CY3236A-PIRMOTION

Pyroelectric Infrared Motion Sensor Kit Guide

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1. Introduction

This evaluation kit provides a way to demonstrate the use of Cypress's PSoC device to control a Pyroelectric Infrared Sensor (PIR). The human body radiates a certain amount of infrared light, in the realm of about 10 µm at normal body temperature. The concept behind PIR sensing is to capture this radiated light, filter the analog signals, convert those signals to digital, and then use those signals to control hardware. In the case of this evaluation kit, the conversion of these infrared rays to digital signals controls a relay and some LEDs. An accompanying application note AN2105 titled, "Sensing - Pyroelectric Infrared Motion Detector, PSoC Style," which can be found on the documentation CD included with this kit, or on the Cypress website at http://www.cypress.com/designresources, documents concepts of this design. This evaluation kit includes the PIR Sensor evaluation board, a 12V power adapter, a PSoC Designer CD, and a documentation CD, which includes design files, a firmware example project to demonstrate the operation of the PIR Sensor, and the aforementioned application note and this user guide in .pdf format.

1.1   Glossary

ADC – Analog-to-Digital Converter

DAC – Digital-to-Analog Converter

PIR – Pyroelectric Infrared

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2. Using the PIR Motion Sensor Evaluation Kit

Associated Project: Yes

Associated Cypress Part: CY8C27443-24PVXI

Software Version: PSoC Designer™ V4.3

Associated Application Note: AN2105 "Sensing - Pyroelectric Infrared Motion Detector, PSoC Style"

2.1   Board Specifications and Component Locations
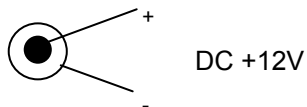
2.1.1 Board Specifications

Feature	Description
Device Part Number	CY8C27443-24PVXI
Power Source	DC Adapter +12V
Maximum Power Consumption	12V, 350 mA
Device Power Consumption	5V – 8 mA
Board Size	3.54x2.6 inches (90x66 mm)

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2.1.2 Component Locations
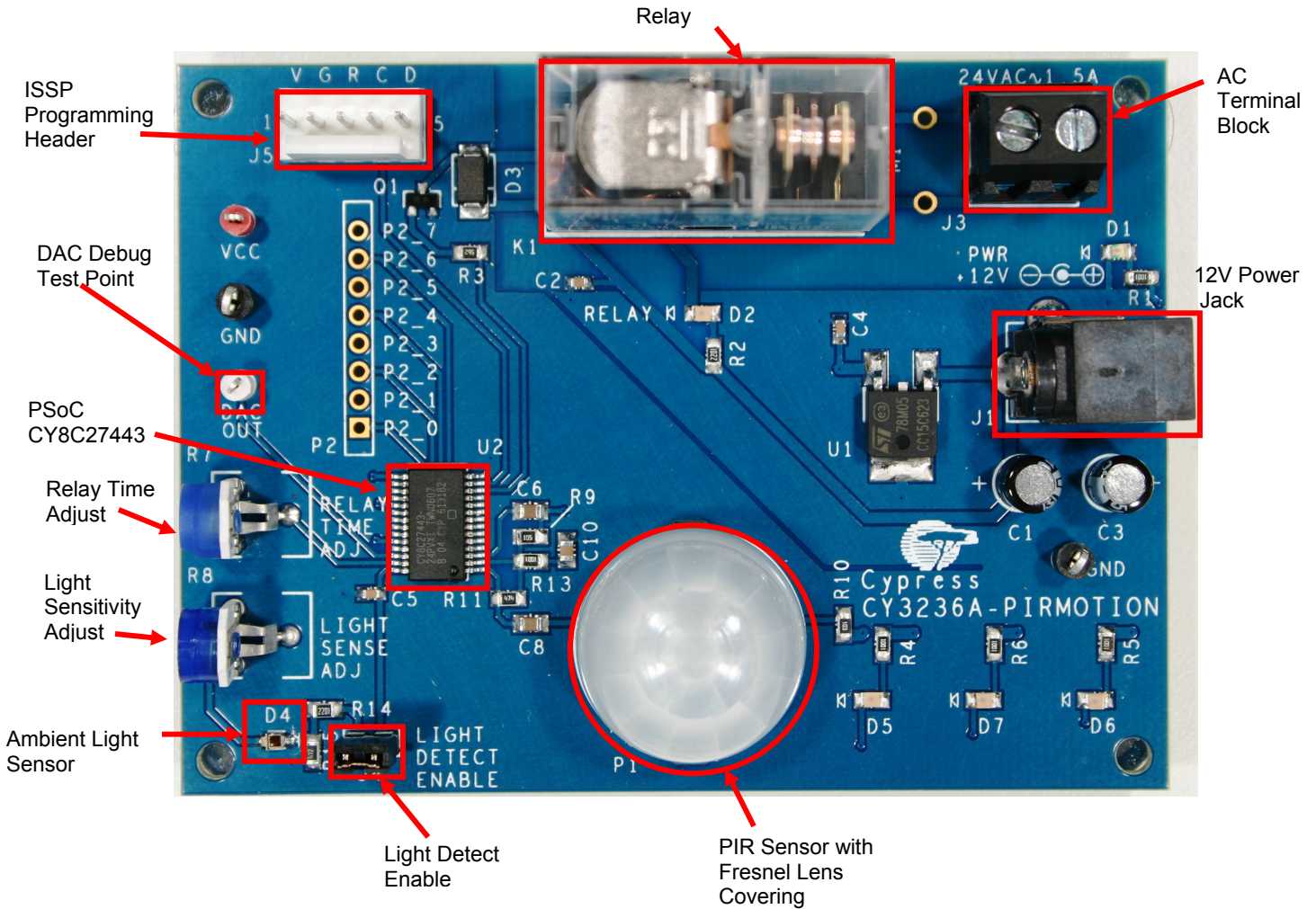
2.2 Jumper Settings and Connector Descriptions

2.2.1 J1 – DC Adapter Jack

DC +12V

2.2.2 DAC Debug Test Point

Use this test point to view the output of the processed PIR signal. Connect a scope to the test point to view the performance of the sensor after the PSoC has filtered, amplified, and digitized the analog signal from the PIR sensor.

2.2.3 J3 – AC Terminal Block

Connect a small AC powered device to this terminal block to be controlled by the relay. Such a device would include a small, low watt incandescent light bulb.

CAUTION: Due to exposed pins on the back side of the board, connect no more than 24 volts AC to this terminal block.

2.2.4 J4 – Ambient Light Detect Enable

Open – Disables ambient light detection.

Closed – Enables ambient light detection. This feature allows for detection of ambient light when the board is in a dark environment. This also causes ambient light detection to override the infrared sensing of the PIR sensor.

2.3   Using the Evaluation Board

2.3.1 Firmware

An example firmware project, which can be found on the documentation CD, is included in this kit. This firmware project is developed to demonstrate the use of PSoC in conjunction with Glolab's PIR325 Pyroelectric Infrared Sensor. The board is preprogrammed with this firmware out-of-box.

2.3.2 Setup

To begin using this evaluation board, provide power to the board using the supplied 12V power adapter. After powering the board on, wait a few moments for the firmware to initialize. Upon initializing, the relay, K1, will begin switching as you move your hand in front of the PIR sensor. Adjust the relay "on" time by turning the potentiometer, R7, so that the relay remains on for longer periods.
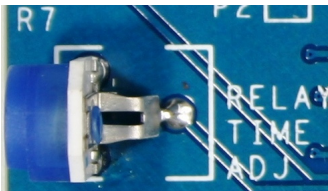
There are LEDs on the board to indicate relay activity and motion detection. D7 will light when the PIR device senses motion. LEDs D5 and D6 are not used with the firmware included with this kit, however, you can configure them using firmware. D2 is configured to indicate the relay's on/off activity.
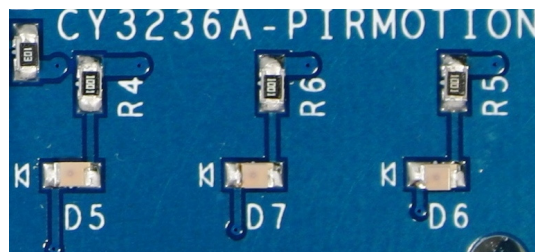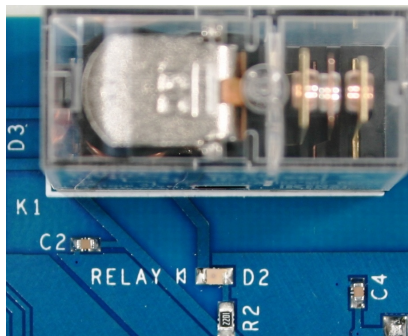
The evaluation board is also equipped with an ambient light sensor, D4. Not only does it sense infrared wavelengths, the board can sense ambient light. When enabled, the presence of ambient light can override the

function of the PIR sensor and keep the relay from turning on. Enable this feature by adding a shunt to J4. To adjust the circuit's sensitivity to ambient light, tune the potentiometer, R8.
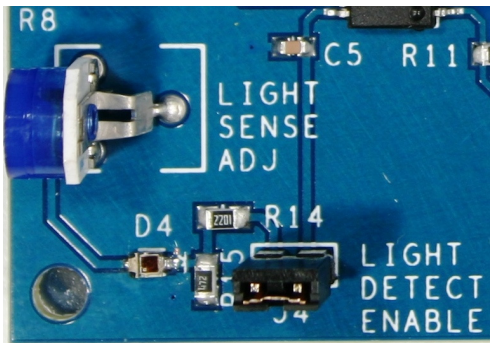
The board also contains a test point for the digital-to-analog output of the PIR signal. Connect a scope to this test point to provide a method for viewing the PIR signal that the PSoC has processed.

This design does not use Port 2 of the PSoC device. Therefore, each of the GPIOs on Port 2 are brought out to an 8-pin, 0.100" pitch footprint, allowing access to this port.

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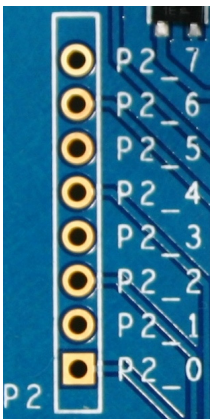
Lastly, the relay is connected to a 2-wire terminal block. A small watt, incandescent light bulb can be connected to this block and controlled (on/off) by the behavior of the relay.

CAUTION: Due to exposed pins on the back side of the board, connect no more than 24 volts AC to this terminal block.

3. References

Data Sheet – CY8C27443 Cypress PSoC Device (included on kit CD)

Data Sheet – Glolab PIR325 Infrared Motion Detector (included on kit CD)

Data Sheet – Rhom PRM-075PT Phototransistor (included on kit CD)

Application Note (AN2105) "Sensing - Pyroelectric Infrared Motion Detector, PSoC Style"

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