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ZDIGPIRM100ZCOG ZDP323 Digital PIR Evaluation Kit

User Manual

UM029702-0824

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Revision History

Each instance in this document's revision history reflects a change from its previous edition. For more details, refer to the corresponding page(s) or appropriate links furnished in the table below.

Date	Revision Level	Description	Pages
Feb. 2024	1	Original issue.	All
Aug. 2024	2	ZDP323Bx support only.	All

1 Overview

The ZDP323 Digital PIR Evaluation Kit and accompanying ZDP323 PC Application provide a convenient and flexible platform to demonstrate the capabilities and develop applications using the ZDP323Bx Series of Digital PIR sensors.

These dual element PIR sensors include all necessary sensing and signal processing functions to provide a fully integrated motion sensor, delivering high performance and excellent EMI immunity for the most demanding motion detection applications.

The ZDP323Bx series sensor on the evaluation board is configured and monitored through an I2C interface allowing up to four ZDP323Bx sensors to be controlled over a common I2C bus.

For more information on the ZDP323Bx Series DPIR sensor, refer to the ZDP323Bx Series Digital PIR Sensor (PS0417) product specifications.

The ZDP323 PC Application allows the user to configure and monitor the ZDP323 series sensors. It provides a graphical display of the sensor data and motion detection events through a USB interface. A Z8F6481 MCU with customized firmware is used to control communications between the Host PC (USB) and the ZDP323 Digital PIR sensors on the board. Once configured, the evaluation board can also be used independently without the PC interface (stand-alone).

1.1 Features

Evaluation Board

- Provides a ZDP323AA (*under development*) and ZDP323Bx sensor on-board (one of each).
- Supports external ZDP323Bx sensors (and lens) to be used from customers own target board.
- Uses a Z8F6481 MCU to communicate with sensors and PC Application via USB.
- Mini-USB interface for connection to a PC and provides power for the board.
- Stand-alone or PC App control operation.
- Selection of default operation mode.
- ZDP323Bx Demo mode.
- PC application controlled.

ZDP323 PC Application

- Provides a graphical display of the sensor data.
- Provides a configuration interface for the selected sensor.
- Supports multiple sensors.
- Provides event logging to a file.

1.2 Kit Contents

The ZDP323 Digital PIR Evaluation Kit includes the components listed in the following table:

Item	Description	Quantity
1	ZDP323 Digital PIR Evaluation Board	1
2	USB Cable - type A/B	1
3	Lenses: ZNCL10IL, ZNCL10R, ZNCL10S, ZCWM05GIV1, ZNCL11, ZNCL926	6

Table 1 - Kit Contents

Figure 1 - ZDP323 Digital PIR Evaluation Kit Contents

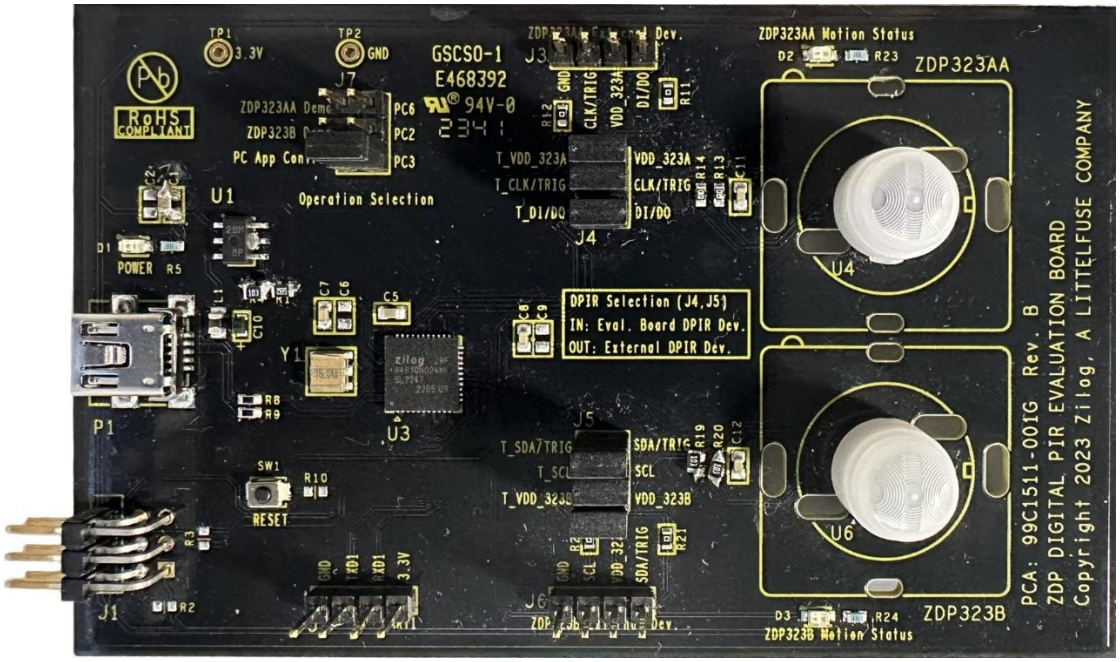


Figure 2 - Evaluation Board (top side)

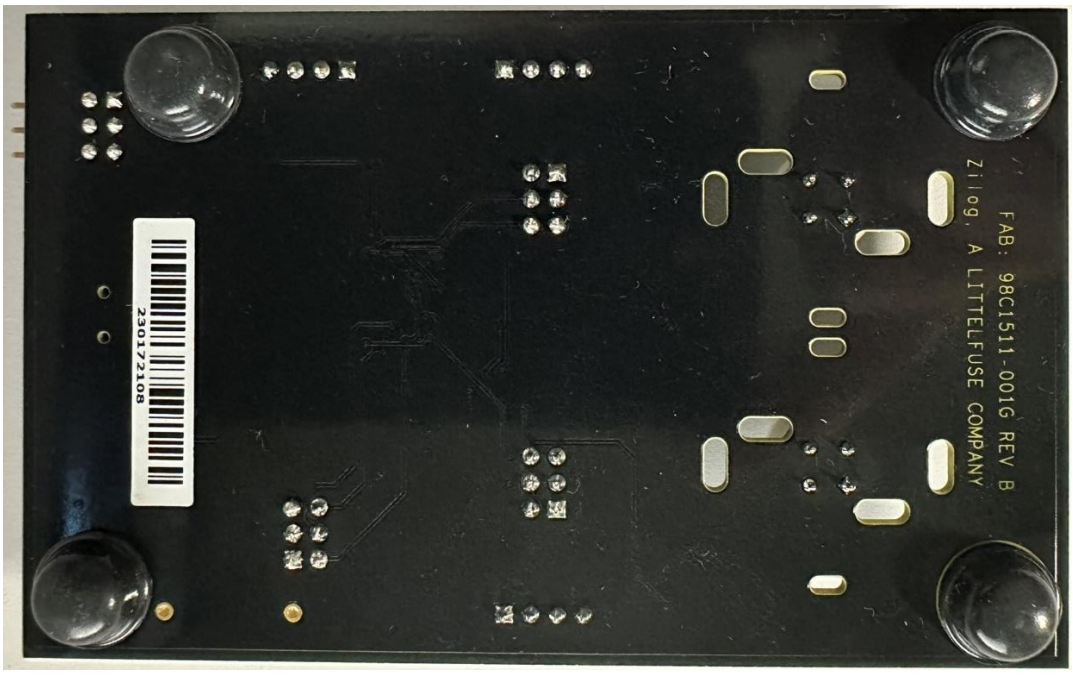


Figure 3 - Evaluation Board (bottom side)

2 Lenses

The Evaluation Kit includes six lenses. Two mounting options are supported – Clip on and PCB Mount. The following table describes the lenses that are included with the Kit.

Lens	Features	Typical Applications
ZNCL10IL 	9mm Wall Mount Array 80°x30° Clips on to pyroelectric sensor 6 beams (X); 2 beams (Y) 7m range Recommended PIR Sensor: Dual Element PIR clip-on	Wall mount for power management Proximity or entrance detection Kiosks Vending Product display's Product Spec: PS0412
ZNCL10R 	9mm Wall/Ceiling Mount Array (circular 360º) Clips on to pyro-electric sensor 90º Cone 14 zones with dual pyro 5m range Recommended PIR Sensor: Quad Element PIR clip-on	Room Occupancy and Proximity Sensing Lighting and HVAC control Kiosk/Display control Vending/Appliance power management Product display's Product Spec: PS0412
ZNCL10S 	9mm Wall/Ceiling Mount Array (7ºx7º) Clips on to pyro-electric sensor 2 beams (X); 1 beam (Y) 12m range Recommended PIR Sensor: Dual Element PIR clip-on	Barrier or entrance detection Kiosk/Display Counters Vending HVAC Directional detection Product Spec: PS0412
ZNCL926 	Clip-on 15mm Array (360º) 26 Segments 5m height, 2.1:1 Floor diameter to height ratio Recommended PIR Sensor: Quad Element PIR clip-on	Room Occupancy and Proximity Sensing Lighting and HVAC Control Kiosk/Display Control Vending/Appliance Power Management Product Spec: PS0413
ZNCL11 	Wall/Ceiling Mount Array 104 º (X), 37 º (Y) Circuit board mount Black rectangular lens with flat front 32 detection zones 4-meter range Recommended PIR Sensor: Dual Element PCB mount	Wall or ceiling mount for power management Room occupancy sensing Appliance power management Display/keypad power management TV auto shut-off Product Spec: PS0414
ZCWM05GIV1 	Ceiling/Wall Mount Array (180 º) Circular lens with 24mm square base Board mount clip-in 9m height/range Recommended PIR Sensor: Dual/Quad Element PCB mount	Wall or ceiling mount for office or meeting rooms Mid Bay Lighting Control Room Lighting Control Local HVAC Control Product Spec: PS0415

Table 2 - Lenses Included with Evaluation Kit

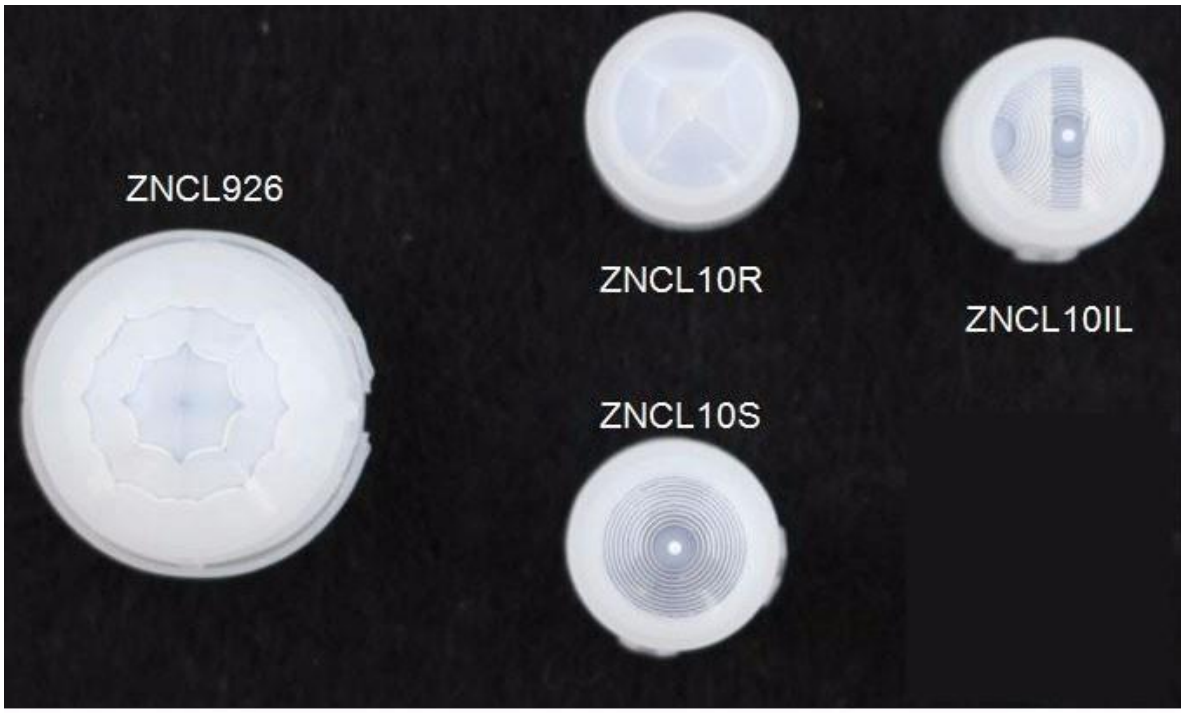


Figure 4 - PIR Clip-on Lenses

Figure 5 - ZNCL11 – PCB Mount Lens

Figure 6 - ZCWM05GIV1 – PCB Mount Lens

Refer to the PIR Lens specifications listed in Table for more information.

3 ZDP323 Digital PIR Evaluation Board

The following figure shows a block diagram of the ZDP323 Digital PIR Evaluation Board. Refer to Section 9 for the complete schematic diagrams.

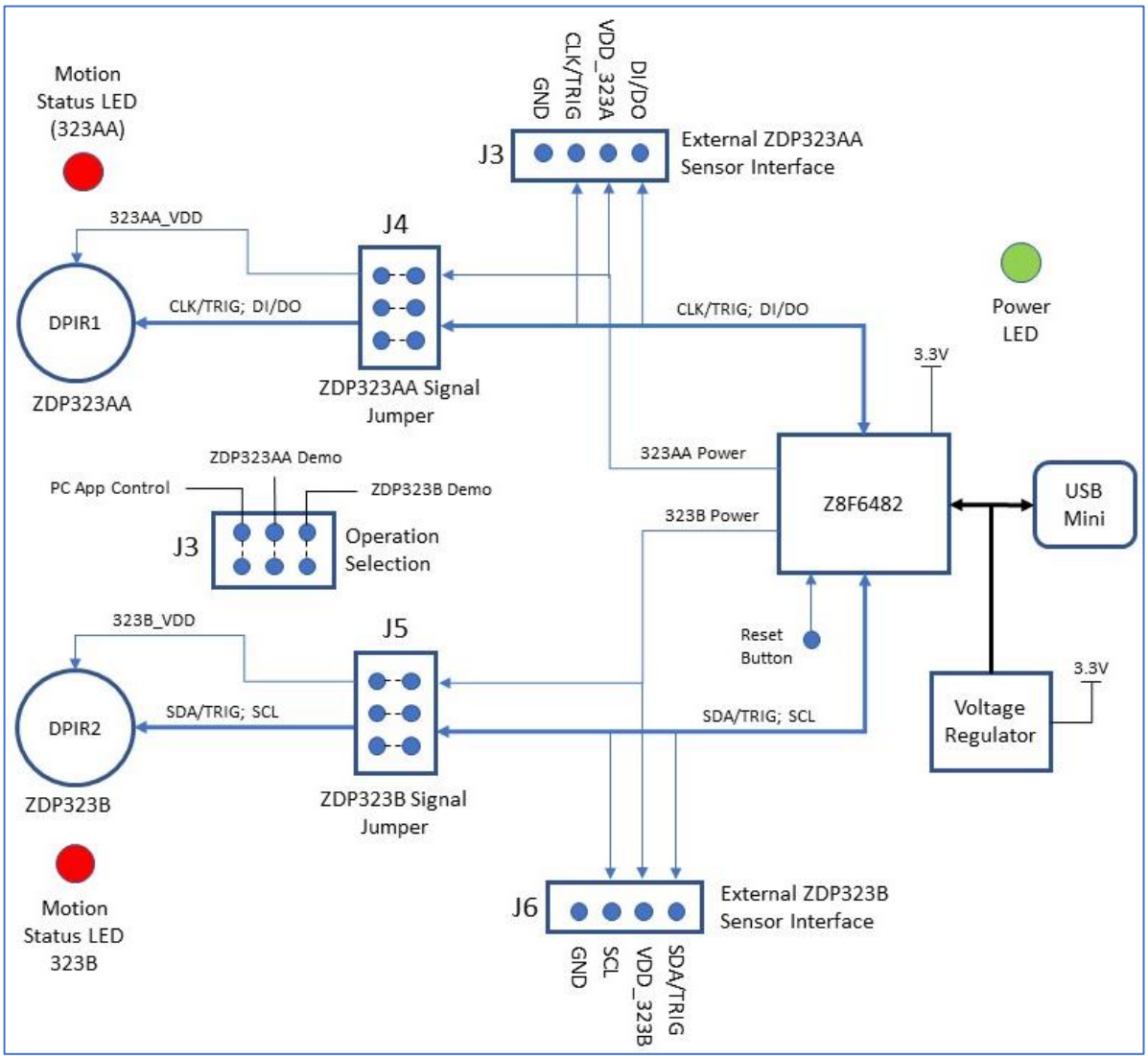


Figure 7 - ZDP323 Digital PIR Evaluation Board Block Diagram

4 Getting Started

Download and install the ZDP323 installation file from the Software Downloads page on the Zilog website. This will create a folder that includes the USB Serial drivers, sample project(s) and related documentation.

The default folder for the application is:

- C:\Zilog\ZDP323_1.0.0\
  - 1.0.0 is the application revision, which may be different.
- Useful folders:
  - Device Drivers – Includes the USB device rivers for interfacing to the Evaluation Board.
  - samples – Provides a sample project to use.

During installation you will be prompted to install the ZDP323 series controller drivers. This USB driver provides the necessary communication between the Evaluation Board and the PC. If not installed during the application installation, the USB driver can be installed manually by right- clicking on the appropriate .exe file and selecting “Run as Administrator”. This driver is in the Drivers folder:

- C:\Zilog\ZDP323_1.0.0\Device Drivers\USB
  - ZDP323_Series_Controller.x64.exe: 64-bit Windows
  - ZDP323_Series_Controller.x86.exe: 32-bit Windows
- The Device Driver will be installed in the Device Manager under “Xtools Usb Devices (ZiLOG)” as “ZDP323 Series Controller”.

4.1 Quick Start

The Evaluation Board comes preconfigured with default parameters for each onboard Digital PIR sensor, offering a convenient means for initial board testing.

1. Set J7 (Operation Selection) to ZDP323B Demo.
2. Connect the P1 mini-USB port to a power source such as a PC or USB charger using the USB cable provided.
3. The respective LED for the Digital PIR Sensor selected will begin flashing for approximately 30 seconds while the sensor stabilizes.
   - D3 for ZDP323B
4. After the Digital PIR sensor stabilizes, the LED D3 turns off and flashes when motion is detected.
5. Wave your hand approximately 30cm (12 inches) over the selected sensor and observe that the LED flashes to indicate motion detection. The LED on time is approximately 500ms.

4.2 Default Operating Mode & Sensor Selection

The evaluation board default operating mode and sensor selection is determined by jumper settings J7 and J5.

J7: Operation Selection – Default Evaluation Board operating mode – see Table 3

J5: ZDP323B on-board and/or external sensor selection – see Table 4

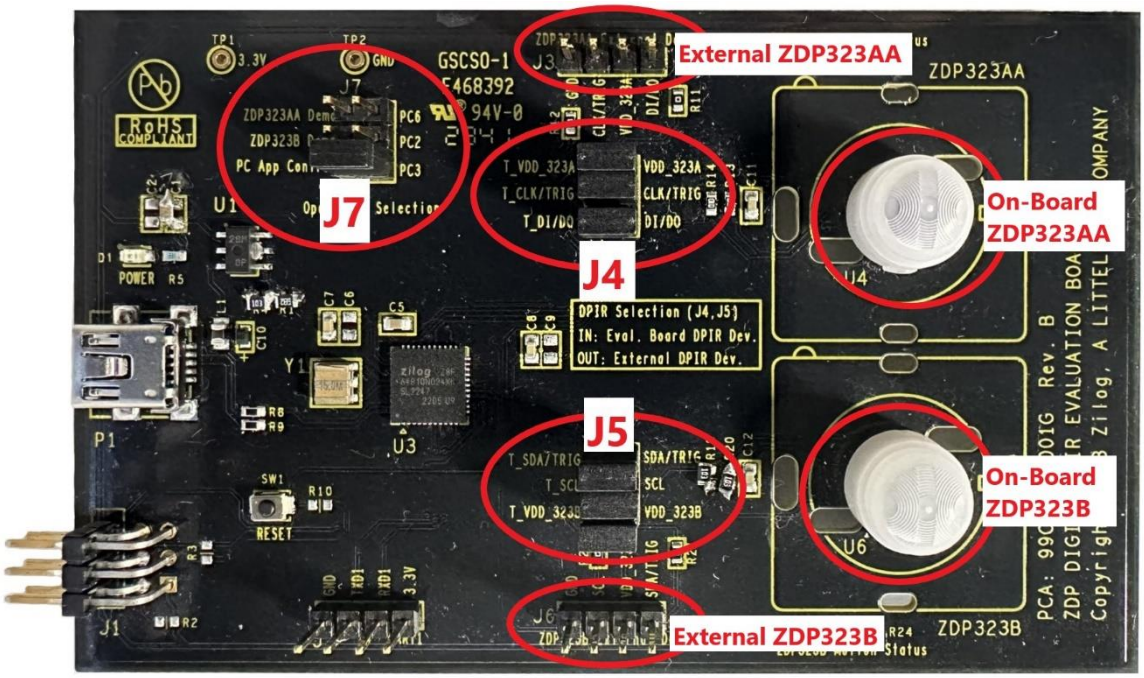


Figure 8 - Evaluation Board Jumper Locations

4.2.1 Operation Selection (J7)

J7 selects the default operating mode of the evaluation board. It determines if the evaluation board is operating in Demo Mode (stand-alone) or controlled by the ZDP323 PC Application over the USB interface.

Set the jumper to PC App Control to use the ZDP323 PC application to select, control and monitor the sensor.

Set the jumper to ZDP323B Demo to set the board to stand-alone demo mode using the respective sensor.

This selection can be over-ridden by the PC application.

Operating Mode	J7 Position	Notes
	ZDP323AA Demo	• *Not activated*
Demonstration mode using a ZDP323B device	ZDP323B Demo	• The ZDP323B is configured and run with the last saved settings. • All J5 jumpers installed to use onboard ZDP323B. • All J5 jumpers removed to use external ZDP323B (connected through J6).
Controlled by ZDP323 PC Application	PC App Control	• The Evaluation Board waits for the PC Application to tell it which sensor to use. • All J5 jumpers installed to use onboard ZDP323B. • All J5 jumpers removed to use external ZDP323B (connected through J6).

Table 3 - Operating Mode Jumper Selection

4.2.2 Sensor Selection (J5)

The on-board sensor can be used if the three J5 (ZDP323B) jumpers are installed. To use an external sensor, remove the J5 jumpers and connect the external sensor on J6 (ZDP323B).

Sensor Selection	Jumper Positions	Notes
On-board ZDP323AA		*Not activated*
On-board ZDP323Bx	J5 Jumpers installed	J7 in ZDP323B Demo or PC App Control position
External ZDP323AA		*Not activated*
External ZDP323Bx	J5 jumpers removed	J7 in ZDP323B Demo or PC App Control position. External ZDP323B sensor connected through J6.

Table 4 - Sensor Selection

4.2.3 External Sensor Connections

To use an external sensor, remove the J5 (ZDP323B) jumpers and connect the external sensor to J6 (ZDP323B).

External ZDP323B sensor connections on J6:

J6 Pin	Signal Name	Sensor Signal	Sensor Pin Number
1	GND	GND - Case	4
2	SCL	SCL	3
3	VDD_323B	VDD	2
4	SDA/TRIG	SDA/TRIG	1

Table 5 - External ZDP323B Connections

With the ZDP323B sensor, multiple devices can be supported on the same I2C bus. Each sensor must have a unique I2C address; There are four variations of the ZDP323B series Digital PIR Sensor available, differentiated by their I2C bus address.

Part Number	I2C Address
ZDP323B1	301h
ZDP323B2	302h
ZDP323B3	303h
ZDP323B4	304h

Table 6 - ZDP323B I2C Addresses

5 Demonstration Modes

The Evaluation Board can be used in a stand-alone demonstration mode without any PC communications required. In this mode, the selected Digital PIR sensor will operate with the last saved parameters. The board is provided with default values for first time use. The on-board LED will flash with each motion event detected.

1. Set J7 (Operation Selection) to ZDP323B Demo.
2. Connect the P1 mini-USB port to a power source such as a PC or USB charger using the USB cable provided.
3. The respective LED for the Digital PIR Sensor selected will begin flashing for approximately 30 seconds while the sensor stabilizes.

- D3 for ZDP323B

4. After the Digital PIR sensor stabilizes, the LED turns off and flashes when motion is detected.
5. Wave your hand approximately 30cm (12 inches) over the selected sensor and observe that the LED flashes to indicate motion detection. The LED on time is approximately 500ms.

While in demonstration mode, the ZDP323 PC application can still be used to monitor and control the selected Digital PIR sensor. Follow the instructions outlined in section 6.

6 ZDP323 PC Application Control Mode

The ZDP323-Digital PIR (ZDP323) software is used in conjunction with the ZDP323 Digital PIR Evaluation Board, enabling the configuration of control registers that govern the operation of the Zilog's ZDP323xx Digital Passive Infrared (ZDP323xx DPIR) sensor. It offers a user-friendly graphical interface for the configuration and monitoring of sensor data over USB communication with the Evaluation Board. The software lets you log data and play a sound when motion is detected, helping you analyze the information better.

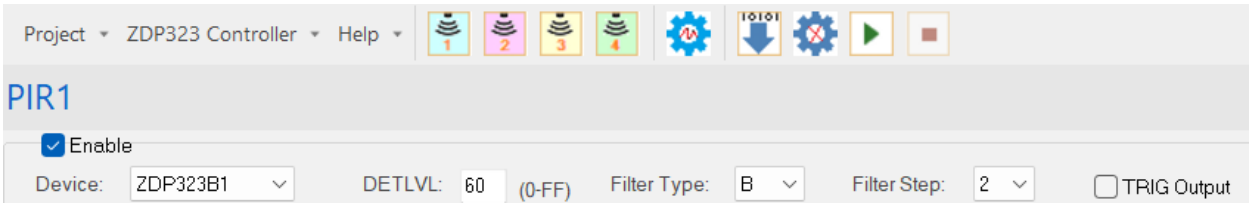
Note:

Refer to the integrated help with the ZDP323 software for instructions on using the application.

Figure 9 – ZDP323 PC Application

6.1 Using the ZDP323 PC Application

1. Ensure the PC application and drivers are installed as described in section 4.
2. On the Evaluation Board, set J7 (Operation Selection) to PC App Control.
3. Connect the P1 mini-USB port to a PC using the USB cable provided.
4. Open the sample project called “test.zdp323proj” from the “samples” folder. The ZDP323 PC Application will start.
5. Select the sensor(s) you wish to use and set the Detection Level (DETLVL), Filter Type and Filter Step parameters as desired.
   - Suggested initial parameters:
     - Device: ZDP323B1
     - DETLVL: 1C
     - Filter Type: B
     - Filter Step: 2



6. Click “Program Device Configurations” to configure the selected device(s) with the parameters.
7. Click “Start Motion Detection”
8. The LED for the selected device will begin flashing and continue for approximately 30 seconds while the sensor stabilizes.
9. After the Digital PIR sensor stabilizes, the LED turns off and flashes when motion is detected.
10. Wave your hand approximately 30cm (12 inches) over the selected sensor and observe that the LED flashes to indicate motion detection. The LED on time is approximately 500ms.

7 Related Documents

The documents associated with the ZDP323 Digital PIR sensors are listed below. Each of these documents, and others can be obtained from the ZMOTION Product Page on the Zilog website: http://www.zilog.com.

Document Number	Description
PB0266	Digital PIR Sensor Product Brief
PS0417	ZDP323B Digital PIR Sensor with I2C Interface
PB0264	PIR Lens Product Brief
PS0412	ZNCL10 Lens Series Product Specification
PS0413	ZNCL926 Lens Product Specification
PS0414	ZNCL11 Lens Product Specification
PS0415	ZCWM05GIV1 Lens Product Specification

Table 7 - Related Documents

8 Customer Support

To share comments, get your technical questions answered, or report issues you may be experiencing with our products, please visit Zilog's Technical Support page.

This publication is subject to replacement by a later edition. To determine whether a later edition exists, please visit the Zilog website at http://www.zilog.com.

9 Appendix A - Evaluation Board Schematic

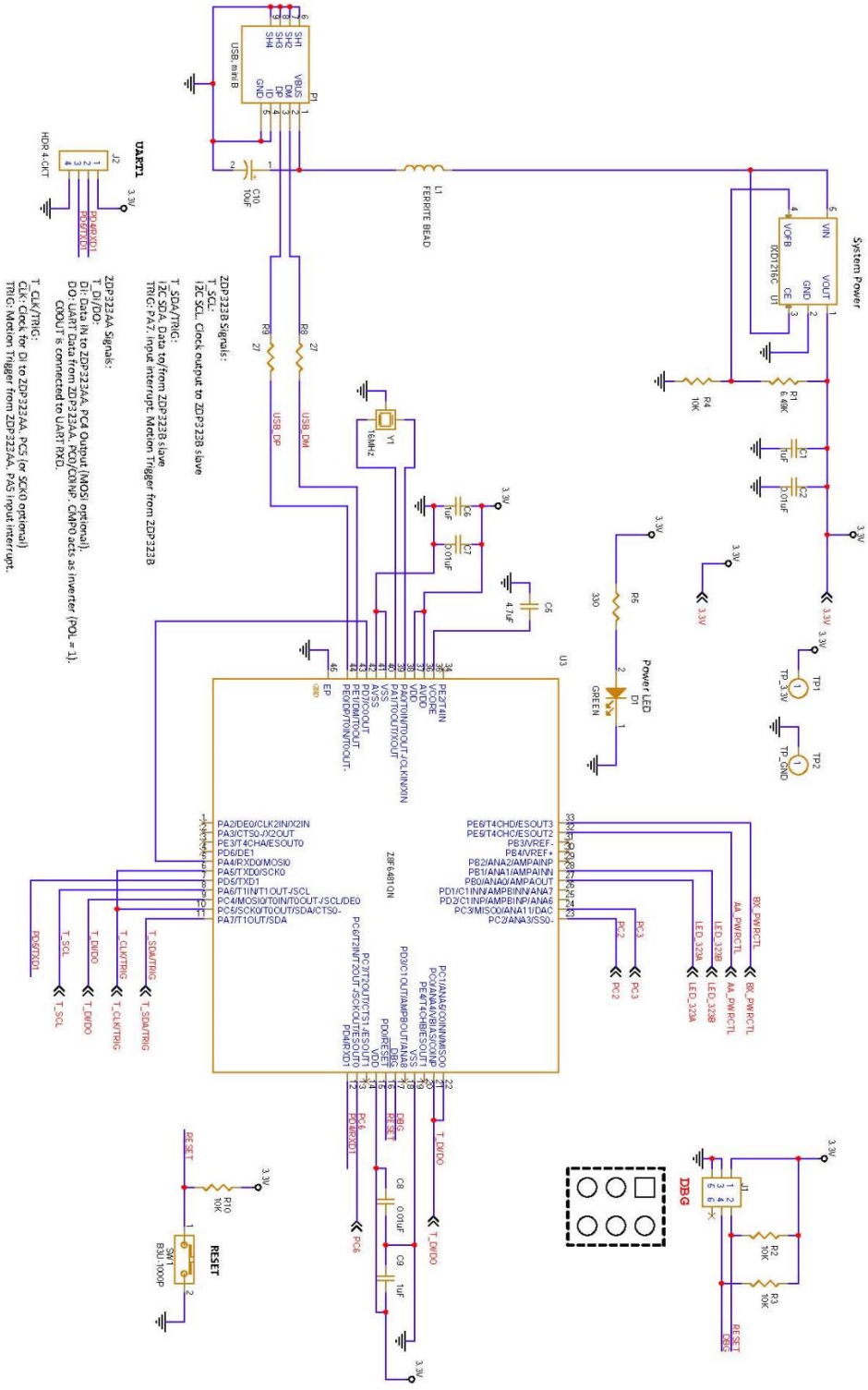


Figure 10 - Evaluation Board Schematic (Page 1)

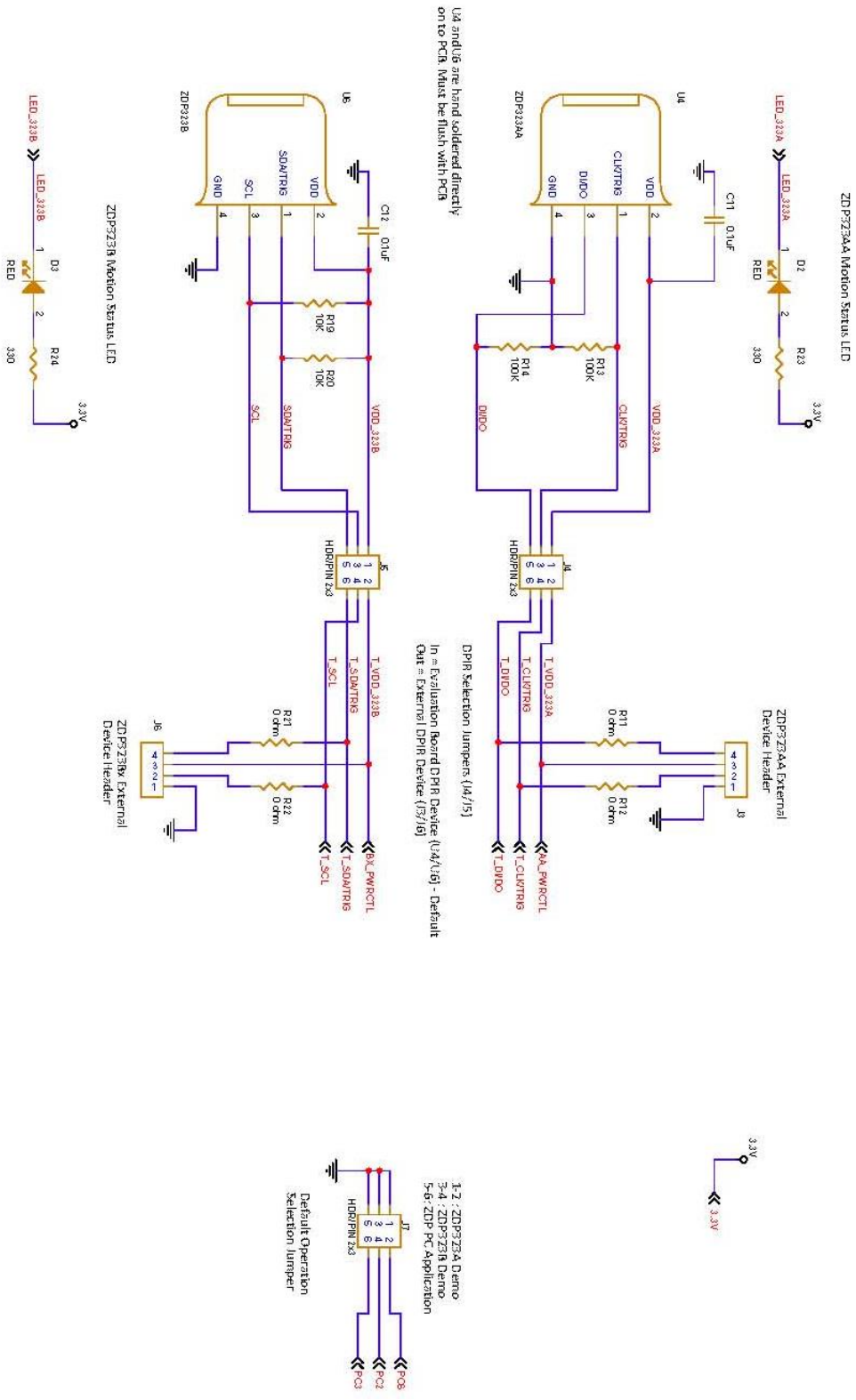


Figure 11 - Evaluation Board Schematic (Page 2)