Digital intelligent pyroelectric infrared sensor BS612

product description

BS612 is a pyroelectric infrared sensor that integrates digital intelligent control circuit and human body detection sensitive element in electromagnetic shielding cover. The human body detection sensor couples the sensed human body movement signal to the digital intelligent integrated circuit chip through a very high impedance differential input circuit, and the digital intelligent integrated circuit converts the signal into an ADC digital signal. When the PIR signal exceeds the selected digital threshold There will be a timed REL level output.

The OEN enable terminal enables the REL output or automatic control by the light sensor. Sensitivity and time parameters are set by voltage divider resistors. All signal processing is done on-chip.

characteristic

ÿ Digital signal processing. ÿ

Low voltage, low power consumption, and short warm-up

time. ÿ High power rejection ratio, anti-RF interference (mobile phone, WiFi, etc.). ÿ

Special built-in second-order Butterworth bandpass filter of infrared sensor to shield input interference of other frequencies. ÿ With sensitivity, timing, light sensor Schmitt REL output. ÿ Timing time simulation is continuously adjustable ÿ Good stability and effective suppression of repeated malfunctions. ÿ The application circuit is simple.

use

ÿ Toys ÿ Digital

photo frames ÿ TVs,

refrigerators, air conditioners ÿ USB alarms

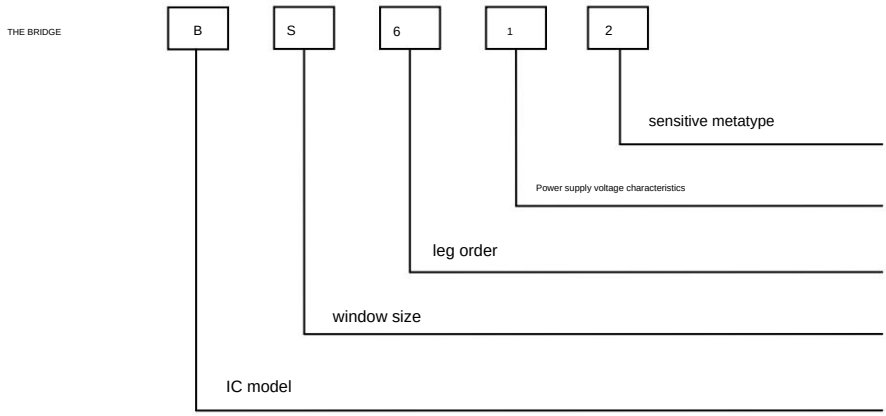
ÿ PIR motion detection ÿ Intrusion detection

ÿ Occupancy detection ÿ IoT sensors ÿ

Sensor lights Automatic turn-on and turn-

off of interior lights, corridor, stair lights, etc.

product model system



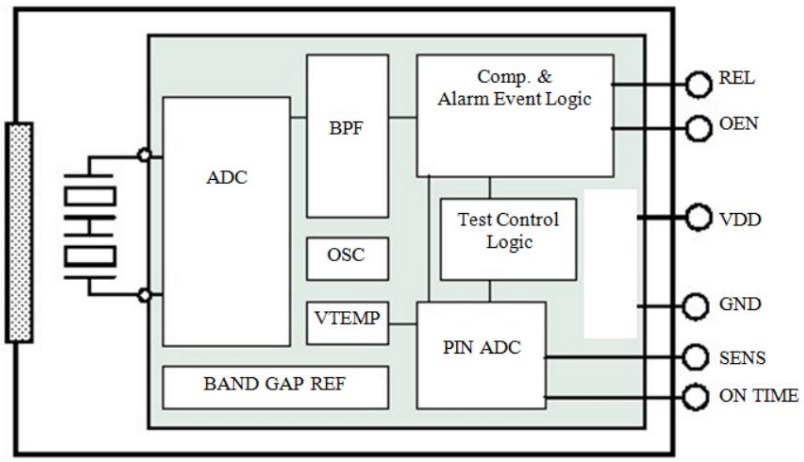
Performance parameters

1. The limit

value exceeding the value in the table below will cause permanent damage to

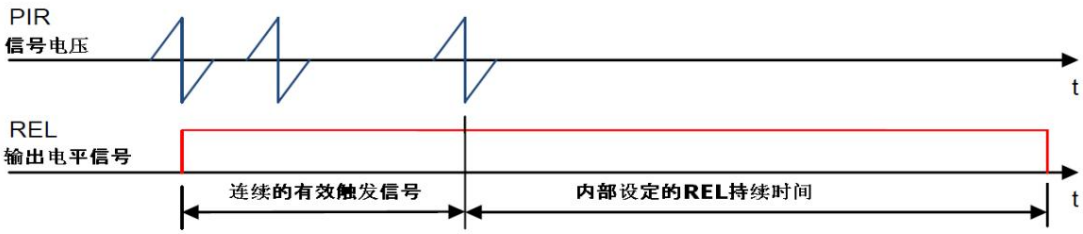
the device. Parameter minimum operating temperature -20 Any limit	symbol	min	maximum value	Unit °C	Remark
storage temperature 2. Operating conditions (T=25°C, Vdd=3V, unless otherwise specified)	TSL	sp	85		
Parameters	Into	-100	100	mA	
	TST	-40	125	ÿ	

	Symbol Min	Typ Max	Unit VDD 2.2 3 3.7 9.5			Remark
Supply voltage					IN	
working current	IDD	9		11	ÿA	
Sensitivity	VSENS	90		2000	ÿV	
threshold output REL						
output low current	IOL	10			mA VOL<1V	
output high current	John			-10 mA VOH>(VDD-1V)		
REL low level output lock time	TOLL		2		s is not adjustable	
REL high level output delay time input	TOH	2		3600	s	
SENS/ONTIME						
Voltage Input Range		0		VDD/2 1	V adjustment range between 0V and VDD/2	
Input Bias Current		-1			ÿA	
Enable OEN						
input low voltage	WILL	Between 0.8V-1.2V is the hysteresis region		0.8	IN	OEN voltage high to low threshold level
Input High	HIV	1.2			V OEN voltage low to high threshold level	
Voltage Input	II	-1		1	ÿA	VSS<VIN<VDD
Current Oscillator and Filter						
low pass filter cutoff frequency				7	Hz	
high pass filter cutoff frequency				0.44	Hz	
On-chip oscillator frequency	FCLK			64	kHz	

Internal block diagram	

3. Output trigger mode

When the pyroelectric infrared signal received by the probe exceeds the trigger threshold inside the probe, a count pulse will be generated internally. When the probe receives this again If the same signal is received, it will consider that it has received the second pulse. Once it receives 2 pulses within 4 seconds, the probe will generate an alarm signal, and at the same time The REL pin has a high level trigger. In addition, as long as the received signal amplitude exceeds 5 times the trigger threshold, then only one pulse is required to trigger REL output. The following figure is an example of the trigger logic diagram. For multiple trigger conditions, the hold time of output REL is counted from the last valid pulse.



Smart Probe Alarm Trigger Timing Diagram

4. ONTIME pin timing setting

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

4.1 If the analog REL timing mode is used, the ONTIME pin is connected to a resistor R to the power supply, and the resistor can be adjusted within the range of 100Kÿ~510Kÿ.

When the analog timing is used, the ONTIME pin will generate the corresponding oscillation frequency. The analog timing time Td= $\frac{230400}{f}$, f is the oscillation frequency. longer if needed

When the ONTIME pin is connected to the resistor R to the power supply, the ONTIME pin can be connected to an additional capacitor C to the ground. You can choose different according to your needs

The capacitance, but the capacitance value can not be greater than 10nF, the resistance value is not greater than 510Kÿ, not less than 100Kÿ.

The working current is related to the selected resistance 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 select the digital REL timing method. To obtain accurate timing time, select the appropriate capacitor resistance value, first calculate the timing time according to the oscillation frequency

During this time, adjust the capacitance and resistance parameters.

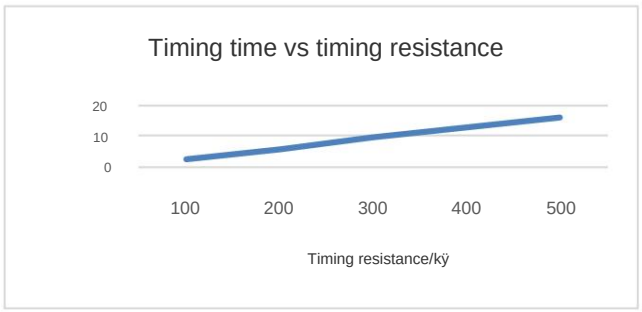


Figure 1 ONTMIE pin without capacitor

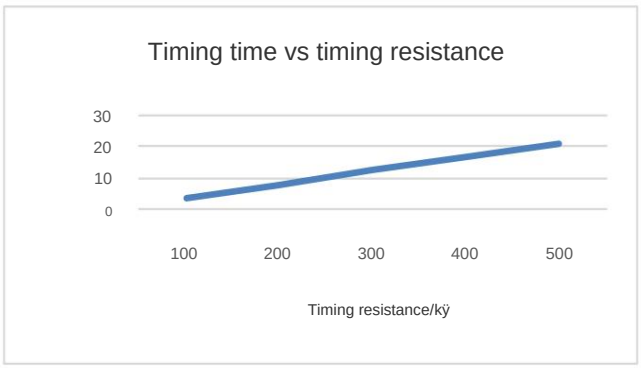


Figure 2 ONTMIE pin connected to 10pF capacitor to ground

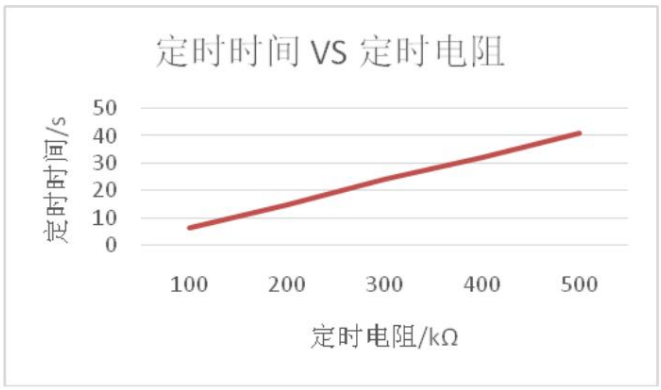


Figure 3 ONTMIE pin connected to 560pF capacitor to ground

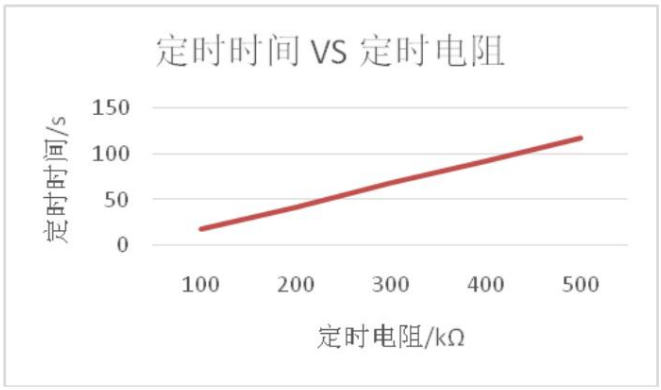


Figure 4 ONTMIE pin connected to 1nF capacitor to ground

4.2 If digital REL timing mode is used, ONTIME pin is connected to a fixed potential whose maximum value is less than VDD/2 to realize timing. In actual use, the

The REL timing adjustment is realized in the form of resistor divider, which is composed of an upper divider resistor RH and a lower divider resistor RL (RH and RL are recommended to use 1% precision resistors).

A recommended solution is: the upper voltage dividing resistor RH is fixed at 1Mÿ, and the lower voltage dividing resistor RL is given by the table below. Refer to the table below for output timing time (Td) and voltage settings.

Note: When the digital REL timing mode is used, the ONTIME pin voltage must not be higher than VDD/2, and the voltage value required by the timing time should be divided into upper and lower

When the critical point is reached, timing time skipping may occur; and the timing time can only be selected from the 16 times in the table below. If the time in the table below is not suitable, it is recommended to use

Analog REL timing mode.

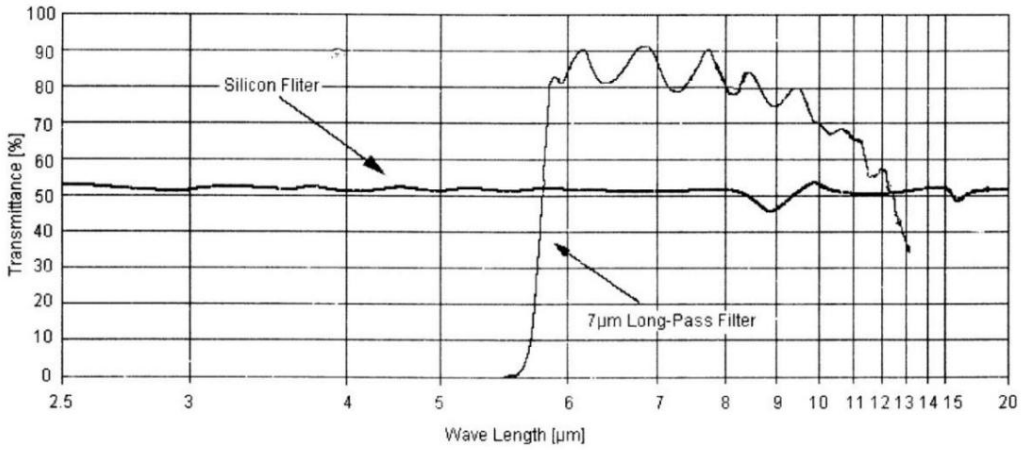
time slot	Set time (s) (Typical)	TIME pin voltage range center value		Recommended value of divider resistor (accuracy ±1%)	
				Pull-up resistor RH	Pull-down resistor RL
1	2	0~1/32VDD	1/64VDD	Do not post/1M	0R
2	5	1/32VDD~2/32VDD	3/64VDD	1M	51K
3	10	2/32VDD~3/32VDD	5/64VDD	1M	82K
4	15	3/32VDD~4/32VDD	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

5. Sensitivity setting

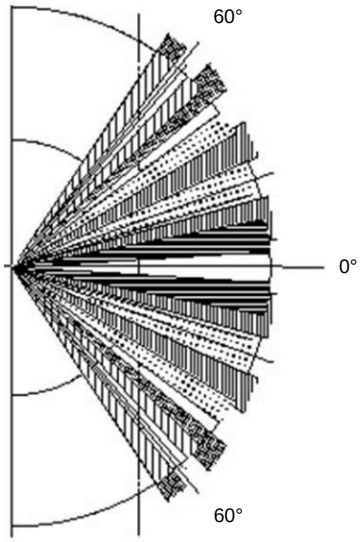
The voltage input by SENS sets the sensitivity threshold, which is used to detect the strength of the PIR signal input by PIRIN and NPIRIN. voltage at ground
The minimum threshold, at this time the sensitivity is the highest. Any voltage above VDD/2 will select the maximum threshold, which is the lowest sensitivity setting for PIR signal detection.
setting, that is, the sensing distance may be the smallest. It should be pointed out that the sensing distance of the infrared sensor is not linear with the SENS input voltage.
Its own signal-to-noise ratio, the imaging object distance of the Fresnel lens, the background temperature of the moving human body, the ambient temperature, the ambient humidity, the electromagnetic interference and other factors form a complex and diverse
relationship, that is, the output result cannot be judged by a single indicator, and the debugging result shall prevail in actual use. The smaller the SENS pin voltage, the higher the sensitivity, and the sensing distance
The farther it is, there are 32 sensing distances to choose from, and the closest sensing distance can reach centimeter level. In actual use, the form of resistor divider is used to adjust the sensitivity.

serial number	SENS pin voltage		serial number	SENS pin voltage	
	Voltage range (VDD)	Center voltage (VDD)		Voltage range (VDD)	Center voltage (VDD)
0	0~1/64	1/128	16	16/64~17/64	33/128
1	1/64~2/64	3/128	17	17/64~18/64	35/128
2	2/64~3/64	5/128	18	18/64~19/64	37/128
3	3/64~4/64	7/128	19	19/64~20/64	39/128
4	4/64~5/64	9/128	20	20/64~21/64	41/128
5	5/64~6/64	11/128	21	21/64~22/64	43/128
6	6/64~7/64	13/128	22	22/64~23/64	45/128
7	7/64~8/64	15/128	23	23/64~24/64	47/128
8	8/64~9/64	17/128	24	24/64~25/64	49/128
9	9/64~10/64	19/128	25	25/64~26/64	51/128
10	10/64~11/64	21/128	26	26/64~27/64	53/128
11	11/64~12/64	23/128	27	27/64~28/64	55/128
12	12/64~13/64	25/128	28	28/64~29/64	57/128
13	13/64~14/64	27/128	29	29/64~30/64	59/128
14	14/64~15/64	29/128	30	30/64~31/64	61/128
15	15/64~16/64	31/128	31	31/64~32/64	63/128

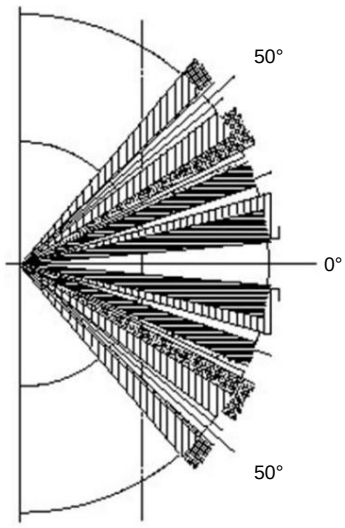
Transmission Spectra of Window Materials



Detection angle



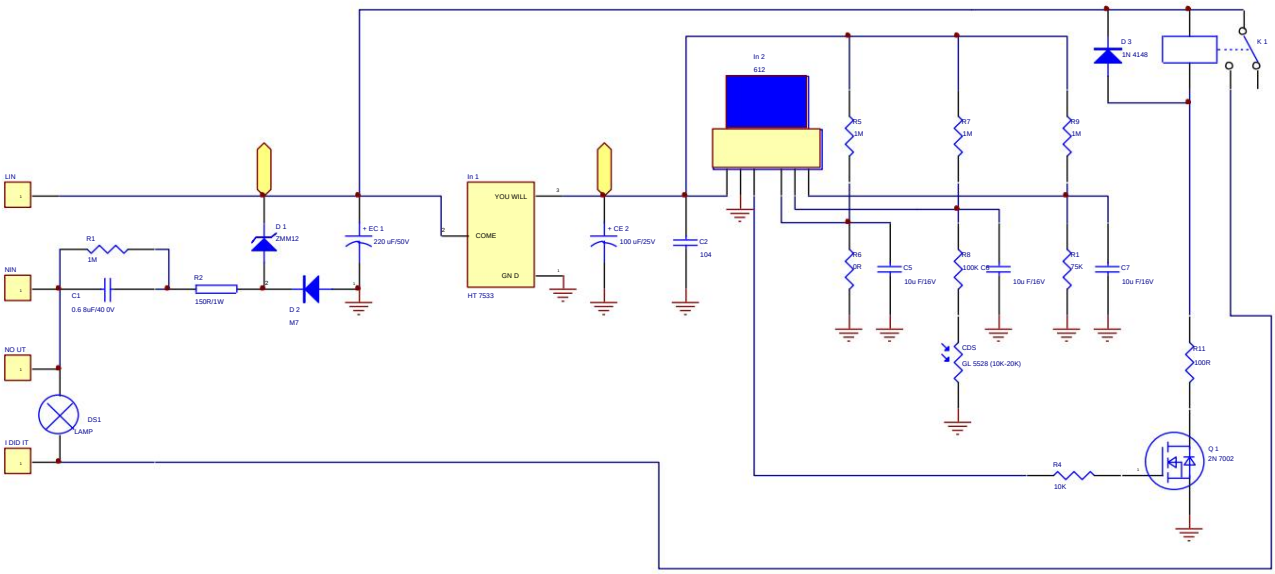
X perspective



Y view

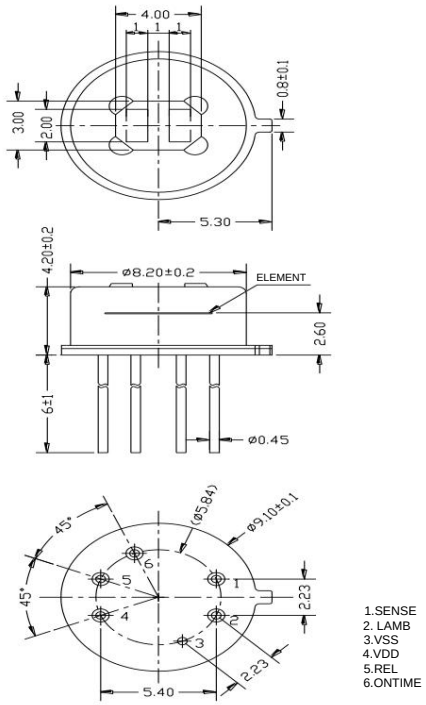
Typical Application Circuit

Reference circuit 1:

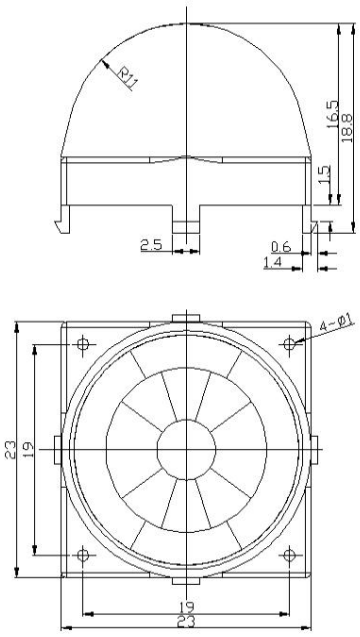


Note: This circuit is a typical reference circuit of BS612 digital intelligent pyroelectric infrared sensor

Dimensions



1.SENSE
2. LAMB
3.VSS
4.VDD
5.REL
6.ONTIME



Probe Appearance (A) Lens Appearance (B) Note: Appearances A and B can be used together

Precautions

1. In terms of circuit design 1. The

connection between the PIR and other devices should be as short as possible. On double-sided or multi-layer boards, try not to route below the connection.
In particular, no traces with large currents are allowed.

2. The circuit of the PIR human body induction part should be a separate PCB board as much as possible to avoid interference. If it is done on the same board, the circuit of the PIR human body induction part should be isolated and grounded separately; only connect other circuits through the positive, negative and output wires.

3. Connect the VDD of the PIR to the ground with a 100NF capacitor, and try to be as close to the VDD of the PIR as
possible. 2. Debugging application 1. PIR is a pyroelectric infrared sensor that detects infrared changes. It may not be possible

to detect heat sources other than the human body, or if there is no temperature change or movement of the heat source. The following general points need to be noted. Be sure to confirm the performance and reliability through actual usage. 1) When detecting heat sources other than the human body

(1) When small animals enter the detection range

(2) When far-infrared direct radiation sensors such as sunlight, car headlights, incandescent lamps, etc. When the

temperature of the range changes drastically 2) When it is difficult to detect the heat source (1) When there is a substance that is difficult to transmit far infrared rays such as glass or acrylic between the sensor and the detection object (2) When the heat source in the detection range hardly operates, or 2. When the detection area is enlarged when moving at high speed

When there is a large difference between ambient temperature and human body temperature (about 20°C or more), even within the specified detection range
In addition, there may be a wide detection area. 3. Regarding other

uses 1) If there are stains on the window, it will affect the

detection performance, so please be careful. 2) The lens is made of soft material (polyethylene). After a load or

impact is applied to the lens, it will be deformed and
Damage can cause malfunction and performance degradation, so please avoid the above.

3) Applying static electricity above ±200V may cause damage. Therefore, please be very careful during operation and avoid touching the terminals directly with your hands. 4) When soldering the lead wire, please solder it within 3 seconds when the temperature of the soldering iron is below 350ÿ. Soldering through a solder bath may cause

performance degradation, so please avoid it.

5) Please avoid cleaning the sensor. Otherwise, the cleaning fluid will penetrate into the lens, which may cause performance deterioration.

6) When using through cable wiring, in order to prevent the influence of interference, it is recommended to use shielded wire and shorten the wiring as much as

possible. 7) Be sure to install the Fresnel lens and the finished shell (the iron shell and pins of the sensor cannot be exposed) before testing.
Otherwise, the induction effect is poor, and the wind blowing is easy to malfunction.

8) Each Fresnel lens has a fixed focal length. Be careful when installing. If the focal length is not adjusted properly, the sensitivity of the sensor will be reduced.