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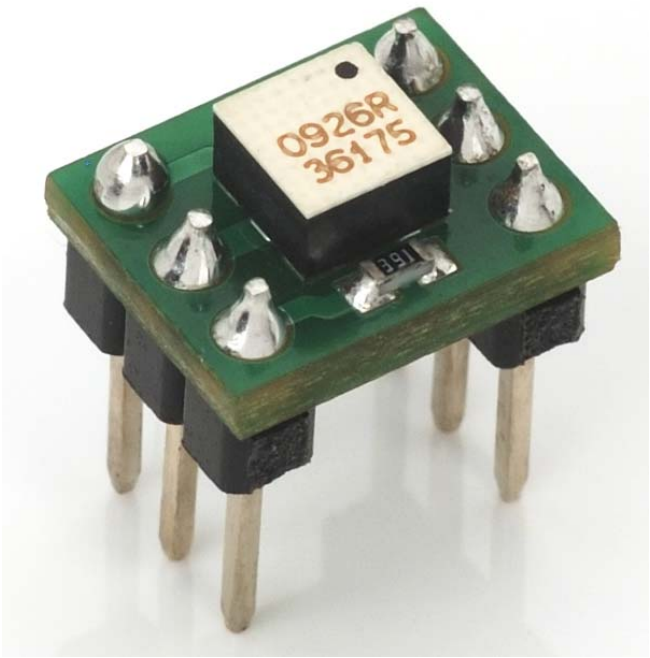
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4-Directional Tilt Sensor (#28036)

The 4-Directional Tilt Sensor is a perfect accelerometer replacement in those applications which may not need precise angular feedback. This type of sensor is commonly used in many smart phones and digital cameras as a cheaper means to adjust the screen display when the device is rotated.

Features

- Small 6-pin DIP packaging with breadboard-friendly 0.1" pin spacing
- Easy communication with any microcontroller
- Positional feedback in four directions



Key Specifications

- Power Requirements: 3 to 5.5 VDC
- Communication Interface: 2-pin high/low output for four sensor states
- Operating temperature: 32 to 122 °F (0 to 50 °C)
- Dimensions: 0.42 x 0.32 x 0.49 in (1.07 x 0.81 x 1.24 cm)

Application Ideas

- Rotating display adjustment
- Robotic movement
- Tilt sensing for remote controls
- Alarm systems

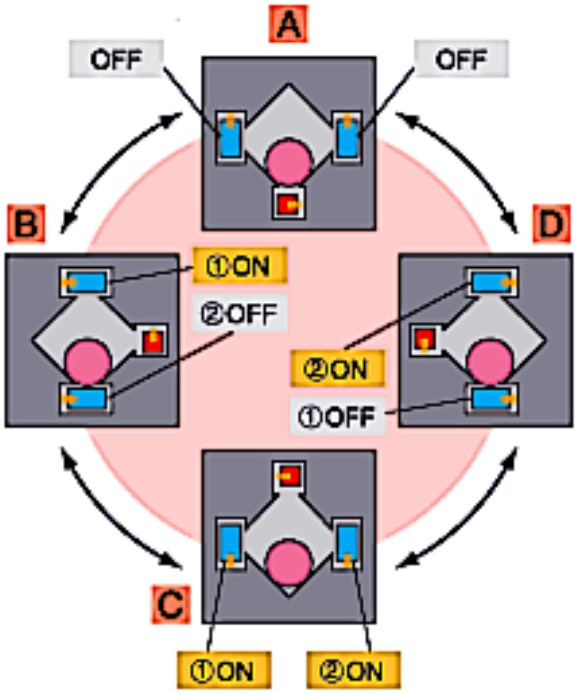
Resources and Downloads

Check for the latest version of this document, free software, and example programs from the 4-Directional Tilt Sensor product page. Go to www.parallax.com and search 28036.

Theory of Operation

Internally, the 4-Directional Tilt Sensor includes one IR LED, two phototransistors, and a small ball that moves when the sensor is rotated. Depending on the orientation of the sensor, the two phototransistors will output high or low signals depending whether light is detected or not. New locations are triggered when the sensor is rotated roughly 30° toward the new position.

The chart below depicts the cylinder location when rotating the sensor, and the output states of each phototransistor during revolution.



Location	Phototransistor 1	Phototransistor 2
A	0	0
B	1	0
C	1	1
D	0	1

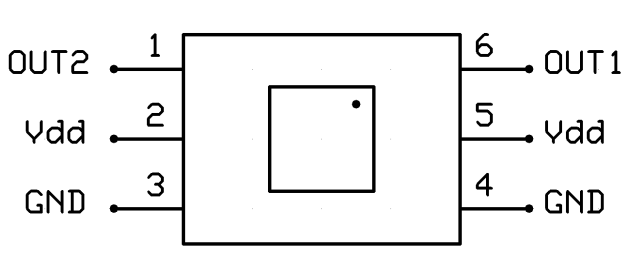
Items of Note:

- When the sensor is lying flat and only acted on by g-forces, the cylinder will be in Location C.
- Upon startup and when lying flat, the sensor remains in the last location before shutdown. Once movement is detected, the sensor will respond normally.

Pin Definitions and Ratings

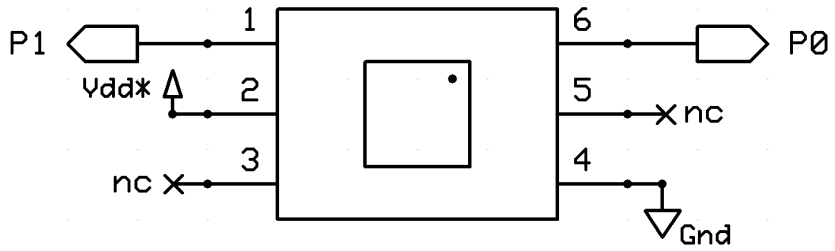
Pin	Name	Type	Function
1	OUT2*	O	Output state of phototransistor 2
2	Vdd*	P	Supply Voltage -> 3.0 - 5.5V
3	GND	G	Ground -> 0V
4	GND	G	Ground -> 0V
5	Vdd*	P	Supply Voltage -> 3.0 - 5.5V
6	OUT1*	O	Output state of phototransistor 1

Pin Type: P = Power, G = Ground, I = Input, O = Output
*Note: Maximum output signal voltage approaches power supply voltage.



Connection Diagrams

For use with the BASIC Stamp and Propeller P8X32A example programs listed below. Note: Maximum output signal voltage approaches power supply voltage, so use the same voltage level for microcontroller and sensor supply.



*Vdd = 3.3V for Propeller Applications, 5V for BASIC Stamp Applications

BASIC Stamp® Example Code

4DirectionalTiltSesnor_Simple.bs2 displays the output states of both phototransistors. It uses the Debug Terminal, which is built into the BASIC Stamp Editor software. The software is a free download from www.parallax.com/basicstampsoftware.

```
' 4DirectionalTiltSensor_Simple.bs2
' Displays output states of both phototransistors

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

PAUSE 1000

DO
  DEBUG HOME, "Phototransistor 1: ", BIN1 IN0, CR,
              "Phototransistor 2: ", BIN1 IN1
  PAUSE 50
LOOP
```

Propeller™ P8X32A Example Code

4DirectionalTiltSesnor_Simple.spin displays the current output states of both phototransistors. It uses the Parallax Serial Terminal to display the device output. The object and the Parallax Serial Terminal itself are included with the with the Propeller Tool v1.2.7 or higher, which is available from the Downloads link at www.parallax.com/Propeller.

```
'' 4DirectionalTiltSensor_Simple.spin for P8X32A
'' Displays output states of both phototransistors

  _CLKMODE = XTAL1 + PLL16X
  _XINFREQ = 5_000_000

OBJ

  pst : "Parallax Serial Terminal.spin"
```

```
PUB Main

  dira[0..1]~                   ' Set pins 0-1 to input
  pst.Start(115_200)            ' Set Parallax Serial Terminal to 115,200 baud

  repeat
    pst.Home
    pst.str(string("Phototransistor 1: "))
    pst.bin(ina[0], 1)
    pst.NewLine
    pst.str(string("Phototransistor 2: "))
    pst.bin(ina[1], 1)
    waitcnt(clkfreq/10 + cnt)
```