PARALLAX

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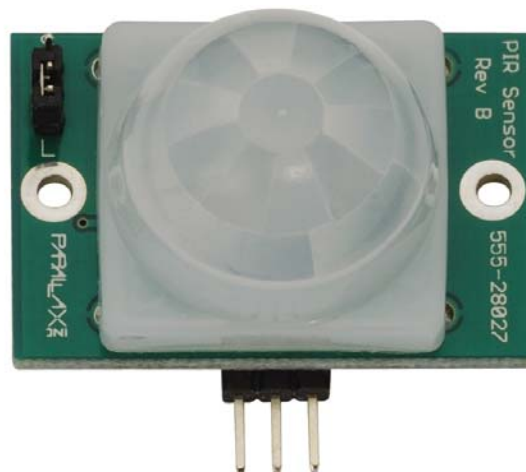Sales: (888) 512-1024
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PIR Sensor (#555-28027)

The PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared (heat) levels emitted by surrounding objects. This motion can be detected by checking for a sudden change in the surrounding IR patterns. When motion is detected the PIR sensor outputs a high signal on its output pin. This logic signal can be read by a microcontroller or used to drive an external load.

NOTE: Revision B of this sensor provides many updates and improvements from Revision A. If your PIR Sensor's PCB does not read "Rev B" please use the specifications and information found in the Revision History section on page 4.

Features

- Detection range up to 15 ft away on short setting, up to 30 ft away on long setting
- Jumper selects short or long settings
- Directly drive a load
- Onboard LEDs light up the lens for fast visual feedback when movement is detected
- Mounting holes for 2-56 sized screws
- 3-pin SIP header ready for breadboard or through-hole projects
- Small size makes it easy to conceal
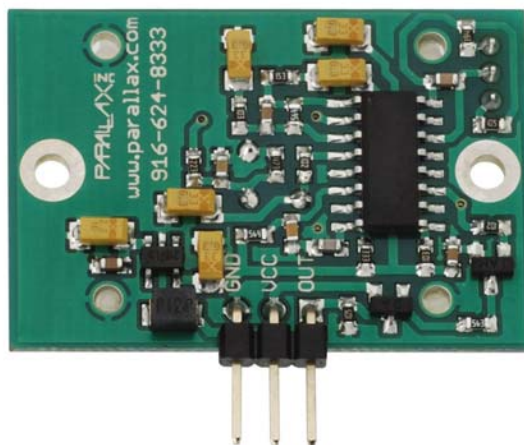- Easy interface to any microcontroller

Key Specifications

- Power Requirements: 3 to 6 VDC; 12 mA @ 3 V, 23 mA @ 5 V
- Communication: Single bit high/low output
- Operating temperature: 32 to 122 °F (0 to 50 °C)
- Dimensions: 1.41 x 1.0 x 0.8 in (35.8 x 25.4 x 20.3 cm)

Application Ideas

- Motion-activated nightlight
- Alarm systems
- Holiday animated props

Theory of Operation

Pyroelectric devices, such as the PIR sensor, have elements made of a crystalline material that generates an electric charge when exposed to infrared radiation. The changes in the amount of infrared striking the element change the voltages generated, which are measured by an on-board amplifier. The device contains a special filter called a Fresnel lens, which focuses the infrared signals onto the element. As the ambient infrared signals change rapidly, the on-board amplifier trips the output to indicate motion.
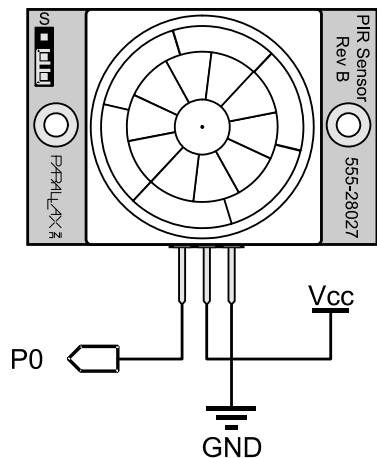
Pin Definitions and Ratings

Pin	Name	Type	Function
1	GND	G	Ground: 0 V
2	Vcc	P	Supply Voltage: 3 to 6 VDC
3	OUT	O	PIR signaling; HIGH = movement/LOW = no movement

Pin Type: P = Power, G = Ground, I = Input, O = Output

Jumper Settings

Symbol	Description
S	PIR Sensor's "short" setting; movement is detected within a 15 ft radius
L	PIR Sensor's "long" setting; movement is detected within a 30 ft radius

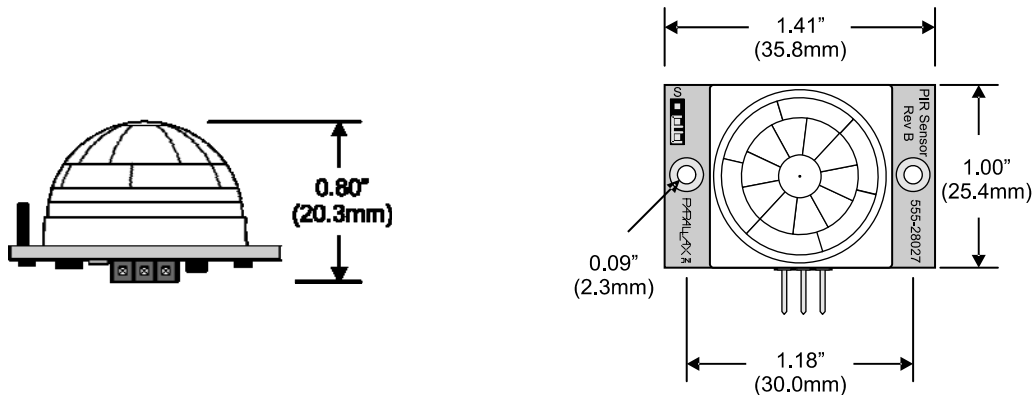## Quick-Start Circuit

Calibration

The PIR Sensor requires a warm-up time in order to function properly. This is due to the settling time involved in "learning" its environment. This could be up to 40 seconds. During this time, the LEDs under the lens will be on and there should be as little motion as possible in the sensors field of view.

Sensitivity

The PIR Sensor's range can vary with environmental conditions. The sensor is designed to adjust to slowly changing conditions that would happen normally as the day progresses and the environmental conditions change, but responds by making its output high when sudden changes occur, such as when there is motion. Note: This device is designed for indoor use. Operation outside or in extreme temperatures may affect stability negatively.

Module Dimensions

BASIC Stamp® Example Code

This program will display the current state of the output pin from the PIR Sensor connected to P0 using the Debug Terminal. The Debug Terminal is built into the BASIC Stamp Editor software. The software is a free download from www.parallax.com/basicstampsoftware.

```
' PIR_Simple.bs2
' Displays the current state of the PIR Sensor connected to P0

' {$STAMP BS2}
' {$PBASIC 2.5}

PAUSE 40000                      ' PIR warm-up time

DO
  DEBUG HOME, BIN1 IN0           ' Display state of P0
  PAUSE 100                      ' Small Delay
LOOP                             ' Repeat Forever
```

Propeller™ P8X32A Example Code

Note: This application uses the Parallax Serial Terminal to display the device output. The object and the Parallax Serial Terminal itself are included with the Propeller Tool v1.2.7 or higher, which is available from the Downloads link at www.parallax.com/Propeller.

```
'' PIR_Simple.spin
'' Displays the current state of the PIR Sensor connected to P0

CON

_clkmode = xtal1 + pll16x          ' Setting Clock Mode to Crystal 1 with 16 multiplier
_xinfreq = 5_000_000               ' Propeller set to run at 80MHz

VAR

  byte state                       ' Declare variable state to store PIR output

OBJ

  pst : "Parallax Serial Terminal"

PUB PIR                            ' Public Method name PIR

  dira[0]~                         ' Set pin 0 to input
```

```
pst.start(115200)                          ' Start Parallax Serial Terminal at 115200 baud
waitcnt(clkfreq * 40 + cnt)                ' PIR "warm-up" time
pst.clear                                  ' Clear the screen

repeat
  state := ina[0]                          ' Save state of PIR Sensor
  pst.home                                 ' Move cursor to position(0,0)
  pst.str(string("IN0 = "))
  pst.bin(state, 1)                        ' Display state
  waitcnt(clkfreq/200 + cnt)               ' Small delay
```

Revision History

The information that follows contains specifications and additional information for previous revisions of the PIR Sensor.

PIR Sensor Rev A

Both revisions of this sensor use the same Fresnel lens, and basic functionality remains the same between the two (for example you can use the same test programs). However, there were a number of improvements and updates made to Revision B, and if using Revision A in your project the following information should be noted and used.

Key Specifications

- Power Requirements: 3.3 to 5 VDC; >3 mA **(may vary)**

- Communication: Single bit high/low output

- Operating temperature: 32 to 122 °F (0 to 50 °C)

- Dimensions: 1.27 x 0.96 x 1.0 in (32.2 x 24.3 x 25.4 mm)

Key Differences

- Jumper setting controls triggering and not distance

- Driving an external load requires a transistor or MOSFET

- Detection range up to 20 ft away

Pin Definitions and Ratings

Pin	Name	Function
-	GND	Ground: 0 V
+	Vin	Supply Voltage: 3 to 6 VDC
OUT	Output	Connect to I/O pin set to INPUT mode (or transistor/MOSFET).

Jumper Settings

Symbol	Description
H	Output remains HIGH when sensor is retriggered repeatedly. Output is LOW when idle (not triggered).
L	Output goes HIGH then LOW when triggered. Continues motion results in repeated HIGH/LOW pulses. Output is LOW when idle.