Features

Mini size, SMD reflow soldering process
16-bit digital signal output
Single wire serial data
Low voltage ,low power consumption

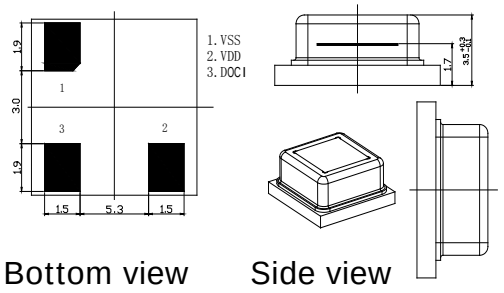
Applications

PIR movement detector
The Internet of things
Wearable devices
Intelligent Residential System
Intelligent lamps
Security, car anti-theft products
Network monitoring system, etc

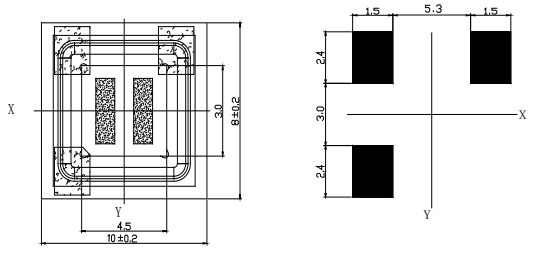
Technical Index

Parameter	Sym	Min	Max	Unit	Remark
Working Temp	TOT	-30	70	℃	
Limit of pins	INTO	-100	100	mA	
View of Angle		X=110°	Y=90°	°	Theoretical Angle
Storage Temp	TST	-40	80	℃	
Spectral Response	λ	5	14	μm	

Sensor Size Unit:mm

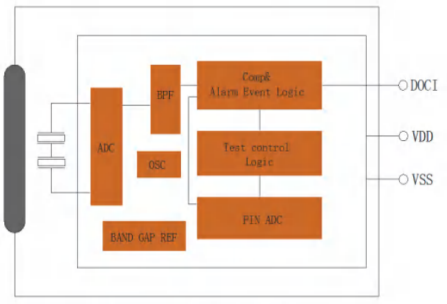


Bottom view Side view



Top view Recommended pad size chart

Internal frame



Working Condition (T=25°C, V =3V)

Parameter	Sym	Min	Typ	Max	Unit	Remark
Voltage	V_{DD}	2.2	3.3	5.5	V	
Current	I_{DD}	5	10	20	μA	
Resolution ratio of ADC			16		Bits	
Oscillators and filters						
Low filter cut-off frequency				7	Hz	
High filter cut-off frequency				0.44	Hz	

Functional Specification

Band Pass Filter

1.The second-order low-pass filter is concatenated with the third-order high-pass filter to form a bandpass filter. Filter out unwanted frequency components in the signal.
2.Band pass filter frequency: 0.44Hz~7Hz.

Single wire serial data reading timing:

Two modes :Based on sensor interrupt signal reading,
Timing defined by microcontroller to force reads.

Sensor-based interrupt signal reading (clock period: about 0.03125ms)

1. The sensor produces an interrupt valid signal every 512 clock cycles. The DOCl is pulled high to maintain two system clock cycles.
2. After the microcontroller waits for 100ms, it generates a rising edge on the DOCl pin and then starts reading data. The first read out is the highest bit. This process is repeated until all 16 bits of data are read out.
3. After the last bit of data is read out, the microcontroller must force a low and immediately release the DOCl pin. The DOCl timer diagram is shown below. The blue line indicates the microcontroller driver.

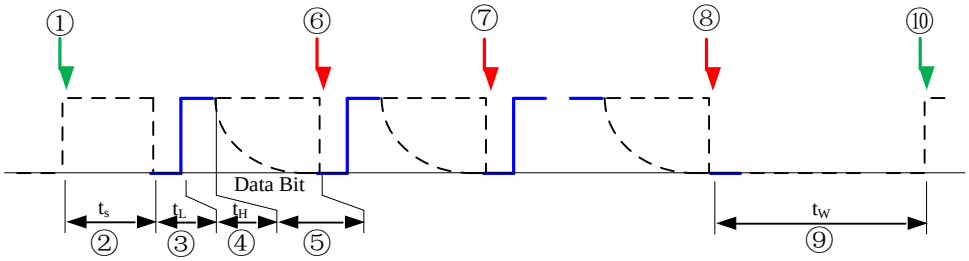


Figure 1: Timing of DOCl pin based on interrupt signal reading

1. The DOCl pin interface is not in the reading state and is not 1. The serial interface completes the data update and generates an interrupt effective signal, and the sensor pulls up the DOCl pin.
2. Sensor pulls DOCl pin to maintain at least two system clock cycles (about 0.0625ms).
3. The microcontroller pulls down the DOCl pin for at least 200ns.
4. The microcontroller generates a rising edge on the DOCl pin, and the high level on the DOCl pin is maintained for at least 200ns.
5. DOCl pin switch state, output data of the highest bit MSB.
6. Microcontroller sample data MSB.
7. Repeat step 3456, and the microcontroller takes the second high data.

8. Repeat step 3456, and the microcontroller takes the lowest data level LSB.

9. After reading the data, the microcontroller forces the DOCl pin low and releases the DOCl pin immediately.

10. Repeat step 1 to start a new cycle.

Timing defined by microcontroller to force reads (clock period: 0.03125ms)

1、Since the low-pass filter produces a new value every 32 system clock cycles and the high-pass filter produces a new value every 512 system clocks, the sensor can accept a shorter readout period when selecting the readout low-pass filter value.

2、In this readout mode, as shown in Figure 2, the microcontroller ignores the interrupt signal, forces the DOCl pin to be high for at least two system clock cycles, and then starts to read out the data as if it were read out in the interrupt mode.

3、To ensure that the output data latch is updated, the microcontroller must release the DOCl pin or forcethe DOCl pin to be low for at least 64 system clock cycles.

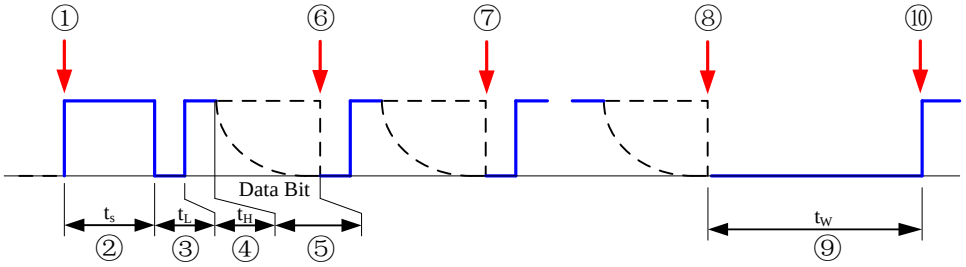


Figure 2. Timing is defined through the microcontroller to force reading of DOCl pin timing

1. The microcontroller directly raises the DOCl pin by ignoring the effective signal interrupted by the sensor.

2. Microcontroller pulls DOCl pin to maintain at least two clock cycles (about 0.0625ms).

3. The microcontroller pulls down the DOCl pin for at least 200ns.

4. The microcontroller generates a rising edge on the DOCl pin, and the high level on the DOCl pin ismaintained for at least 200ns.

5. DOCl pin switch state, output data of the highest bit MSB.

6. Microcontroller sample data MSB.

7. Repeat step 3456, and the microcontroller takes the second high data.

8. Repeat step 3456, and the microcontroller takes the lowest data level LSB.

9. After reading the data, the microcontroller forces the DOCl pin to be low and maintains at least 64 system clock cycles to complete the serial port data update. Or as shown in Figure 2, the microcontroller forces the DOCl pin low and immediately releases the DOCl pin to complete the automatic data update according to the interrupt mode.

10. Repeat step 1 to start a new cycle.

Regardless of the readout method, the data reading process can be terminated at any time

As shown in Figure 3, the DOCl pin maintains a low level for more than one system clock cycle during the reading process, the data reading process terminates, and the output data latch is updated.

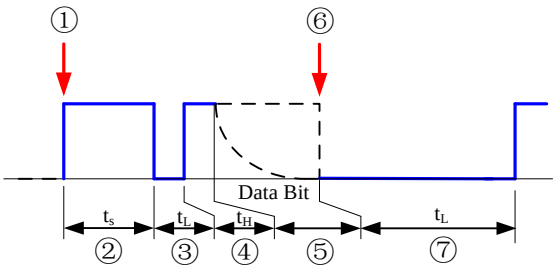


Figure 3. The end of the reading process due to the continuous low DOCl level.

As shown in Figure 4, during the read process, the DOCl pin is forced to be high and the read process terminates, but the output data latch is not updated.

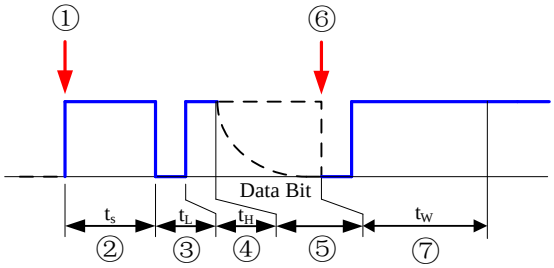


Figure 4. The end of the reading process due to the forced pull of the DOCl pin

- **Data format:**

data	Head code		16 bits of data																Tail code
value	D18	D17	D16	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
32767	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
32766	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
…																			
127	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
…																			
4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
-2	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
-3	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0
-4	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
…																			
-128	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
…																			
-32767	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
-32768	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Reliability Test

Test Item	Testing Standard	Result
Salt spray test	GB/T10125-2012	OK
Hot test	100°C for 500 h	OK
Cold test	-40°C for 500 h	OK
Humidity test	95% relative humidity, for 500 h	OK
Heat resistance test	250°C, for 10s	OK
Vibration	Frequency variation: 10Hz-55Hz Vibration time: 2 h in 3-axis direction	OK
Drop test	1 m free fall test	OK
Air tight test	immerse in water at 21kPa for 1 hour	OK

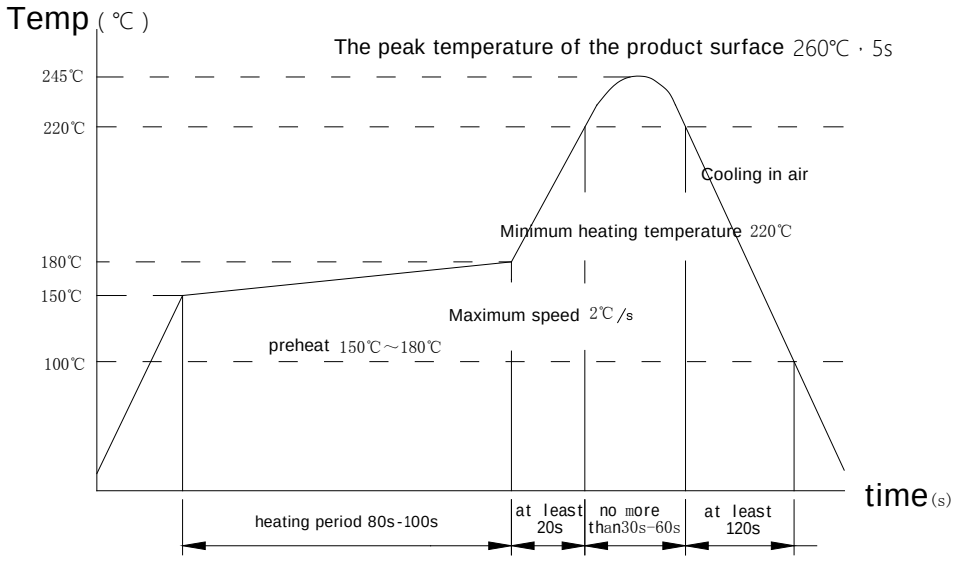
Cautions

•Solder Reflow

Direction for use

Please follow the temperature curve shown in the figure below when reflow welding.

If you have any questions, please consult the engineer in advance



Cautions :

Customers can adjust the reflow soldering temperature according to the type of solder paste. The maximum temperature does not exceed 260°C.

Manual welding process:

When welding the sensor, the soldering should be completed within three seconds after the solder paste is melted by hot air on the sensor backplane. It should be noted that manual welding cannot control the temperature and the device may suffer from performance degradation due to thermal damage.

1. Do not repeatedly refluxing high temperature heating to remove and repair the sensor.
2. Do not use corrosive chemicals to clean the filter.
3. It is recommended to use the sensor after 1 hour of mounting.
4. Please avoid touching the terminals with metal pieces or hands.

•Description of the sensor detection principle:

• The sensor is a pyroelectric infrared sensor that detects changes in moving infrared rays.
• Heat sources other than the human body may not be detectable.
• In the detection process, the sensing distance of the sensor is related to environmental factors such as ambient temperature and humidity.

•Heat sources other than the human body:

Internal light source:sunlight, incandescent lamps, etc. Internal heat source: radiator, heater, etc.
Animal heat source: pet cat, pet dog, etc.

•Example of the impact on detection performance:

When there is an occlusion between the human body and the sensor.
When the human body moves at a high speed or is stationary within the detection range.

•Applicable environment temperature and humidity

•Temperature ：Working Temperature：-30℃～+70℃（No fog, No ice)
Storage Temperature：–40℃～+80℃

•Humidity: Working Humidity：≤85%RH（No fog, No ice）
Storage Humidity：≤60%RH

•The aging of the sensor will be accelerated when it is used outside the working temperature and working.

•Additional notes

•The device will be due to static electricity, lightning, mobile phone, radio, high intensity light and other electric noise to produce false action.
•Customer terminal products should be installed firmly to avoid the wrong action caused by wind shaking.
•The device will be damaged after strong vibration or impact, which will lead to incorrect action. Please avoid high-intensity vibration or impact.
•This product is not waterproof, dustproof product, use should be waterproof, dustproof, anti-condensation, anti-ice.
• If there is corrosion gas volatilization in the working environment of the device, it will produce misoperation.