SD4101R

Pyroelectric Infrared Sensing Controller IC

Features

- Industry standard, good stability, strong anti-interference, wide working temperature range
- Built-in amplifier works with different PIR sensors to perform signal processing
- Built-in amplifier peripheral circuit to reduce external adjustment, save development time and production cost
- Built-in high-precision algorithm unit, adaptive to ambient environment, effectively distinguish human signals from interference
- Long sensing range. Probability of malfunction is much lower than traditional control circuits
- Adjustable sensitivity for convenient usage
- Adjustable output pulse width with high accuracy and wide range
- Built-in 1.5s masking time, effectively inhibits repetitive malfunction
- Connect external photo-transistor or photo-resistor to inhibit day light working
- Re-triggerable during active output signal
- 15s power up stability time
- Simple application circuit results in small product space, high consistency, and low repair rate in volume production.
- Fast test mode during production to enhance manufacturing throughput

Description

SD4101R is an integrated PIR (Passive Infra-Red) controller IC with very low power consumption. Its internal analog and digital mixed signal design architecture results in very stable operation under various environment conditions.

SD4101R employs PIR human pyroelectric infrared detection technology. It has built-in high-precision algorithm that is adaptable to current environment, filters out ambient interference, and effectively extracts human signals. The sensing range is more than ten meters. Application circuits are simple, and do not need tuning during development or production, thus saving product space and manufacturing cost.

Applications

Automatic energy-efficient lighting, security monitor, alarm, doorbell systems at home, shop, office, factory, and other facilities.

Automatic switching system for exhaust fan and ceiling fan.

Energy saving control system for electronic display, digital camera, hunting camera, and other digital products.

Control for intelligent toy.

Control for automatic door, drip dispenser, toilet flusher.

Ordering Information

SOP8 package

Pin Diagram and Descriptions

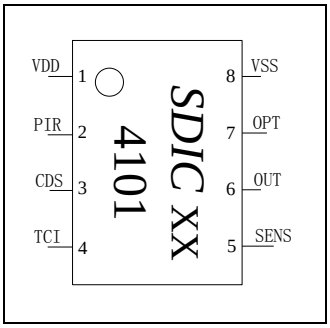


Figure 1. SOP8 pin out diagram

Table 1. Pin Descriptions

Pin No.	Pin Name	Attribute	Descriptions
1	VDD	Power	Power supply voltage
2	PIR	Analog input	PIR sensor signal input
3	CDS	Analog input	CDS signal input "OUT" stays low when CDS is below 1.0V (daylight). "OUT" works normally when CDS is above 1.0V (night). Modify R2 resistance in fig 3 or fig 4 in order to change the ambient brightness trigger level. Smaller resistance corresponds to brighter threshold.
4	TCI	Analog input	"OUT" pulse width control. Two width adjustment method: Discrete (fig 3) and Continuous (fig 4). In the discrete mode, if TCI is shorted to VDD, the IC goes into fast test mode. In this mode, the IC is least sensitive, the "OUT" pulse is 1s long, and the photosensitive function is turned off.
5	SENS	Analog input	Sensitivity Adjustment. 0% VDD is the least sensitive, 100% VDD is the most sensitive. Common sensitivity selection is 65 -90% VDD.
6	OUT	Digital output	Control signal output. Normally low, goes high when human body signal is detected. When power is going up, OUT goes high for 15s, then sends out two 50% duty cycle pulses each with 375ms pulse width. Afterwards the IC goes into normal operation.
7	OPT	Digital input	Width adjustment method select: open for discrete method (fig 3), grounded for continuous method (fig 4).
8	VSS	Ground	Power ground

Functional Block

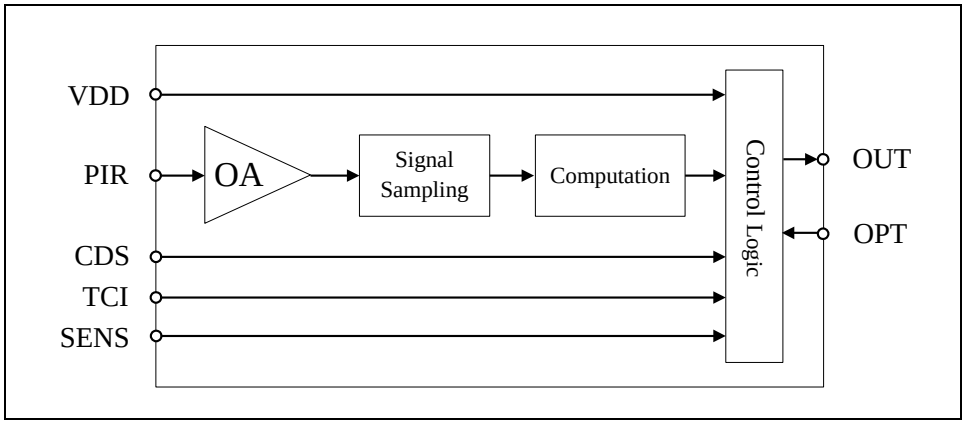


Figure 2. Functional block diagram

Typical Applications

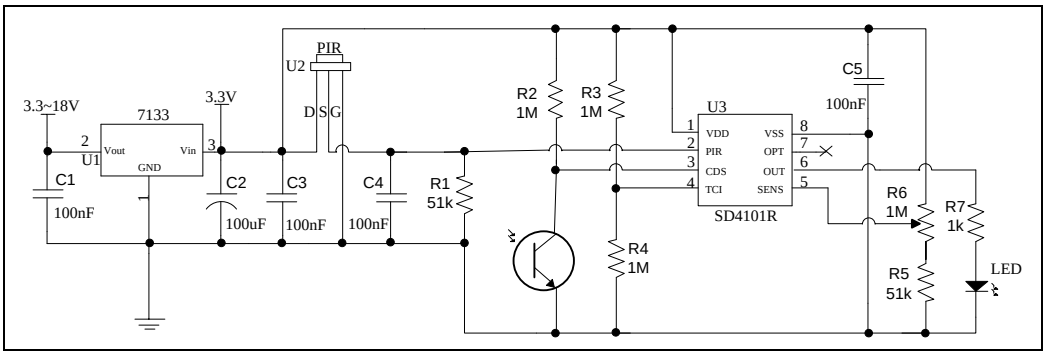


Figure 3. Human body sensing circuit with discrete output delay time

Table 3. R4 values in figure 3 vs OUT pulse width

R4 value (Ω)	OUT pulse width (s)
Open	Enter fast test mode
1M	1
910K	5
820K	10
750K	15
680K	20
560K	30
470K	45
390K	60
300K	90
200K	120
150K	180
100K	300
47K	480
0	600

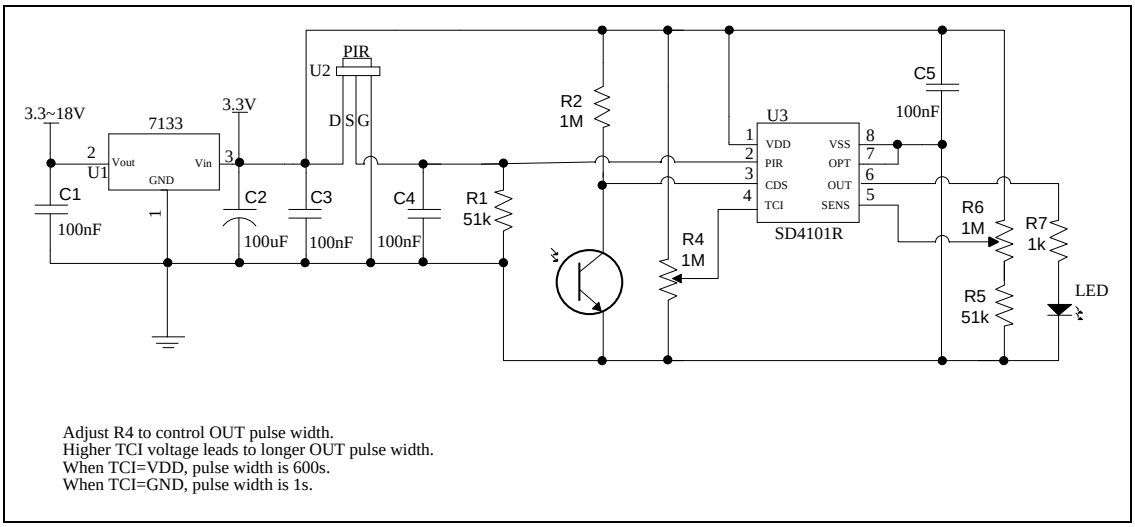


Figure 4. Human body sensing circuit with continuously adjustable output delay time

Electrical Specifications

Table 2. Absolute Maximum Ratings

Symbol	Parameter	Minimum	Maximum	Unit
T_A	Operating temperature	-40	+85	℃
T_S	Storage temperature	-55	+150	℃
V_{DD}	Supply voltage	-0.2	+4.0	V
V_{IN}, V_{OUT}	Digital input/output voltage	-0.2	V_{DD}+0.3	V
T_L	Reflow temperature profile		Per IPC/JEDECJ-STD-020C	℃

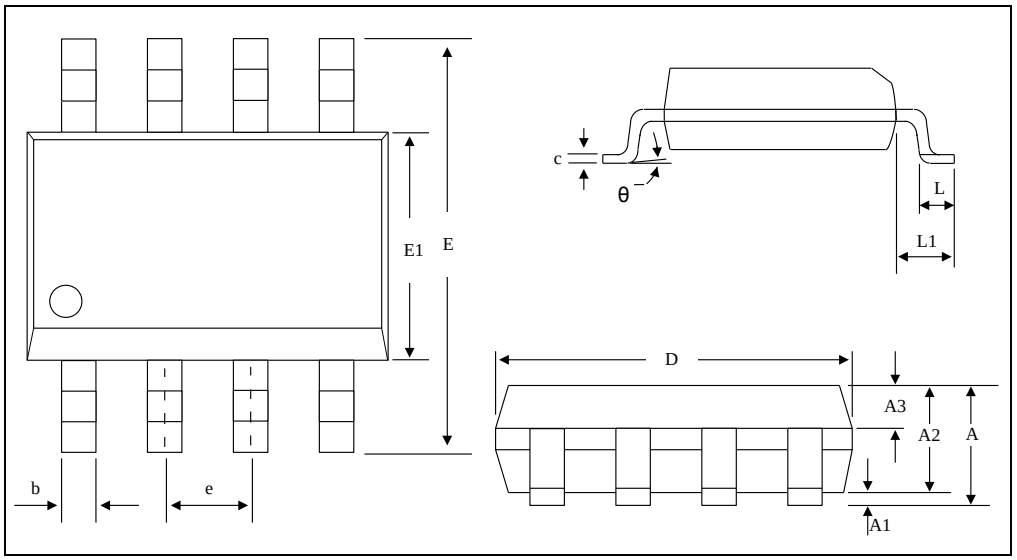
Remarks:
1. CMOS device can easily be damaged by electrostatics. It must be stored in conductive foam, and careful not to exceed the operating voltage range.
2. Turn off power before insert or remove the device.

Table 3. Electrical Specifications（VDD=3.3V, T_A=25℃）

Symbol	Parameter	Minimum	Typical	Maximum	Unit	Conditions/Remarks
VDD	Power supply voltage	2.8	3.3	3.6	V	-
Idd	Operating current	-	400	-	uA	VDD = 3.3V, no load
IOH	OUT terminal output current	-	-	5	mA	VOH=VDD-0.3V

Remarks:
1. Distance from PIR SENSER wiring and PCB routing traces to SD4101 should be as short as possible. If double-sided or multi-layer board is used, area under these routing traces should avoid having other traces, especially those that carry high current
2. Implement the whole human body sensing circuit in a separate PCB in order to avoid interference. Otherwise, it should be isolated from rest of the system circuits, with positive, negative, and output lines only connecting between the two.
3. Fresnel lens and the finished product housing must be installed (sensor's metal case and pins must not be exposed) before performing test. Otherwise the sensor sensitivity will be poor, and may result in lots of misjudgment from blowing wind.
4. Every Fresnel lens has its own fixed focal length. One must pay attention to this during installation. Sensitivity will be poor if the focal length is not adjusted correctly.

Package Information



Dimensions: mm

Symbol	Min.	Nom.	Max.
A	1.35	——	1.80
A1	0.10	——	0.25
A2	1.25	1.40	1.55
A3	0.60	0.65	0.70
D	4.78	4.90	5.00
E	5.80	6.00	6.30
E1	3.80	3.90	4.00
L	0.40	——	1.27
L1	1.05BSC		
b	0.33	——	0.51
c	0.19	——	0.25
e	1.27BSC		
θ	0°	——	8°

Figure 5. SOP8 mechanical specification