Digital intelligent pyroelectric infrared sensor BS412

Product Overview

BS412 is a pyroelectric red that integrates digital intelligent control circuits and human detection sensitive e

External sensor. The human body detection sensitive element couples the sen sed human body moving signal to the digital intelligent integrated circuit chi p through a very high impedance differential input circuit. The digital intellig ent integrated circuit converts the signal into a digital signal, and when the PI R signal exceeds the selected digital threshold, there will be a delayed REL l evel output. The time parameters are set through resistors to control the delay time of continuous operation of the appliance. All signal processing is done o n one chip.

characteristic

Digital signal processing. Low voltage, low power consumption, short heat engine time. High power rejection ratio and anti-RF interference (mobile phone, WiFi, etc.). A secon d-order Butterworth bandpass filter with built-in infrared sensors to shield input interfere nce from other frequencies.

It has a timing time and the simulation time is continuously adjustable. Good stability and e ffectively suppress repeated malfunctions. Th e application circuit is simple.

use

Toys

Digital photo frames

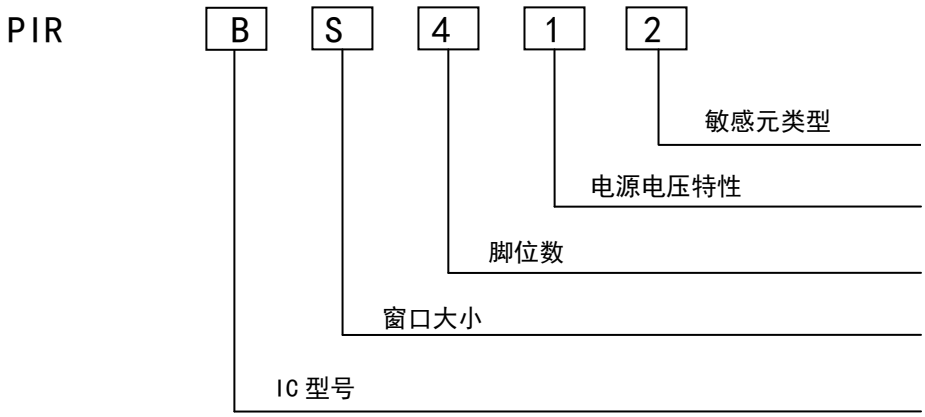
TV, refrigerator, air conditioner

USB alarm

PIR motion detection

Intrusion detection Placeholder detection IoT sensor I nduction light Network camera LAN monitor Private alarm Automobile anti-theft system Automatic lights on and off for indoor lights, corridors, stair lights, etc.

Product model system



Performance parameters

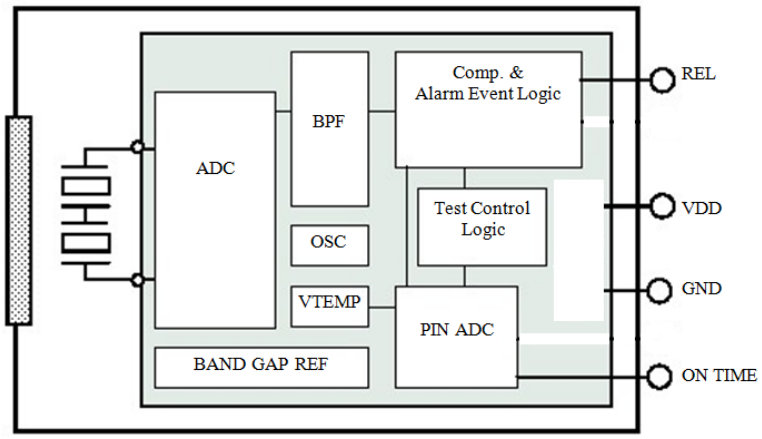
1. Limit value

Exceeding the values in the table below may cause permanent damage to the device.

参量	符号	最小值	最大值	单位	备注
工作温度	T_{ST}	-20	85	℃	
任何引脚极限	Into	-100	100	mA	
存储温度	T_{ST}	-40	125	℃	

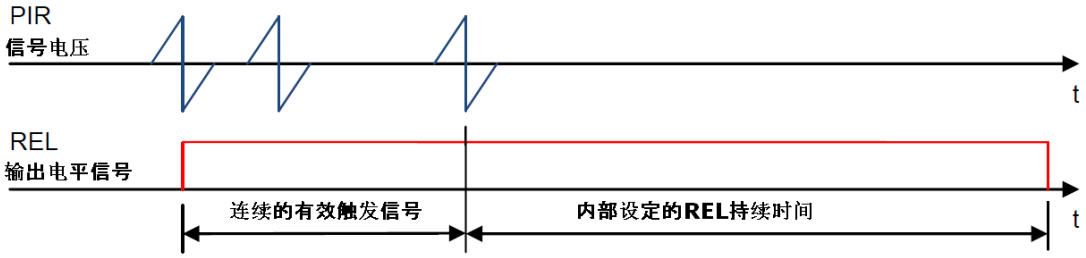
2. Working conditions (T=25°C, Vdd=3V, unless otherwise specified)

参量	符号	最小值	典型值	最大值	单位	备注
电源电压	V_{DD}	2. 2	3	3. 7	V	
工作电流	I_{DD}	9	9. 5	11	μA	
灵敏度阀值	V_{SENS}		90		μV	不可调
输出REL						
输出低电流	I_{OL}	10			mA	V_{OL}<1V
输出高电流	I_{OH}			-10	mA	V_{OH}>(V_{DD}-1V)
REL的低电平输出锁定时间	T_{OL}		2		s	不可调
REL的高电平输出延时时间	T_{OH}	2		3600	s	
输入ONTIME						
电压输入范围		0		VDD/2	V	调节范围在0V和V_{DD}/2间
输入偏置电流		-1		1	μA	
振荡器和滤波器						
低通滤波器截止频率				7	Hz	
高通滤波器截止频率				0.44	Hz	
芯片上的振荡器频率	F_{CLK}			64	kHz	

内部方框图	

3. Output trigger mode

When the pyroelectric infrared signal received by the probe exceeds the trigger threshold inside the probe, a counting pulse will be generated inside. When the probe receives such a signal again, it will think that it has received the second pulse. Once 2 pulses are received within 4 seconds, the probe will generate an alarm signal, and at the same time, the REL pin is triggered at a high level. In addition, as long as the received signal amplitude exceeds more than 5 times the trigger threshold, only one pul se is needed to trigger the output of the REL. The following figure is an example of a trigger logic diagram. For multiple trigge rs, the sustain time of the output REL is timed from the last valid pulse.



Smart probe alarm trigger timing diagram

4. ONTIME pin timing settings of REL output

When the probe detects the human body movement signal, a high level will be output on the REL pin. The duration of this leve l is determined by the level applied to the ONTIME pin. If multiple trigger signals are generated in the REL high level device, as long as a new trigger signal is detected, the time of REL will be reset and then re-timed.

4.1 If the analog REL timing is used, connect a resistor R to the power supply on the ONTIME pin, which is allowed to be adjusted with

$$\frac{230400}{f}$$

When using analog timing, the ONTIME pin will generate corresponding oscillation frequ

At the timing time, you can connect an additional capacitor C to ground on the ONTIME pin while connecting resistor R to the power supply. Different capacitors can be selected according to the needs, but the capacitance value cannot be greater than 10n F, the resistance value shall not be greater than 510KΩ, and shall not be less than 100KΩ.

The working current is related to the selected resistor R. The larger the resistance value, the smaller the working current. If the power consumption requirements are high, it is recommended to use a larger resistor (300K-510K) or choose a digital REL t iming method. To obtain an accurate timing time, you can select the appropriate capacitance resistance value, first calculate the timing time according to the oscillation frequency, and then adjust the capacitance resistance parameters.

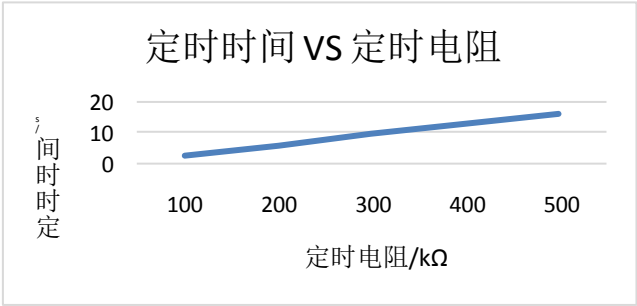


Figure 1 ONTMIE pin does not connect to capacitor

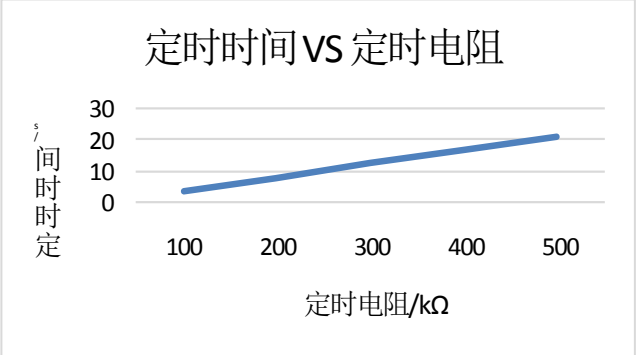


Figure 2 ONTMIE pin is connected to 10pF capacitor to ground

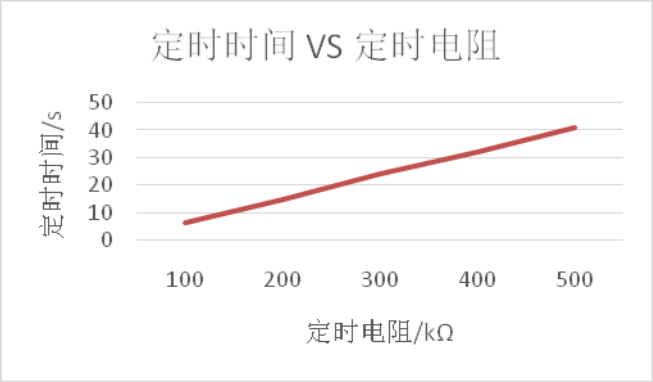


Figure 3 ONTMIE pin is connected to the 560pF capacitor to the ground

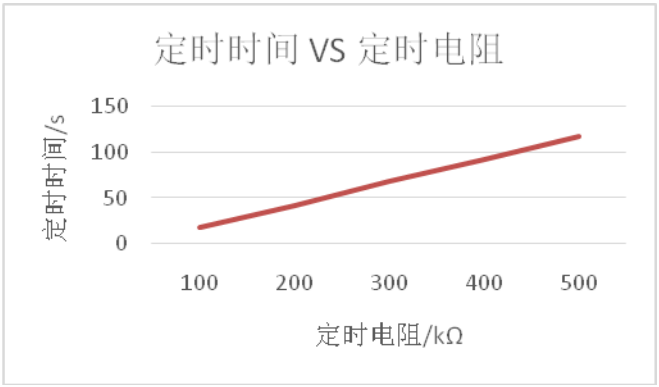
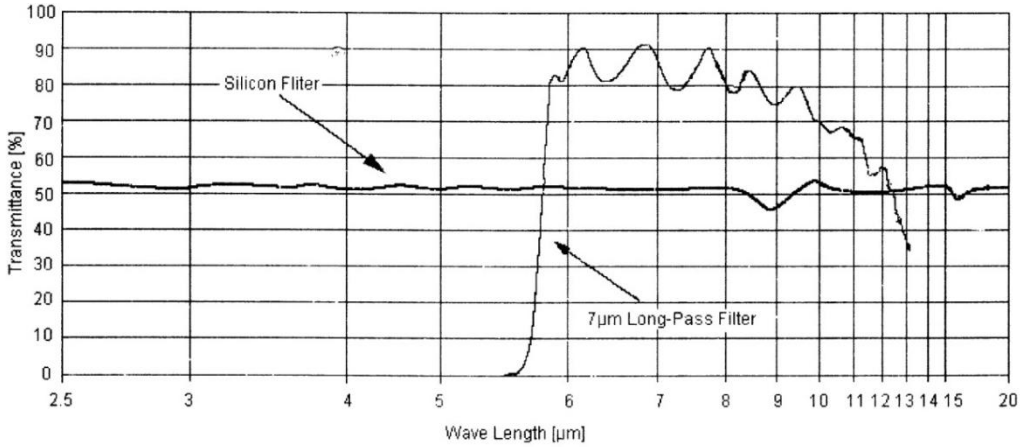


Figure 4 ONTMIE pin connects 1nF capacitor to ground

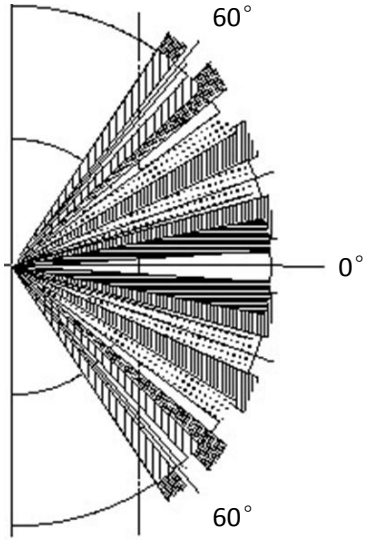
4.2 If the digital REL timing method is used, the ONTIME pin is connected to a fixed potential with a maximum value of less than VDD/2 to achieve timing. In actual use, the REL timing adjustment can be achieved by using the resistor voltage division form, which consists of the upper voltage division resistor RH and the lower voltage division resistor RL (resistance with 1% accuracy is recommended for RH and RL). A recommended solution is: the upper voltage divider resistor RH is fixed to 1MΩ, and the lower voltage divider resistor RL is given by the table below. The output timing time (Td) and voltage settings refer to the table below. Note: When using digital REL timing mode, the voltage of the ONTIME pin must not be higher than VDD/2. If the voltage value required for its timing time is at the critical point of upper and lower gears, a timing time jump may occur; and the timing time can only be selected from one of the 16 times in the table below. If the time in the table below is not suitable, it is recommended to use the analog REL timing mode.

时间档位	设定时间（s）(典型值)	TIME 脚电压范围	中心值	分压电阻推荐值(精度±1%)	
				上拉电阻 RH	下拉电阻 RL
1	2	0~1/32VDD	1/64VDD	不贴/1M	0R
2	5	1/32VDD~2/32VDD	3/64VDD	1M	51K
3	10	2/32VDD~3/32VDD	5/64VDD	1M	82K
4	15	3/32VDD~4/32VDD	7/64VDD	1M	124K
5	20	4/32VDD~5/32VDD	9/64VDD	1M	165K
6	30	5/32VDD~6/32VDD	11/64VDD	1M	210K
7	45	6/32VDD~7/32VDD	13/64VDD	1M	255K
8	60	7/32VDD~8/32VDD	15/64VDD	1M	309K
9	90	8/32VDD~9/32VDD	17/64VDD	1M	360K
10	120	9/32VDD~10/32VDD	19/64VDD	1M	422K
11	180	10/32VDD~11/32VDD	21/64VDD	1M	487K
12	300	11/32VDD~12/32VDD	23/64VDD	1M	560K
13	600	12/32VDD~13/32VDD	25/64VDD	1M	634K
14	900	13/32VDD~14/32VDD	27/64VDD	1M	732K
15	1800	14/32VDD~16/32VDD	29/64VDD	1M	825K
16	3600	15/32VDD~16/32VDD	31/64VDD	1M	953K

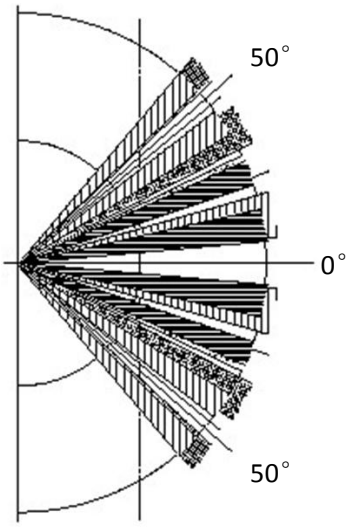
Transmission spectrum of window material



Detecting the perspective

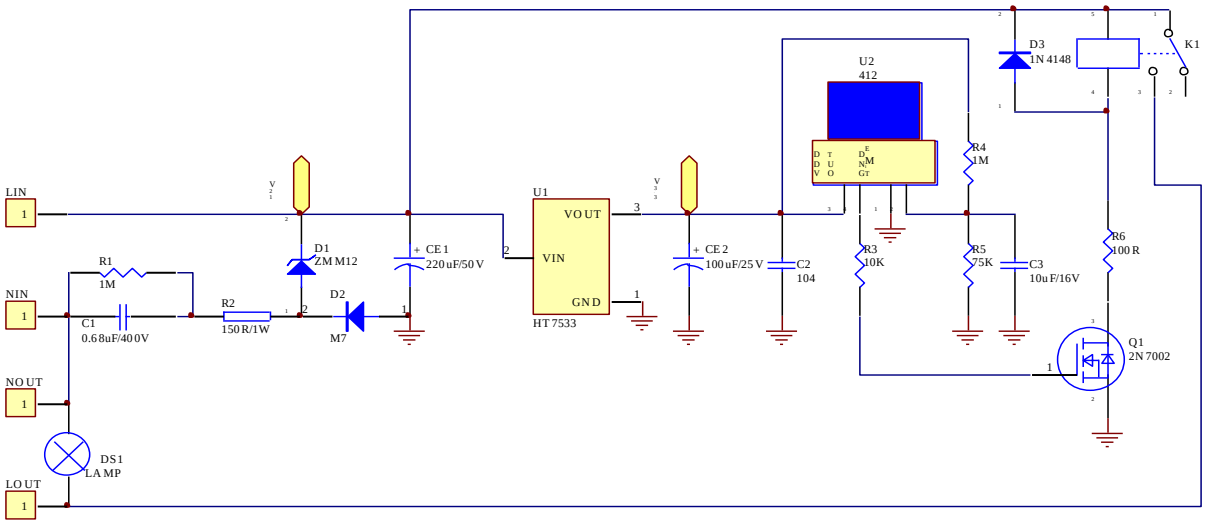


X-direction view



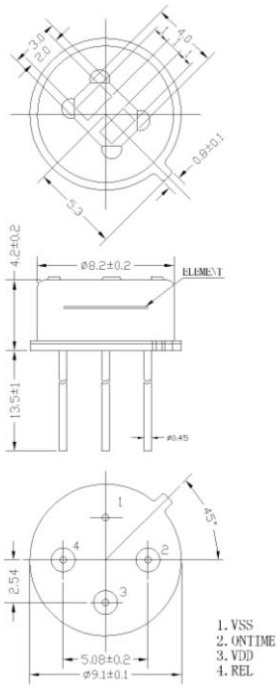
Y-direction view

Typical application circuits

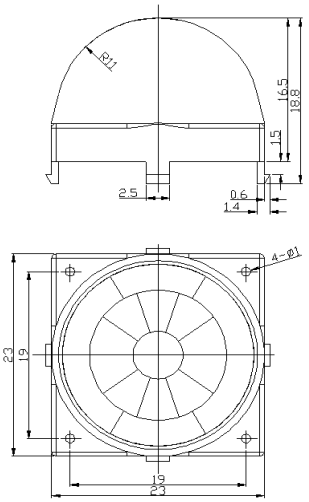


Note: This circuit is a reference circuit for BS412 digital intelligent pyroelectric infrared senso

Appearance and size drawing



探头外观图（A）



透镜外观图（B）

Note: Appearance drawings A and B can be used together

Things to note

1. Circuit design

1. The shorter the connection between PIR and other devices, the better. On double-sided panels or multi-layer boards, try not to trace below the connection, especially with high current traces.

2. Try to make a PCB board separately for the circuit of the PIR human body sensing part to avoid interference. If it is done on the same board, the circuit of the PIR human body sensing part must be isolated and grounded separately; other circuits must be connected only through three wires, positive, negative and output.

3. Connect the VDD of PIR to ground with a 100NF capacitor and try to be close to the VDD of PIR.

2. Debugging and application aspects

1.PIR is a pyroelectric infrared sensor that detects infrared changes. Detection may not be possible if heat sources other than the human body, or if there is no temperature change or movement of the heat source. The following general matters need to be paid attention to. Be sure to confirm performance and reliability through actual usage status.

1) When detecting heat sources outside the human body

(1) When small animals enter the detection range

(2) When the far-infrared direct sensor of sunlight, car headlights, incandescent lamps, etc.

(3) When the temperature in the detection range changes dramatically due to the warm air of the cold greenhouse equipment, the water vapor of the humidifier, etc.

2) When it is difficult to detect heat sources

(1) When there are substances such as glass and acrylic groups that are difficult to transmit far infrared rays between the sensor and the detection object (

2) When the heat source within the detection range is almost inactive or moves at high speed

2. When the detection area is expanded

When the temperature difference between the surrounding ambient temperature and the human body is lay byIn addition, there are sometimes broad detection areas.

3. About other uses

1) When stains are attached on the window, they will affect the detection performance, so pay attention

2) The lens is made of soft material (polyethylene). After applying load or impact on the lens, poor movement and deterioration of performance will occur due to deformation and damage. Therefore, please avoid the above situation.

3) It may cause damage when static electricity above ±200V is applied. Therefore, please be very careful when operating to avoid touching the terminal with your hands directly.

4) When welding the wire, please welding the soldering iron temperature below 350℃ and within 3 seconds when welding. When soldering through a solder tank, performance may deteriorate, so avoid it.

5) Please avoid cleaning this sensor. Otherwise, the cleaning liquid will penetrate into the lens, which may

6) When using cable wiring, in order to prevent the impact of interference, it is recommended to use shielde

7) You must first install a Fresnel lens and a finished shell (the iron shell and pins of the sensor cannot be exposed) before testing, otherwise the sensing effect will be poor and the wind blows will easily cause malfunction.

8) Each Fresnel lens has a fixed focal length. Be sure to pay attention when installing. If the focal length is not adjusted properly, the sensing sensitivity will be reduced.