakage current FET to transform the high impedance of the detector material to a common output resistance. The pyroelectric element’s capacitance and the high gate resistance of the FET form a RC circuit with a time constant of approx. 1 s., which makes the detector suitable for very low frequencies

Tranesen is using digital technology to Pyroelectric Detectors with integrated and digital ICs. Here, a special ADC circuit provides amplification, A/D conversion and interfacing to the outside electronics.

Digital process



Electrical configuration



Sensor construction

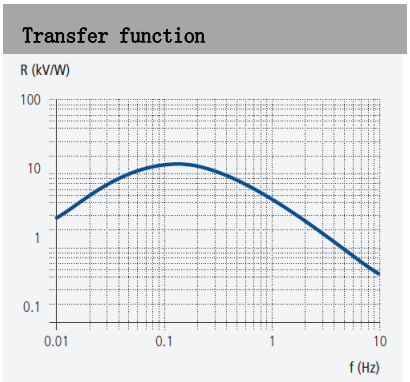
The pyroelectric material is placed on a special pc-board which provides thermal and mechanical isolation for the delicate pyroelectric material and provides space for the gate resistor and the FET. The connections are made either by wire bonding or conductive bonding. The whole pc-board is placed on to a TO header and closed with a TO cap, which has the relevant optical filter window. The window possesses a special infrared transmission characteristic, selected for the detector application.

Pyro characteristics

The most important electrical data of the IR Sensor are its responsivity, balance and noise. Sometimes it is also useful to refer to NEP or D*.

● Responsivity

The responsivity shows bandpass characteristics with a maximum at approx. 0.1 Hz radiation modulation. A typical curve "responsivity versus frequency" is indicated below as below. Responsivity is measured in V/W by means of a defined black body radiator. Responsivity refers to the active sensor area and is usually tested at 1 Hz modulation frequency unless specified differently.



● Balance / Matcch

The balance of a dual element detector indicates the common mode rejection also called matching between the two elements. It is an important value for the performance of dual element detectors, applied in motion applications, as it is a measure for distinction between moving and fixed objects. It can be specified either in V/W or in % of Responsivity.

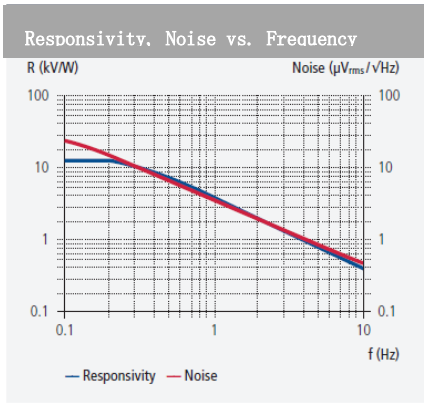
● Noise

The noise of the sensor consists of three parts: The basic thermal noise of the sensing material, the (Johnson) noise of the high ohmic resistor and the input noise of the FET. The total output of these tree parts is rather stable for temperatures below 40° C. Above this temperature, noise increases exponentially with temperature as can be observed with typical active electronic components. Noise is given in μV peak-to-peak or zero- peak. Similar to the dependence of responsivity on frequency, the noise values decrease with frequency from approx. 0.15 Hz to 50 Hz.

● NEP, D*

The NEP value is a form of signal to noise ratio. The NEP value specifies the minimum radiation power that can be detected by the sensor, resulting in an output that just exceeds the noise. NEP refers to RMS values of signal and noise and in addition to the electrical bandwidth. The lower the NEP, the better the sensor is.

metimes also used for comparison of sensors, the specific detectivity (D*) allows the characterization of sensing materials. It is defined as reciprocal of NEP referring to the sensor area. Details of these parameters as function of the electrical frequency are given as below.



Operating conditions

The storage and operating temperature range of the detectors is specified from -40° C up to +85° C. It needs to be noted that technical data usually reference room temperature and may vary within the specified temperature range.

Integrated and digital sensors

Pyroelectric detectors are AC type devices and give signals upon change of received Infrared radiation. Until today, all available detectors are analogue, i.e. they provide an analogue signal output. Tranesen introduced a family of detectors which differ from previous generations by offering a digital signal output. With the integrated and digital ICs, Tranesen is offering digital Detectors for these applications and configurations.

● Integrated electronics

The digital sensor integrates the first stages of circuitry into the detector housing: Amplification of the signal, then the A/D conversion, which needs a voltage reference. Following an internal 10 Hz electrical low pass filter the serial Interface provides for the "direct link" communication which is a one wire bidirectional communication feature. The whole concept is running by its own internal oscillator, which determines the speed of the internal process. The direct link feature enables the user to have the host μC request the information and its resolution, so the host controls the communication speed.

● From analog to digital

The digital sensor is a pyroelectric detector family to display information in Bit form as opposed to μV signals of analogue detectors. To give a measure for comparisons of traditional detectors to digital versions, the rule of thumb for signal levels versus bit information can be used:

- Resolution: 1 LSB ≙ 6.5 μV
- Noise: 6 Count ≙ 39 μV (with band-pass)
- DC Offset 8192 Counts
- Digital Range: 0 to 16383 Counts

In a typical motion electronic application the expected signal voltages range from 100 μV to 500 μV, so the digital signal may range about 100 bit-count on to the offset. The dynamic range of the digital detector comprises the range from 511 counts to 15873 counts and with this it is wider than the most application based signal levels. Outside of this range the detectors offers an Out-of-Range Reset function.

● Digital zero signal line

As the pyroelectric effect generates positive and negative signal amplitudes, the detector circuitry needs an electrical offset to be able to process such signals. In all analog circuitry this value is the offset voltage, which is usually subtracted after the first amplifier stage.

With digital sensors, the amplification is included already, and the internal voltage reference provides for the required offset. As to the user this offset appears as a digital zero line at about 8000 bit-count, it may vary in series from one part to the next. To recognize the zero line of the individual detector, the user may either use a digital band-pass or subtract the measured offset from the signal.

● The Host Needs to Filter The Signal

The digital sensor does not include any processing intelligence inside, unlike most analog pyrodetectors the digital sensor uses a direct communication with the hosting microcontroller without any analog hardware filtering (only the previously mentioned low-pass filter). Thus it becomes necessary to implement all necessary filtering by software filters within the hosting microprocessor of the unit.

Applications

Pyroelectric sensors had originally been designed as single element types for non-contact temperature measurement. During further research, dual element types were developed with multi-facet mirrors or Fresnel lenses entering the field of motion detection, starting as passive intrusion alarm (Burglar Alarm, PIR), followed by automatic light switches and security lights and lamps. The same concept is also applied with some automatic door openers.

Today the Environment and its protection is one of our most serious concerns. Features and instrumentation are required to measure and monitor all kinds of gas in our environment. One of the methods applied is the NDIR technique, a principle of measuring gas concentration by its absorption properties in the infrared range. Our detectors and sensors are a vital part of making our environment more safe, secure and healthy. Most of PIR Motion detecting devices have been designed around Dual Element types, more advanced units apply Four Element "Quad" type configurations.

Pyroelectric Sensor

Motion detection

Analog – Low cost

Application

- Auto light switch
- Night light

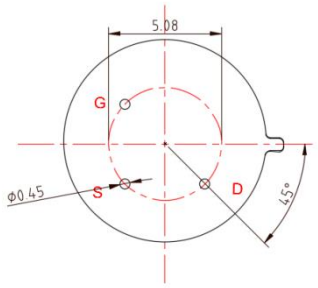
Features

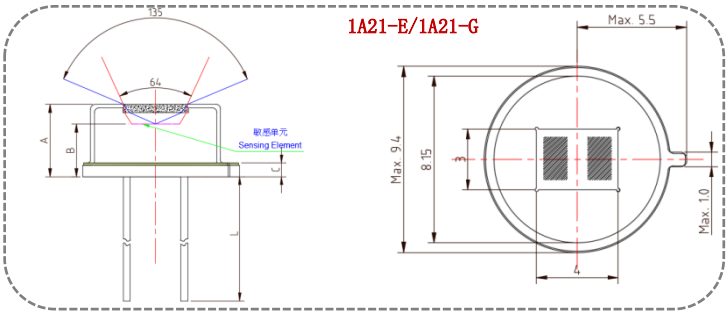
- TO-5 assembly
- Low cost

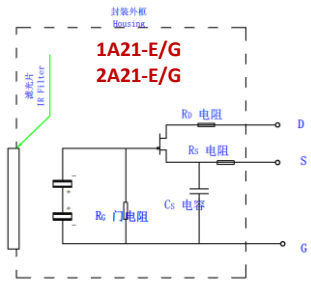
Description

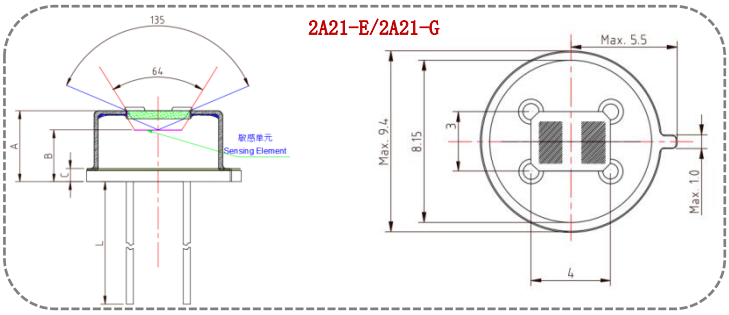
It is the low cost analog pyroelectric sensor, can be used in almost light switch applications.

Used it with ASIC or MCU to deal with analog signal.









1A21-E /2A21-E、 1A21-G / 2A21-G							
Parameters	**Symbol**	**1A21-E**	**2A21-E**	**1A21-G**	**2A21-G**	**Unit**	**Conditions**
Responsibility, Min	Rmin	3.4	3.4	3.8	3.8	kV/W	100℃，1Hz
Responsibility, Max	Rtyp	3.8	3.8	4.2	4.2	kV/W	100℃，1Hz
Match, Max	Mmax	15%	15%	15%	15%	15%	100℃，1Hz
Noise, Max	Nmax	80	80	80	80	μVpp	25℃，0.3~3Hz
Noise, Typical	N	33	33	33	33	μVpp	25℃，0.3~3Hz
FoV, Horizontal	Fov.H	135°	135°	135°	135°		
FoV, Vertical	Fov.V	123°	123°	123°	123°		
Source Voltage	Vs	0.3~1.2	0.3~1.2	0.3~1.2	0.3~1.2	V	Vdd=5V
Operating Voltage	Vop	2~15	2~15	2~15	2~15	V	
Standby current, Typical	Idd	12	12	12	12	μA	25℃，Vdd=5V
Standby current, Max	Idd	20	20	20	20	μA	25℃，Vdd=5V

Tranesen Optoelectronics

Pyroelectric Sensor

Motion detection

Analog – high performance

Application

- Auto light switch
- Night light
- Intruder alarm

Features

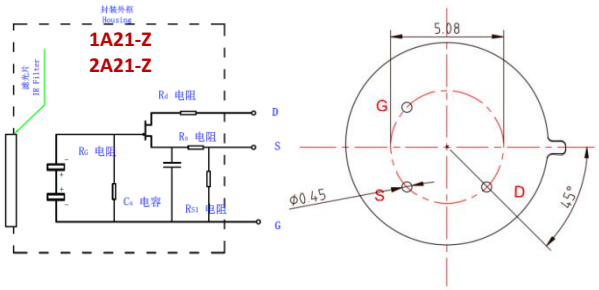
- TO-5 assembly
- Wider FoV

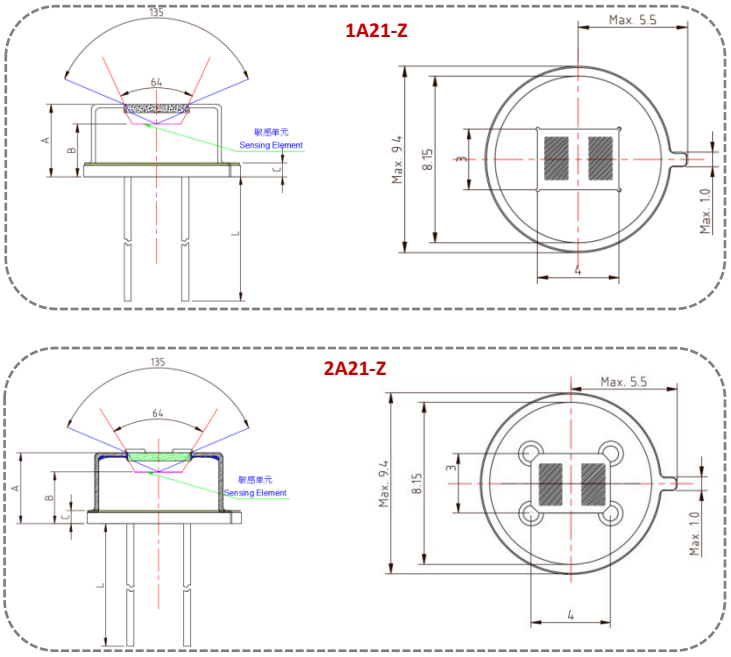
Description

It is the low cost analog pyroelectric sensor, can be used in almost light switch applications.

Used it with ASIC or MCU to deal with analog signal.

Built-in with filter circuit, good performance in resist EMI.

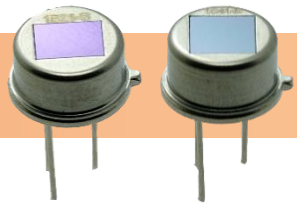




1A21-Z / 2A21-Z							
Parameters	**Symbol**	**1A21-Z**	**2A21-Z**			**Unit**	**Conditions**
Responsibility, Min	Rmin	3.6	3.6			kV/W	100℃，1Hz
Responsibility, Max	Rtyp	4.0	4.0			kV/W	100℃，1Hz
Match, Max	Mmax	15%	15%			15%	100℃，1Hz
Noise, Max	Nmax	80	80			μVpp	25℃，0.3~3Hz
Noise, Typical	N	28	28			μVpp	25℃，0.3~3Hz
FoV, Horizontal	Fov.H	135°	135°				
FoV, Vertical	Fov.V	123°	123°				
Source Voltage	Vs	0.3~1.2	0.3~1.2			V	Vdd=5V
Operating Voltage	Vop	2~15	2~15			V	
Standby current, Typical	Idd	12	12			μA	25℃，Vdd=5V
Standby current, Max	Idd	20	20			μA	25℃，Vdd=5V

Pyroelectric Sensor

Motion detection



Analog - special

Application

- Auto light switch
- Night light
- Ceiling switch/alarm

Features

- TO-5 assembly
- Wider FoV in vertical

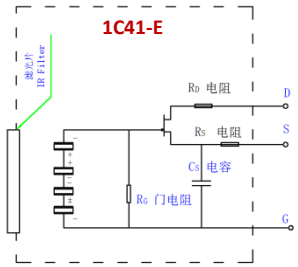
Description

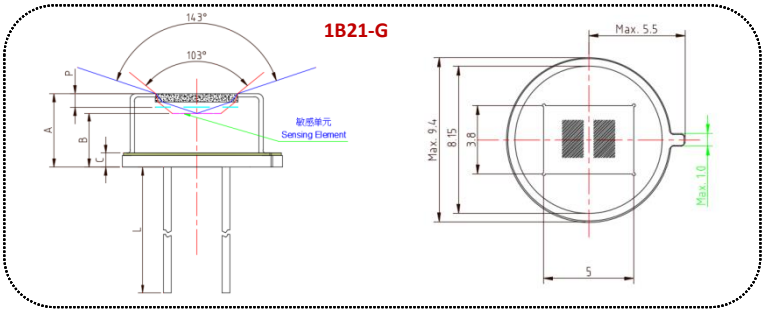
It is the 4 sensing elements pyroelectric sensor with wider vertical FoV and sensitivity, specially used in ceiling mounted light switch or alarm.

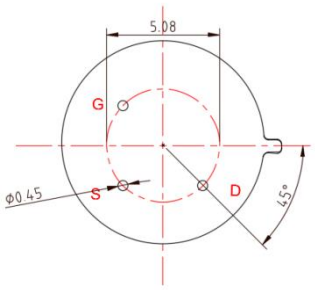
Used it with ASIC or MCU to deal with analog signal.

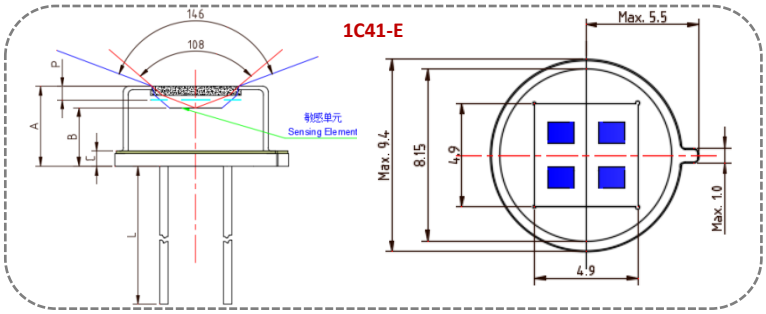
Bigger window will have greater FoV.

4 sensing element sensor has better performance in ceiling application.









1B21-G /1C41-E							
Parameters	**Symbol**	**1B21-G**	**1C41-E**			**Unit**	**Conditions**
Responsibility, Min	Rmin	3.8	5.0			kV/W	100℃，1Hz
Responsibility, Max	Rtyp	4.2	6.2			kV/W	100℃，1Hz
Match, Max	Mmax	15%	15%			15%	100℃，1Hz
Noise, Max	Nmax	80	120			μVpp	25℃，0.3~3Hz
Noise, Typical	N	33	57			μVpp	25℃，0.3~3Hz
FoV, Horizontal	Fov.H	143°	146°				
FoV, Vertical	Fov.V	132°	146°				
Source Voltage	Vs	0.3~1.5	0.3~1.5			V	Vdd=5V
Operating Voltage	Vop	2~15	2~15			V	
Standby current, Typical	Idd	12	12			μA	25℃，Vdd=5V
Standby current, Max	Idd	20	20			μA	25℃，Vdd=5V

Tranesen Optoelectronics

Pyroelectric Sensor

Motion detection

Analog - Customized

应用

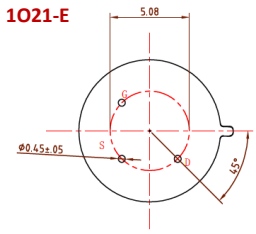
- Air conditioner
- Flame alarm
- Auto voice kits

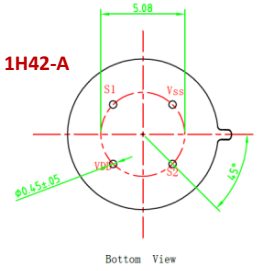
特性

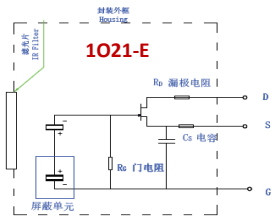
- TO-5 assembly
- Customized

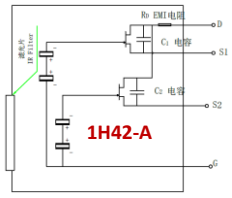
Description

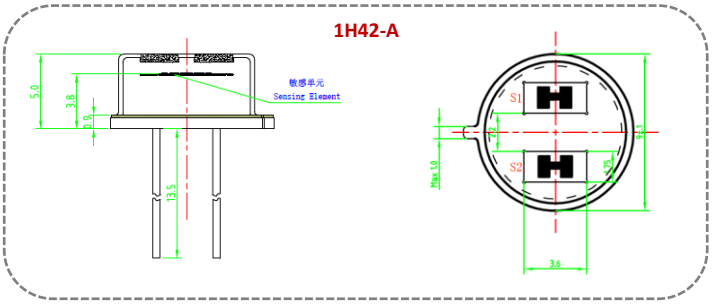
We provide customize sensor in some special applications.

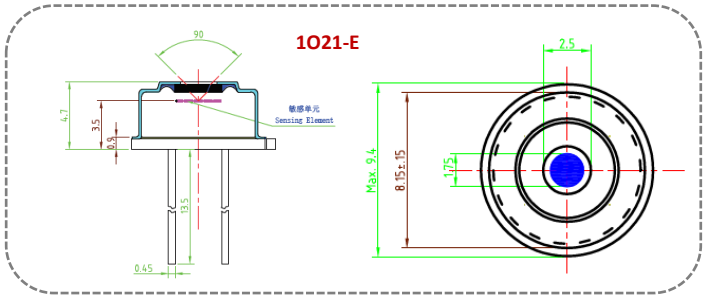












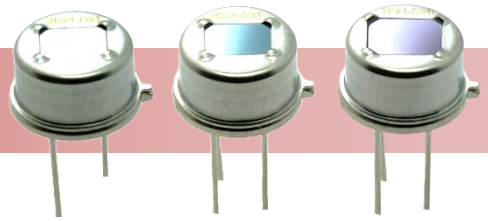
1O21-E / 2T22-C / 2D31-F							
Parameters	**Symbol**	**1O21-E**	**1H42-A**			**Unit**	**Conditions**
Responsibility, Min	Rmin	3.6	2.8			kV/W	100℃，1Hz
Responsibility, Max	Rtyp	4.0	3.2			kV/W	100℃，1Hz
Match, Max	Mmax	NA	15%			15%	100℃，1Hz
Noise, Max	Nmax	95	80			μVpp	25℃，0.3~3Hz
Noise, Typical	N	37	33			μVpp	25℃，0.3~3Hz
FoV, Horizontal	Fov.H	90°	90°				
FoV, Vertical	Fov.V	90°	90°				
Source Voltage	Vs	0.3~1.2	0.3~1.2			V	Vdd=5V
Operating Voltage	Vop	2~15	2~15			V	
Standby current, Typical	Idd	12	12			μA	25℃，Vdd=5V
Standby current, Max	Idd	20	20			μA	25℃，Vdd=5V

Tranesen Optoelectronics

Pyroelectric Sensor

Motion detection

Integrated - Simple



Application

- Smart home
- Intruder alarm

特性

- TO-5 assembly with ASIC inside
- Different window size
- Low power consumption
- Good EMC performance

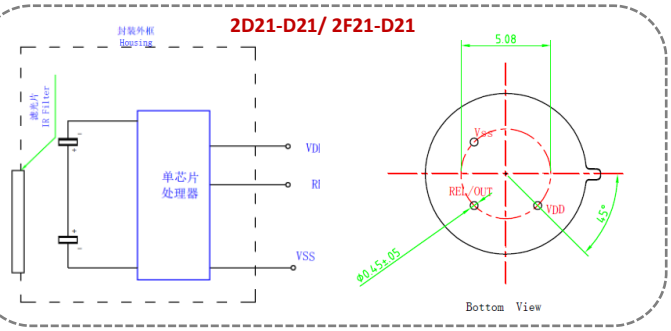
Description

Professional ASIC inside, very good EMC performance.

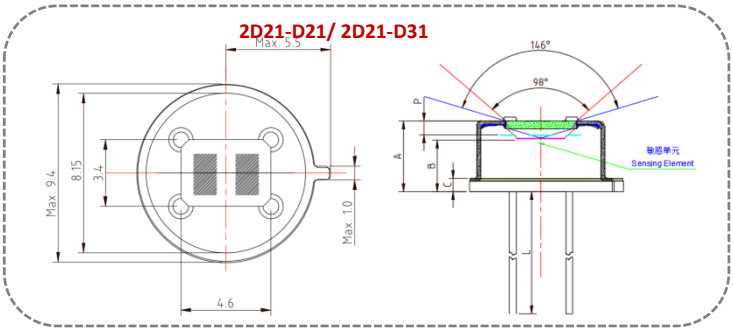
No need additional ASIC outside to deal with analog signals.

Very easy to use.

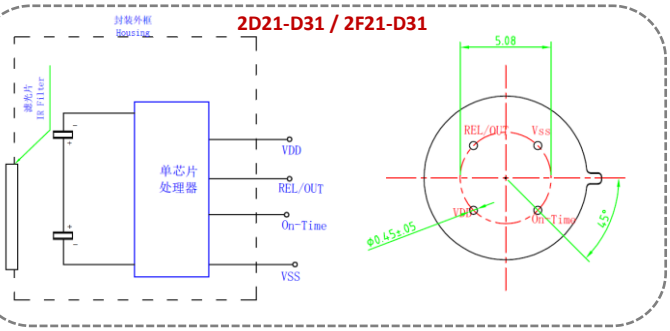
2D21-D21/ 2F21-D21



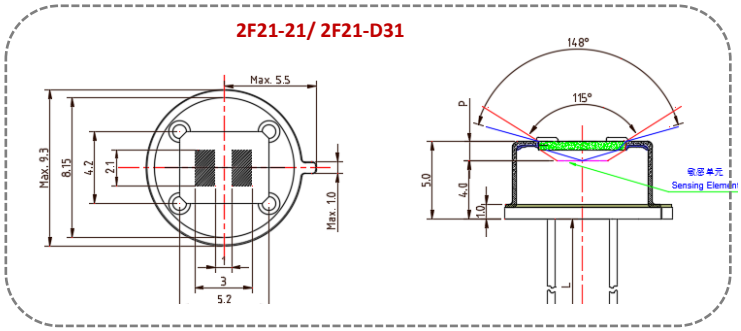
2D21-D21/ 2D21-D31



2D21-D31 / 2F21-D31



2F21-21/ 2F21-D31

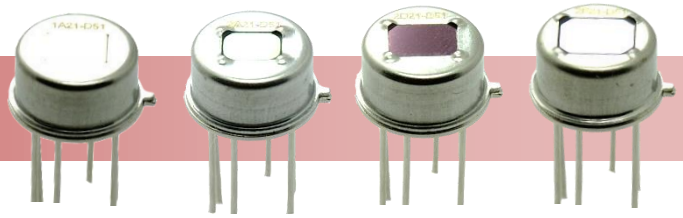


2D21-D21/ 2F21-D21 、 2D21-D31/ 2F21-D31							
Parameters	**符号**	**2D21-D21**	**2F21-D21**	**2D21-D31**	**2D21-D31**	**Unit**	**Conditions**
Responsibility, Min	Rmin	3.9	3.9	3.9	3.9	kV/W	100℃，1Hz
Responsibility, Max	Rtyp	4.3	4.3	4.3	4.3	kV/W	100℃，1Hz
Match, Max	Mmax	15%	15%	15%	15%	15%	100℃，1Hz
Noise, Max	Nmax	80	80	80	80	μVpp	25℃，0.3~3Hz
Noise, Typical	N	33	33	33	33	μVpp	25℃，0.3~3Hz
FoV, Horizontal	Fov.H	142°	148°	142°	148°		
FoV, Vertical	Fov.V	136°	138°	136°	138°		
Source Voltage	Vs	NA	NA	NA	NA	V	Vdd=5V
Operating Voltage	Vop	2.7~3.3	2.7~3.3	2.7~3.3	2.7~3.3	V	
Standby current, Typical	Idd	10	10	10	10	μA	25℃，Vdd=5V
Standby current, Max	Idd	20	20	20	20	μA	25℃，Vdd=5V

Tranesen Optoelectronics

Pyroelectric Sensor

Motion detection



Integrated – Standard

Application

- Smart home
- Intruder alarm
- Smart doorbell

Features

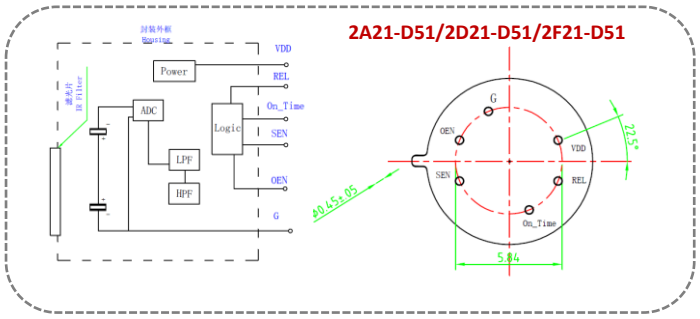
- TO-5 assembly with ASIC inside
- Low power consumption
- Good EMC performance

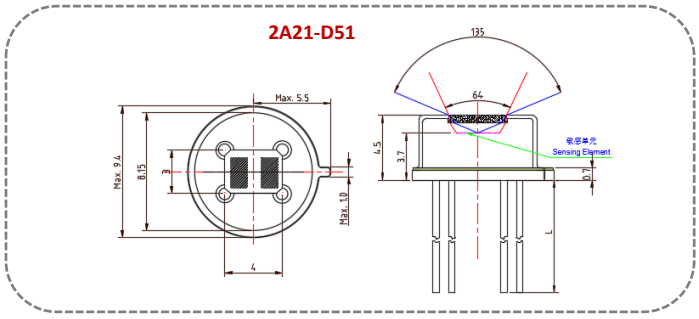
Description

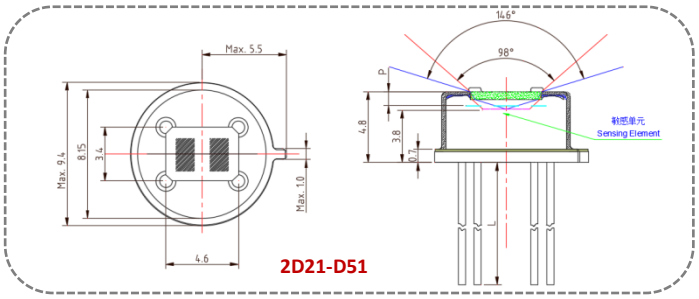
Professional ASIC inside, very good EMC performance.

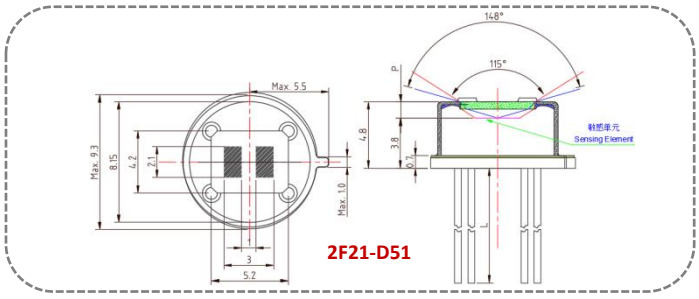
No need additional ASIC outside to deal with analog signals.

On-time, sensitivity, CDS are adjustable.









1A21-D51/ 2A21-D51 / 2D21-D51 /2F21-D51								
Parameters	**Symbol**	**2A21-D51**	**2D21-D51**	**2F21-D51**			**Unit**	**Conditions**
Responsibility, Min	Rmin	3.9	3.9	3..9			kV/W	100℃，1Hz
Responsibility, Max	Rtyp	4.3	4.3	4.3			kV/W	100℃，1Hz
Match, Max	Mmax	15%	15%	15%			15%	100℃，1Hz
Noise, Max	Nmax	80	80	80			μVpp	25℃，0.3~3Hz
Noise, Typical	N	33	33	33			μVpp	25℃，0.3~3Hz
FoV, Horizontal	Fov.H	135°	142°	148°				
FoV, Vertical	Fov.V	123°	136°	138°				
Source Voltage	Vs	NA	NA	NA			V	Vdd=5V
Operating Voltage	Vop	2.7~3.3	2.7~3.3	2.7~3.3			V	
Standby current, Typical	Idd	10	10	10			μA	25℃，Vdd=5V
Standby current, Max	Idd	20	20	20			μA	25℃，Vdd=5V

Pyroelectric Sensor

Motion detection

Digital sensor

Application

- Intruder alarm
- Smart home

Features

- TO-5 assembly with ASIC inside
- Low power consumption
- Temperature signal included.
- Digital (DOCI) output

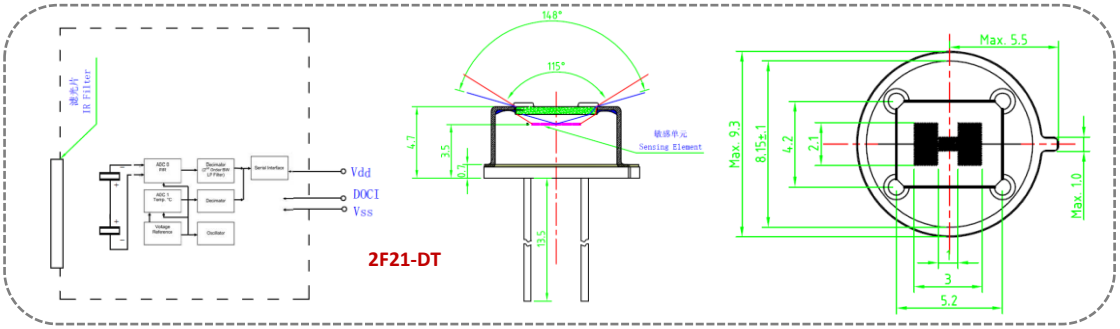
Description

Professional ASIC inside, very good EMC performance.

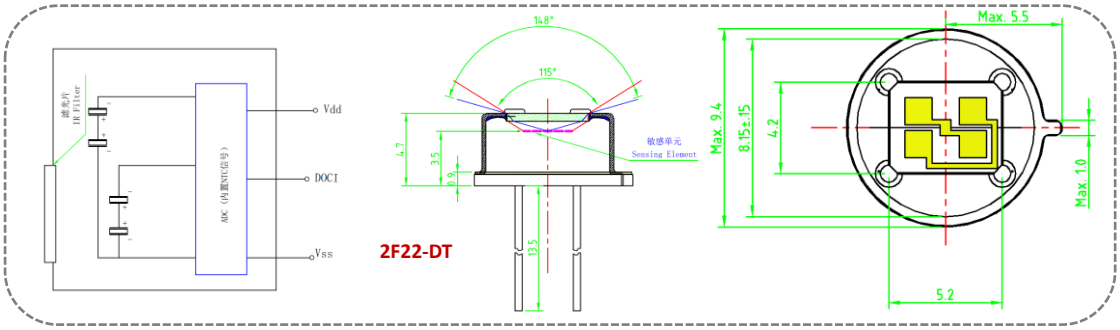
Use MCU to deal with digital signal.

Flexibility is high, upon customer's imagination.

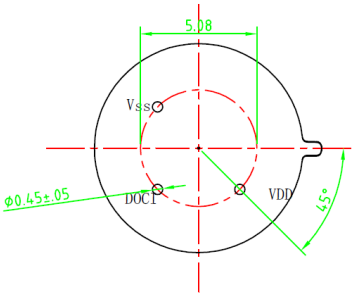
Except for PIR signal, there is temperature signal was built-in.



2F21-DT



2F22-DT



2F21-DT/2F22-DT

Pyroelectric Sensor

Motion detection

Smart sensor

Application

- Intruder alarm
- Smart home

Features

- TO-5 assembly with ASIC inside
- Low power consumption
- Temperature signal included.

Description

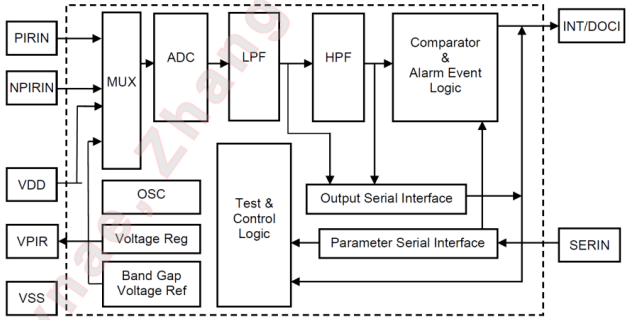
Professional ASIC inside, very good EMC performance.

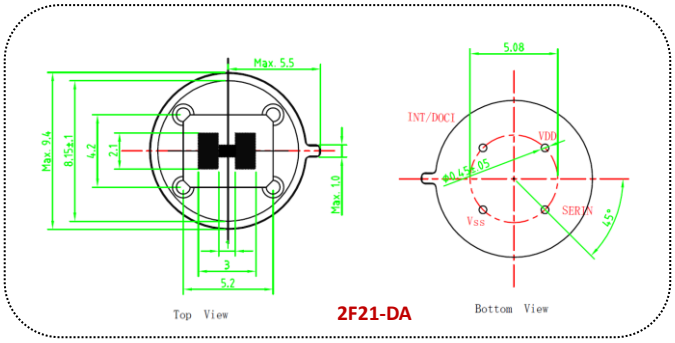
Flexibility is high, it can be used as integrated sensor or digital sensor.

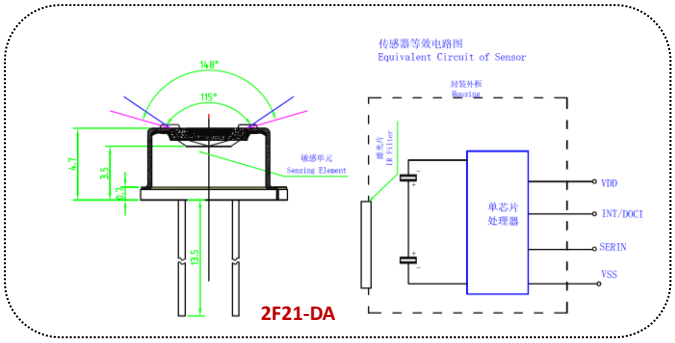
Use with MCU to configure sensor detail parameters.

Ultra-low power consumption, suitable for smart home kits especially.

Detailed Description







2F21-DA							
Parameters	Symbol	2F21-DA				Unit	Conditions
Responsibility Min	Rmin	3.9				kV/W	100℃, 1Hz
Responsibility Max	Rtyp	4.3				kV/W	100℃, 1Hz
Match, Max	Mmax	15%				15%	100℃, 1Hz
Noise, Max	Nmax	80				uVpp	25℃, 0.3~3Hz
Noise, Typical	N	33				uVpp	25℃, 0.3~3Hz
FoV, Horizontal	Fov.H	148°					
Fov, Vertical	Fov.V	138°					
Source voltage	Vs	NA				V	Vdd=5V
Operating voltage	Vop	2.7~3.3				V	
Standby curr. Typ.	Idd	5				uA	25℃, Vdd=5V
Standby curr. Max	Idd	10				uA	25℃, Vdd=5V

Pyroelectric Sensor

Motion detection

T501/T601 Series

Application

- Intruder alarm
- Smart home

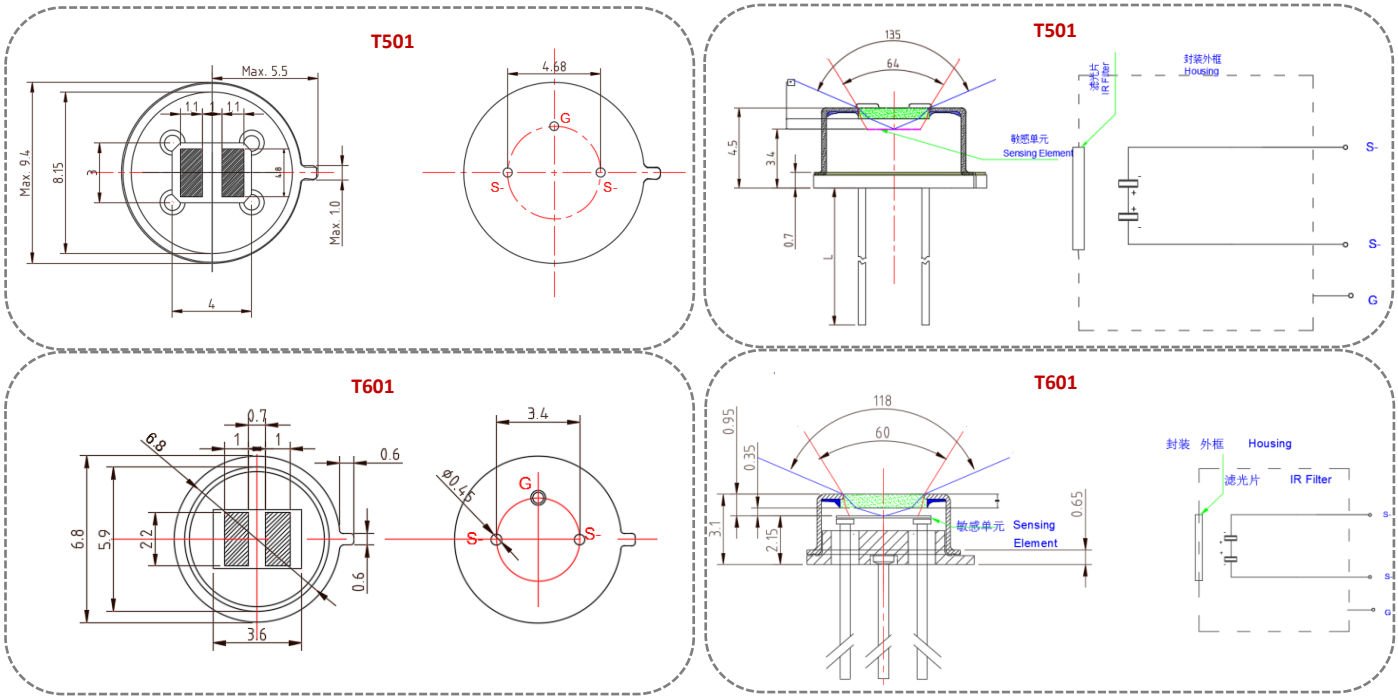
Features

- TO-5 assembly with ASIC inside
- Low power consumption
- Temperature signal included

Description

High heat sink

New design without power supply.



T501/T601							
Parameters	Symbol	T501	T601			Unit	Conditions
Responsibility Min	Rmin	3.8	3.4			kV/W	100℃, 1Hz
Responsibility Max	Rtyp	4.2	3.8			kV/W	100℃, 1Hz
Match, Max	Mmax	15%	15%			15%	100℃, 1Hz
Noise, Min	Nmax	80	80			μVpp	25℃, 0.3~3Hz
Noise, Typical	N	33	33			μVpp	25℃, 0.3~3Hz
FoV, Horizontal	Fov.H	135	146°				
FoV, Vertical	Fov.V	64°	98°				
S1、S2 Signal	Vpp	0.1 ~1.2	0.1 ~1.2			mV	100℃@25℃, 1Hz
S-&S-Resistance	Rs	>20				Gohm	@ -20~40C° & 25V

Handling and pre-cautions

Handling and pre-cautions

Handling Tips

Handle the detectors as ESD sensitive devices and protect them from electrostatic discharges. Working areas should be conductive and grounded. When handling detectors, operators shall be grounded.

Carefully cutting or bending leads and don’ t bend leads close their base end. Avoid dropping detectors on the floor.

Don’ t touch the detector window. If yes, please clean windows with cotton swap. Do not expose detector to aggressive detergents, etc.

This IR-detector is sealed with metal cap & header.

Soldering conditions:

The typically applied and recommended process is manual soldering. The soldering temperature should not exceed 320° C with exposure time of 5 seconds.

FAQ

Performance

1. **How about the detecting distance of the pyroelectric sensors?**

   It depends on:

   a. The responsibility of sensor.
   b. The amplification factor of the amplification circuit.
   c. Fresnel lens type.
   d. The frequency characteristics of the amplification circuit.
   e. The threshold of the comparator in the circuit.

   Within these factors, the most important part is the Fresnel lens. By using a big size Fresnel lens, even a simple sensor can detect a distance of 20~30 meters.

2. **What is the basic character of pyroelectric sensor?**

   Sensor will output voltage change when the IR ray changed (people moved).

3. **Can it be used in outdoor conditions?**

   It can be used in outdoor conditions. But please install it in a place where avoid sunshine, wind or dewing. Because the sunshine, wind would lead to temperature change of sensor, and result in error signal output. Dewing would lead optical property change of Fresnel lens and filter, and result in error signal output.

4. **Does clothes affect sensitivity ?**

   Yes, it does. The more skin exposed, the more IR ray radiated, and the better sensitivity.

Quality & Reliability

5. **What is the MSL (Moisture Sensitivity Level)?**

   Level 2.

Asssembly

6. **What is the soldering condition ?**

   Please use hand soldering or standard wave soldering. Please do not use reflow soldering.
   Hand soldering: not over 350℃
   Distance between soldering position to the bottom of pins:
   1~3mm: within 3sec every time.
   More than 3mm: within 10sec every time.
   Please contact us if you’ re going to use standard wave soldering.

7. **Is it OK to use wave soldering or reflow soldering?**

   Please contact us for detail of wave soldering. Reflow soldering is not OK.

8. **Is it OK to rework after the sensor is soldered?**

   No, it is not recommend.

Structure / Material

9. **What material is used in the sensor?**

   Pyroelectric ceramics, resin, metal, optical file, semiconductor.

10. **Is it OK to use other material to make Fresnel lens except for HDPE (as the requirement of anti-flaming)?**

    No. Considering the IR transmittance, please use HDPE to make Fresnel lens.

Operating circuit

11. What is the power consumption of sensor?

It depends on the operating voltage and the source resistor. It is about 20uA while the operating voltage is 3V and the source resistor is 47kohm.

The higher voltage, the greater power consumption, the smaller resistor, the higher power consumption.

12. How long will it take before sensor become stable ?

About 30 seconds. As the amplification uses a big capacitor, it needs time to get stable.

Others

13. Dose detecting distance change while the environment temperature change?

The detecting distant will change. The greater temperature difference between human body and environment, the longer detection distance.

14. Does sunshine or automotive headlamp affect detection?

Yes. Please avoid sunshine or automotive headlamp shining to sensor.

15. Dose warming equipment, air conditioner affect detection ?

Yes. They generate different temperature flow, which will affect detection and results in error signal output. Please use sensor in the place avoiding such equipment.

16. Does dewing affect detection?

Yes. Dewing will affect optical property and result in error signal output or unable to detect.

17. Dose cell phone affect detection?

Yes. We recommend to use integrated sensor or digital sensor.

18. Does it work if there is some glass between human body and sensor?

No. The IR ray (human, 9um~10um) transmittance in glass is too low to detect.

19. Does it affect if the Fresnel lens is dirty?

Yes. Dirty lens would lead to lower transmittance of IR ray thus affect detection.

20. Is the sensor affected by other factors?

Sensors will be affected by temperature, electromagnetic waves, strong light, hot or cool wind.

Customer need to evaluate the environment of application.

Please do not install sensor under hot or cool wind outlet.

21. Does pyroelectric sensor detect by animals?

Yes. As animal also emitted IR rays.

22. Is it OK to customize Fresnel lens?

We have Fresnel lens resource.

23. How many years do we make pyroelectric sensors.

7 years, since 2011.

N