zilog

ZEPIR000101ZCOG

ePIR™ Motion Detection Zdots® SBC Development Kit

User Manual

UM022302-1008

Revision History

Each instance in Revision History reflects a change to this document from its previous revision. For more details, refer to the corresponding pages and appropriate links in the table below.

Date	Revision Level	Description	Page Number
October 2008	02	Removed references to General Purpose (GP).	All
October 2008	01	Original issue.	All

Safeguards

The following precaution must be observed when working with the devices described in this document:

⚠ Caution: *Always use a grounding strap to prevent damage resulting from electrostatic discharge (ESD).*

Table of Contents

Introduction

Zilog's ePIR™ Motion Detection Zdots® Single Board Computer (SBC) Development Kit includes all the necessary components needed to evaluate and begin development with the ePIR Motion Detection Zdots SBC.

The kit includes a base board into which the ePIR Motion Detection Zdots SBC is plugged and a prototyping area that enables you to add your own custom application hardware.

The ePIR Motion Detection Zdots SBC is a complete motion detector solution including passive infrared (PIR) Sensor and Fresnel lens. Based on PIR sensor technology it combines the unique features of the Z8 Encore! XP® MCU with powerful new software detection algorithms and delivers a significant performance improvement over traditional PIR based solutions.

The 3 main functions of ePIR Motion Detection Zdots SBC Development Kit include:

1. Evaluate the complete ePIR Motion Detection Zdots SBC using jumpers and trim pots located on the base board to control sensitivity, range and output timing.

2. Evaluate the ePIR Motion Detection Zdots SBC using the built-in serial interface to gain advanced control over its settings and performance. Use the kit to tailor the settings needed for your own custom application.

3. Use the included ZDS II and USB based debugger to develop your own custom hardware and software applications using the ePIR Motion Detection software engine embedded in the ePIR Motion Detection Zdots SBC.

ePIR™ Motion Detection Zdots® SBC

Zilog's ePIR Motion Detection Zdots SBC is a complete, compact, and high-performance product specifically designed for the rapid development and deployment of products requiring control based on infrared motion detection. It is a complete motion detector solution including PIR sensor and lens.

The features of ePIR Motion Detection Zdots SBC include:

- Complete, fully functional motion detection SBC including lens
  - Comes pre-programmed with application software
- Small form factor: 25.5 mm x 16.7 mm
- Wide 5 m x 5 m, 60 degree detection pattern
- Sensitivity control via simple hardware configuration
- Advanced serial (UART) based configuration and interface
- Sleep mode for low power applications
- No temperature compensation required
- Input to support CDS photocell input for ambient light detection
- Minimal components ensure highest possible Mean Time Between Failures (MTBF)
- Application code can also be modified to support custom solutions
- Complete development system available
- Operates from 2.7 V to 3.6 V power supply
- Simple 8-pin interface
- Standard operating temperature 0 °C to 70 °C

Kit Contents

The ePIR™ Motion Detection Zdots® SBC Development Kit contains the following (see Figure 1 on page 4):

Hardware

The hardware in the ePIR Motion Detection Zdots SBC Development Kit include:

- ePIR Motion Detection Zdots SBC Base Board
- ePIR Motion Detection Zdots SBC
- USB Smart Cable
- RS-232 Serial Cable DB9-DB9
- 5 V DC Power Supply

Software (on CD-ROM)

The software on CD-ROM provided with the ePIR Motion Detection Zdots SBC Development Kit includes:

- ZDS II—Z8 Encore!® IDE with ANSI C-Compiler
- Sample/Applications Code
- Document browser
- Acrobat Reader

Figure 1. ePIR™ Motion Detection Zdots® SBC Development Kit

Documentation

The documentation include:

- ePIR™ Motion Detection Zdots® SBC Development Kit Quick Start Guide (QS0073)

- Z8 Encore! Series Technical Documentation
    - ZDS II—IDE User Manual (UM0130)
    - eZ8 CPU User Manual (UM0128)

- ePIR Motion Detection Zdots SBC Development Kit Documentation
    - ePIR™ Motion Detection Zdots® SBC Development Kit User Manual (UM0223)
    - ePIR™ Motion Detection Zdots® SBC Product Specification (PS0284)
    - ePIR™ Motion Detection Zdots® Single Board Computer Product Brief (PB0223)

Software Requirements

Supported Operating Systems

The supported operating systems include Windows Vista Business, Windows XP Professional, Windows 2000 SP4, and Windows 98Se.

Recommended Host System Configuration

The recommended host system configuration include:

- Windows XP Professional

- Pentium III 500 MHz processor or higher

- 128 MB RAM or more

- 135 MB hard disk space (includes Application and Documentation)
- Super VGA Video Adapter
- CD-ROM for installation
- USB High-Speed port (when using USB Smart Cable)
- RS-232 communication port
- Internet browser (Internet Explorer or Netscape)
- Terminal application like HyperTerminal

Installation

For software installation and setup of the ePIR™ Motion Detection Zdots SBC Development Kit, refer to *ePIR™ Motion Detection* Zdots® SBC *Development Kit Quick Start Guide (QS0073)*.

ePIR™ Motion Detection Zdots® SBC Development Board

The ePIR Base Board and SBC is a development and prototyping board for the ePIR Motion Detection MCU. The board provides a tool to evaluate features of the ePIR Motion Detection MCU and SBC, and to start developing an application before building the actual hardware.
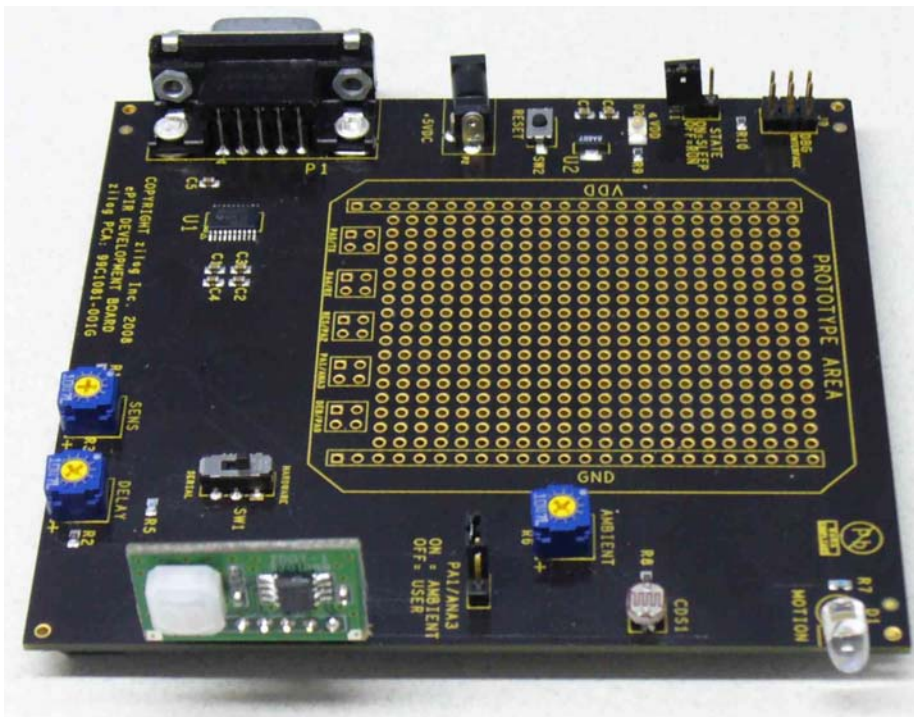

Figure 2. ePIR™ Motion Detection Zdots® SBC Development Board

Features

The features of ePIR Motion Detection Zdots SBC Development Board include:

- ZDS II development system

- ePIR Motion Detection Zdots SBC including built-in software supporting hardware and serial interfaces

- Base board to supply interface, control and support functions
    - Trim Pot's for sensitivity and output delay timing
    - Switch selection for hardware or serial interface modes
    - Reset button
    - CDS Photocell for ambient light detection
    - Two LED's for power and 'Motion Detected'
    - On-Chip Debugger (OCD)
    - Prototype area for custom hardware
    - RS-232 interface with DB-9 connector supporting serial interface mode

- USB based debugger for development of custom software applications

The ePIR Motion Detection Zdots SBC Development Kit provides various features to control its overall operation. It operates in two basic modes:

- Hardware Interface Mode

- Serial Interface Mode

Hardware Interface Mode

Hardware Interface Mode provides the simplest mode of operation and allows basic control of the ePIR Motion Detection Zdots SBC with hardware jumpers and potentiometers.

- SW1 is placed in 'Hardware' position

- Serial interface is disabled

- Sensitivity, Delay, and Ambient Light Threshold are set using Trim Pots on base board

Serial Interface Mode

Serial Interface Mode provides more control over the operation of the ePIR Motion Detection Zdots SBC. In Serial Interface Mode commands are sent over the provided RS-232 interface.

- SW1 is placed in 'Serial' position

- Serial interface is activated

- Sensitivity and Delay potentiometers are deactivated

- Ambient Light Threshold is set using Trim Pots on base board

Additionally, the ePIR Motion Detection Zdots SBC Development Kit allows you to develop software using the provided USB Smart Cable. The On Chip Debug Port is available through the DBG Interface connector (J9) for this purpose (see Schematics on page 13). For more information, refer to *ePIR™ Motion Detection Zdots® SBC Product Specification (PS0284)*.

Ambient Light Threshold

In various lighting control applications, the decision of when to turn ON the lights can depend on the current ambient light level in addition to detecting motion. A CDS photocell is provided on the kit to demonstrate this function. When light illuminates on the photocell, its resistance decreases, providing a lower voltage to the light gate (LG) signal on the ePIR Motion Detection Zdots SBC. When the SBC detects this voltage to be below 1.0 V in Hardware Mode or the programmed threshold in Serial Mode, the MOTION LED (/MD signal) does not activate even when the motion is detected. The AMBIENT potentiometer (R6) sets the amount of ambient light required to cross the threshold.

Sensitivity

The amount of motion required to trigger the MOTION LED (/MD signal) can be adjusted using the SENS potentiometer (R3). This also has the effect of controlling the range that the detector can 'see'—lower sensitivity reduces the range of the detection pattern. The SENS potentiometer provides a voltage between 0 V and 1.8 V to the TXD/SNS signal on the ePIR Motion Detection Zdots SBC. A higher voltage means lower sensitivity. The SENS potentiometer is used only in Hardware Interface Mode. In Serial Interface Mode, the sensitivity is set via commands sent over the serial interface.

/MD Output Delay Time

The amount of time that the MOTION LED (/MD signal) is activated can be controlled by the DELAY (R4) potentiometer. You can set this time between 2 seconds and 15 minutes. This feature is typically used in power control applications where the amount of time that a device is activated needs to be controlled. The potentiometer provides a voltage between 0 V

and 1.8 V to the RXD/DELAY input on the ePIR Motion Detection Zdots SBC. A higher voltage gives a longer activation time.

Table 1 describes the ePIR Motion Detection Zdots SBC Development Kit Operational Functions.

Table 1. ePIR Motion Detection Zdots SBC Development Kit Operational Functions

| Feature | Operational Mode (SW1—MODE) | | | |
	Function Name	Function Type	Hardware Mode	Serial Mode
System Reset	RESET (SW2)	Push Button	Reset the ePIR Zdots SBC by momentarily interrupting power.	
Ambient Light Threshold	AMBIENT (R6)	Potentiometer	Sets the amount of ambient light required to prohibit the MOTION LED from activating. Turn clockwise to increase the amount of light required.	
Sensitivity	SENS (R3)	Potentiometer	Controls the ePIR Motion Detection Zdots SBC's sensitivity to motion. It provides an adjustable voltage between 0 V and 1.8 V to the SBC's TXD/SNS input. Turn clockwise to increase sensitivity.	No effect. Use the serial interface to control sensitivity.
/MD Output Delay Time	DELAY (R4)	Potentiometer	Controls the amount of time that the MOTION LED is activated after motion has been detected. Turn clockwise to increase the time.	No effect. Use the serial interface to control /MD output delay time.

Table 1. ePIR Motion Detection Zdots SBC Development Kit Operational Functions (Continued)

Feature	Operational Mode (SW1—MODE)			
	Function Name	Function Type	Hardware Mode	Serial Mode
SBC State	STATE (J11)	Jumper	Places the ePIR Motion Detection Zdots SBC into a low power sleep mode.	
CDS Enable	CDS ENABLE (J7)	Jumper	When this jumper is installed, the CDS Photo Cell is used. When this jumper is not installed, you can control the LG signal from the prototype area.	
OCD Interface	DBG INTERFACE (J9)	6-pin Header	This 6-pin header provides the interface to the USB Smart Cable (debugger) when developing software on the ePIR Motion Detection Zdots SBC.	

Schematics

Figure 3 displays the ePIR Motion Detection Zdots SBC Development Board schematics.
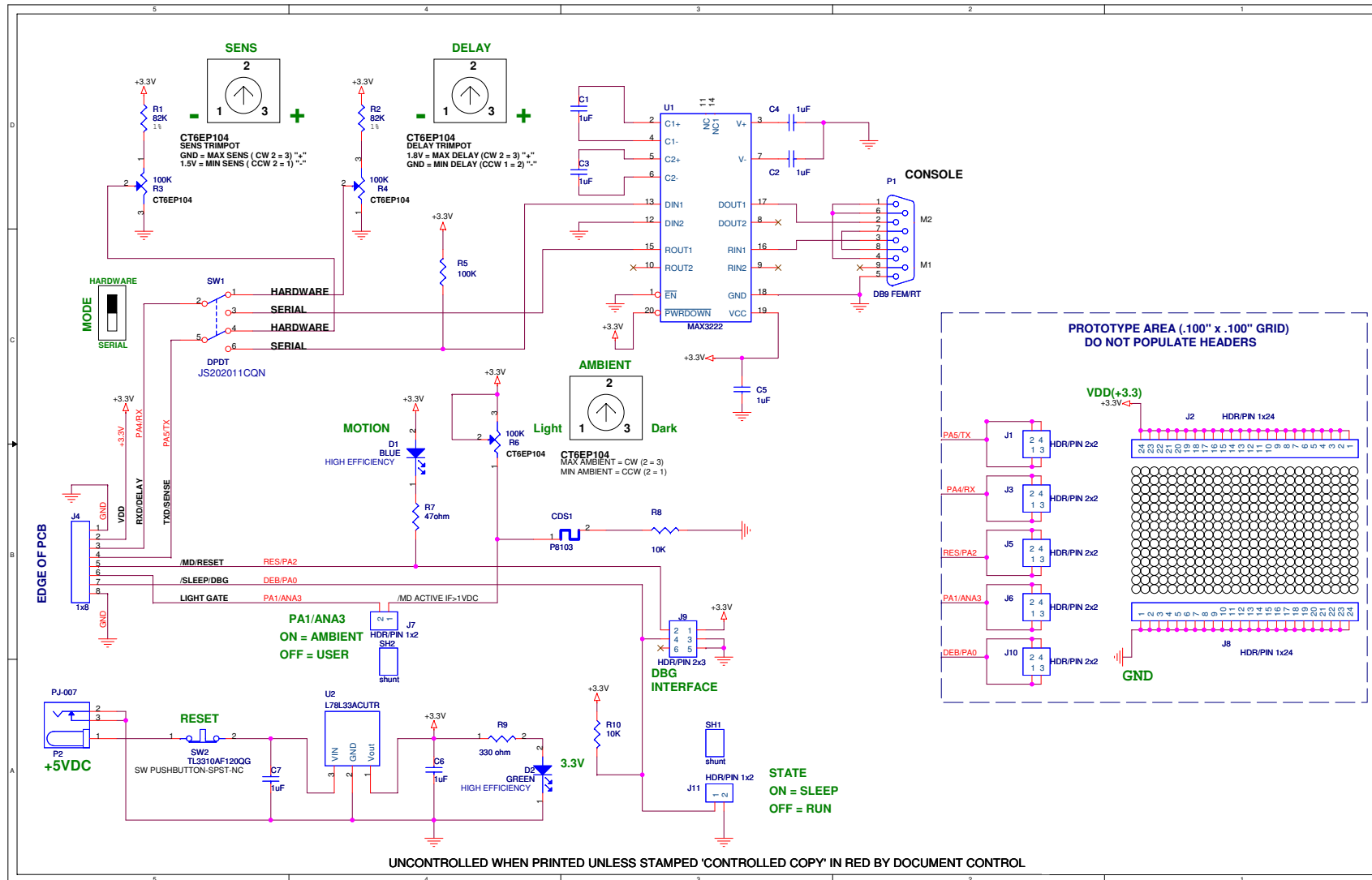

Figure 3. ePIR™ Motion Detection Zdots® SBC Development Board Schematics

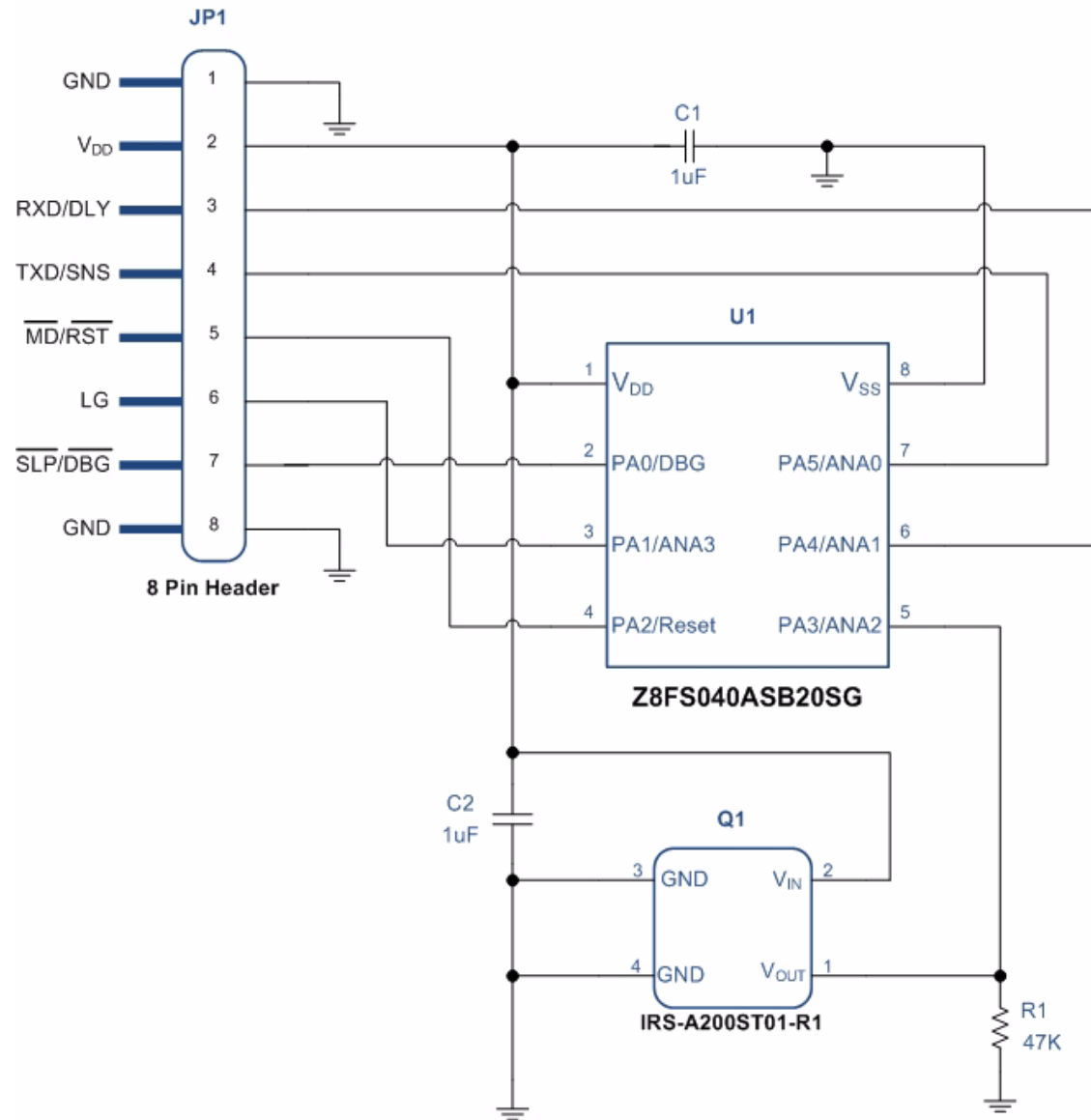Figure 4 displays the ePIR Zdots SBC Schematic.

Figure 4. ePIR Zdots SBC Schematic

Customer Support

For answers to technical questions about the product, documentation, or any other issues with Zilog's offerings, please visit Zilog's Knowledge Base at http://www.zilog.com/kb.

For any comments, detail technical questions, or reporting problems, please visit Zilog's Technical Support at http://support.zilog.com.

⚠ **Warning:** DO NOT USE IN LIFE SUPPORT

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As used herein

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