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Z8F64820100ZCOG

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⚠ **Warning:** DO NOT USE THIS PRODUCT IN LIFE SUPPORT SYSTEMS.

LIFE SUPPORT POLICY

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As used herein

Life support devices or systems are devices which (a) are intended for surgical implant into the body, or (b) support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in a significant injury to the user. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.

Document Disclaimer

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Revision History

Each instance in the Revision History table below reflects a change to this document from its previous version. For more details, click the appropriate links in the table.

Date	Revision Level	Description	Page
Sep 2016	02	Removed RS-232 to 6-pin circuit adapter in the Kit Contents	3,12
Oct 2013	01	Original issue.	n/a

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Safeguards

The following precautions 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).

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The Z8 Encore! XP® F6482 Series Development Kit

This document describes how to set up the F6482 Series Development Kit (Zilog part number Z8F64820100ZCOG) and use it to evaluate your Z8F6482-based designs and applications. The Kit features a development board consisting of four LEDs, three push-buttons, a buzzer/speaker, a 7.1 seven-segment LCD, a pyroelectric sensor, a phototransistor, 32Mbit SPI Flash, port pin headers, and USB and UART ports. The Board features the Z8F6482 MCU in a 80-pin LQFP package, plus a DBG connector to connect the Board to a host development PC using Zilog's USB SmartCable. To learn more about the Z8F6482 MCU, refer to the F6482 Series Product Specification (PS0294).

This document provides instructions for setting up and configuring Z86482 Development Board and includes schematic diagrams and a discussion of Board features and ZDS II.

The first sections of this document guide you through the following tasks:

- Download and Install the ZDS II Software and Documentation – see page 4
  - Installing the USB SmartCable Driver – see Appendix B. Installing the USB SmartCable Driver on page 36
- Connect the F6482 Series Development Board to your PC – see page 6
- Start the Z8F6482 Demonstration Program – see page 8

Further details, including memory configurations, jumper settings, and a listing of sample projects can be found in the Z8F6482 Sample Projects section on page 30.

Figure 1 shows an image of the F6482 Series Development Kit.

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Figure 1. The F6482 Series Development Kit

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Kit Contents

Table 1 lists the contents of the F6482 Series Development Kit.

Table 1. Z8F64820100ZCOG Contents

Item	Description	Quantity
1	F6482 Series Development Board	1
2	USB SmartCable	1
3	6-circuit ribbon cable	1
4	A (male) to Mini-B USB cable	1
5	F6482 Series Development Kit Flyer (FL0160)	1

Kit Features

The key features of the F6482 Series Development Kit are:

- F6482 Series Development Board, which includes:
  - Z8F6482 MCU in an 80-pin LQFP package operating at 24 MHz with 64 KB of internal Flash memory and 3.75 KB of internal RAM memory
  - 32 Mbit SPI Flash
  - A USB interface that provides:
    - Power to the Board with overcurrent protection
    - Connection to the Z8F6482 MCU's USB port

  - 7.1 segment LCD module
  - Speaker: SP1
  - Pyroelectric sensor
  - Phototransistor
  - UART(s) port J20
  - Test points, headers, and prototype area
  - External source of reference voltage (2.5 V)
  - MCU current measurement test points J5 and J6
  - Power supply level adjustable with potentiometer R13

- USB SmartCable
- ZDS II software, samples, and documentation available free for download
  - Z8F6482 Board Support Package (BSP) source code and sample programs

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Board Support Package

The ZDS II software download includes a Board Support Package (BSP) that provides an application programming interface (API) to configure and control select Z8F6482 MCU peripherals. This BSP API is accessible through a static library linked to customer applications and is a blend of macros and C functions that facilitate application development by abstracting direct SFR manipulation from the programmer. Macros provide near-assembly-level access to SFRs without incurring the overhead (i.e., code size and execution time) of C functions for basic operations (e.g., stopping a timer). More complex operations are implemented in C functions, thereby eliminating the customer requirement for recreating code for frequently-used operations (e.g., transmitting a block of data through the UART under DMA control). By using the BSP library, customers can develop applications that access Z8F6482 MCU peripherals with only a few function calls, effectively reducing development effort to a minimum.

The ZDS II software download also includes complete source code to all peripheral devices supported by the BSP API. Advanced programmers can cut and paste code snippets from the BSP into their own applications, or simply study the BSP source code to gain a better understanding of the Z8F6482 Series of MCUs.

To learn more about the BSP API, refer to the [F6482 Series Board Support Package Reference Manual (RM0064)](#).

Supported Operating Systems

The F6482 Series Development Board supports the following operating systems:

- Microsoft Windows 8 (32-bit/64-bit)
- Microsoft Windows 7 (32-bit/64-bit)
- Microsoft Windows Vista (32-bit/64-bit)
- Microsoft Windows XP

Download and Install the ZDS II Software and Documentation

Observe the following steps to install your ZDS II software and documentation.

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> ➤ **Note:** If you have already installed ZDS II – Z8 Encore! <version> and have downloaded the software and documentation by following the procedure on the paper insert in your kit (FL0160), you're ready for Appendix B. Installing the USB SmartCable Driver on page 36.

1. Prior to connecting the F6482 Series Development Board to your development PC, download ZDS II for Z8 Encore! v5.2.2 (or later) from the Downloadable Software category in the Zilog Store; see Figure 2.
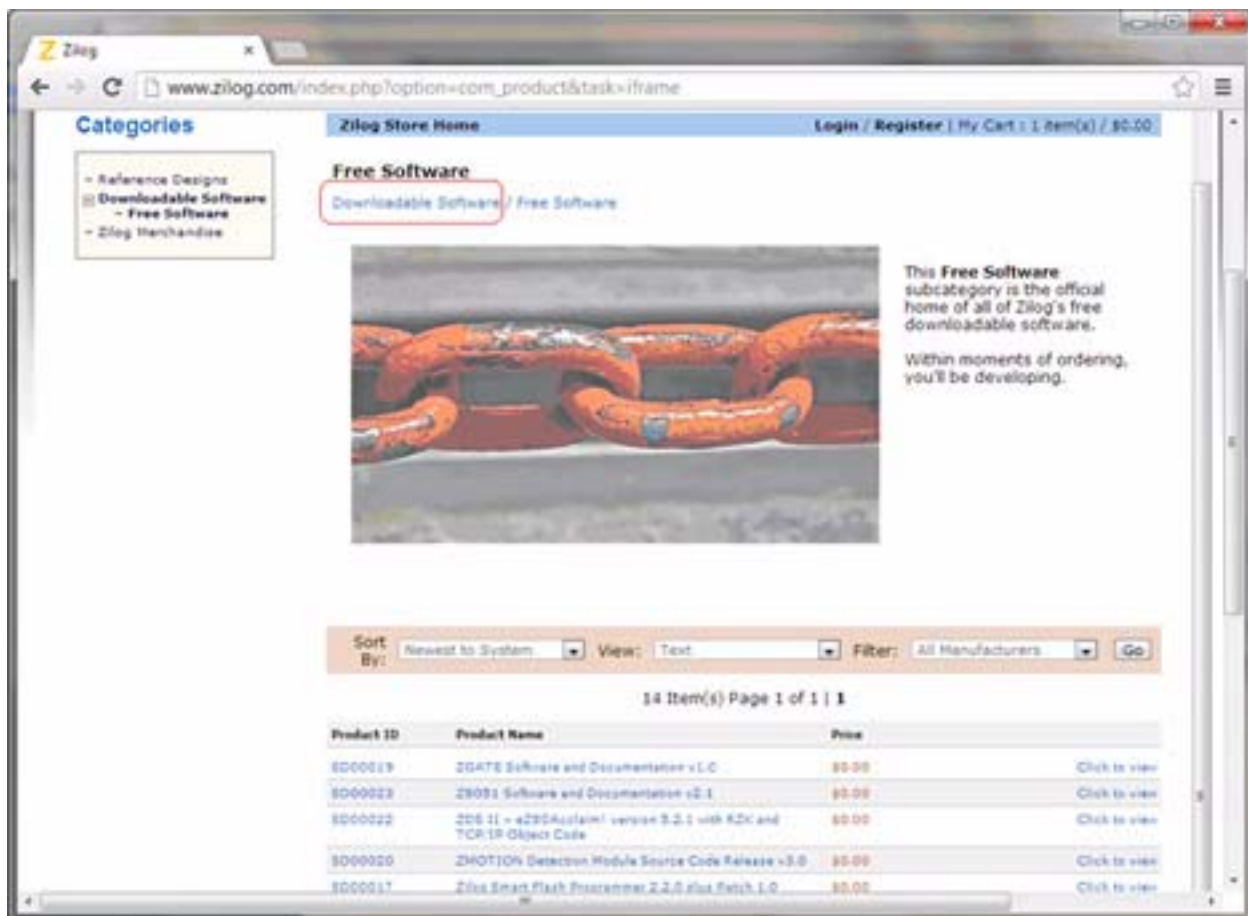
Figure 2. The Downloadable Software category in the Zilog Store

2. When your download is complete, double-click the installation file named `ZDS2_Z8Encore!_<version>.exe`, and follow the on-screen instructions.

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Connect the F6482 Series Development Board to your PC

Observe the following procedure to connect the F6482 Series Development Board to your PC.

⚠️ **Caution:** Disconnect or turn off the power to the F6482 Series Development Board before connecting or disconnecting the USB SmartCable.

1. Ensure that the following F6482 Series Development board default jumper settings are configured (see Table 5 on page 31 for reference):

   J1 IN

   J2 OUT

   J9 IN

   J19 OUT

   J21 1-2 IN

   J21 5-6 IN

   J23 1-2 IN

2. Connect one end of the 6-circuit ribbon cable provided in your Kit to the USB SmartCable unit, ensuring that the ribbon's male connector is aligned correctly with the female connector on the unit, as indicated by the red stripe in Figure 3.

Figure 3. Connecting the 6-Circuit Ribbon Cable to the USB SmartCable

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3. Connect the other end of the ribbon cable to Debug Connector J16 on the Development Board. Ensure that Pin 1 on the ribbon cable is aligned with Pin 1 on the target connector, as highlighted in Figure 4.
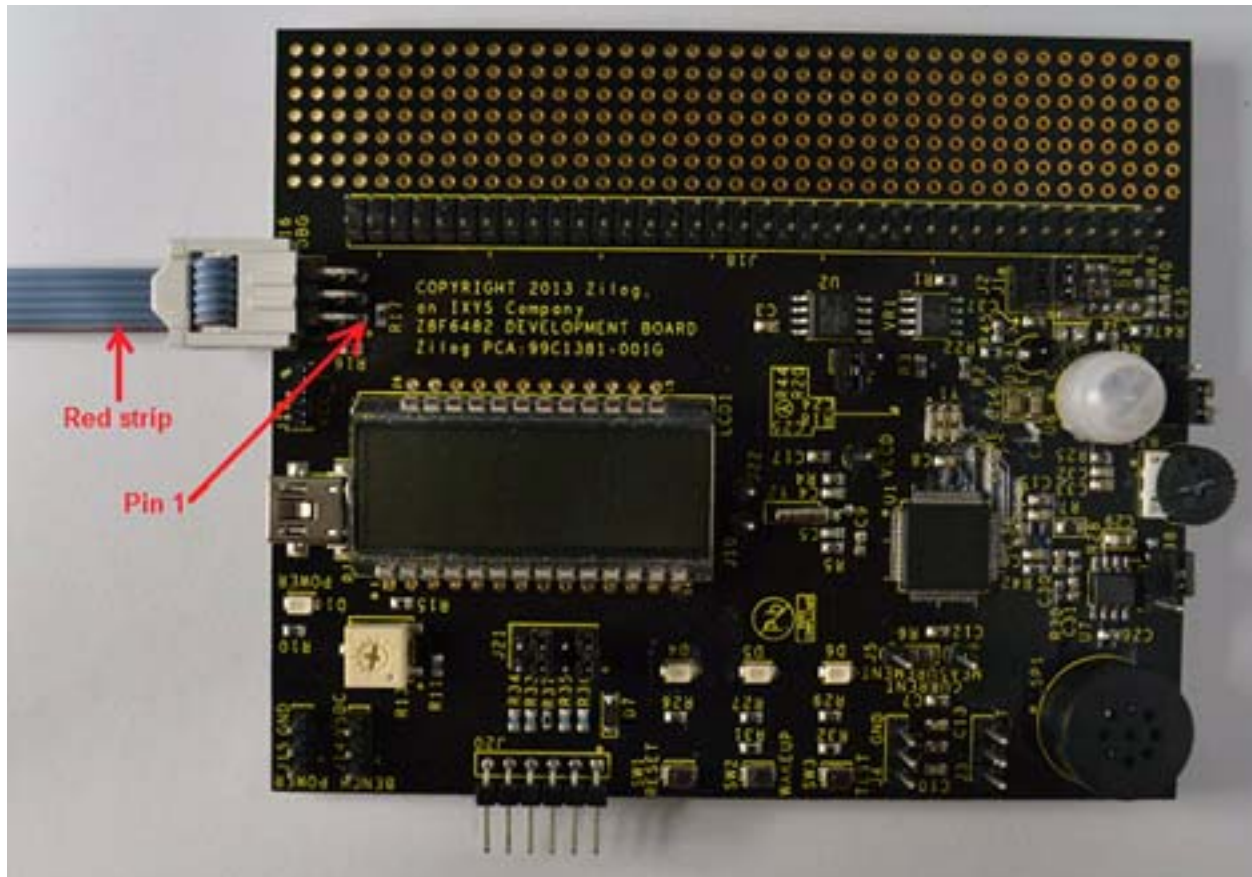

Figure 4. Debug Connector J16

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4. With the USB A (male) to Mini-B cable, connect Port P1 on the F6482 Series Development Board to a USB port on the development PC to apply power to the Development Board, as highlighted in Figure 5.
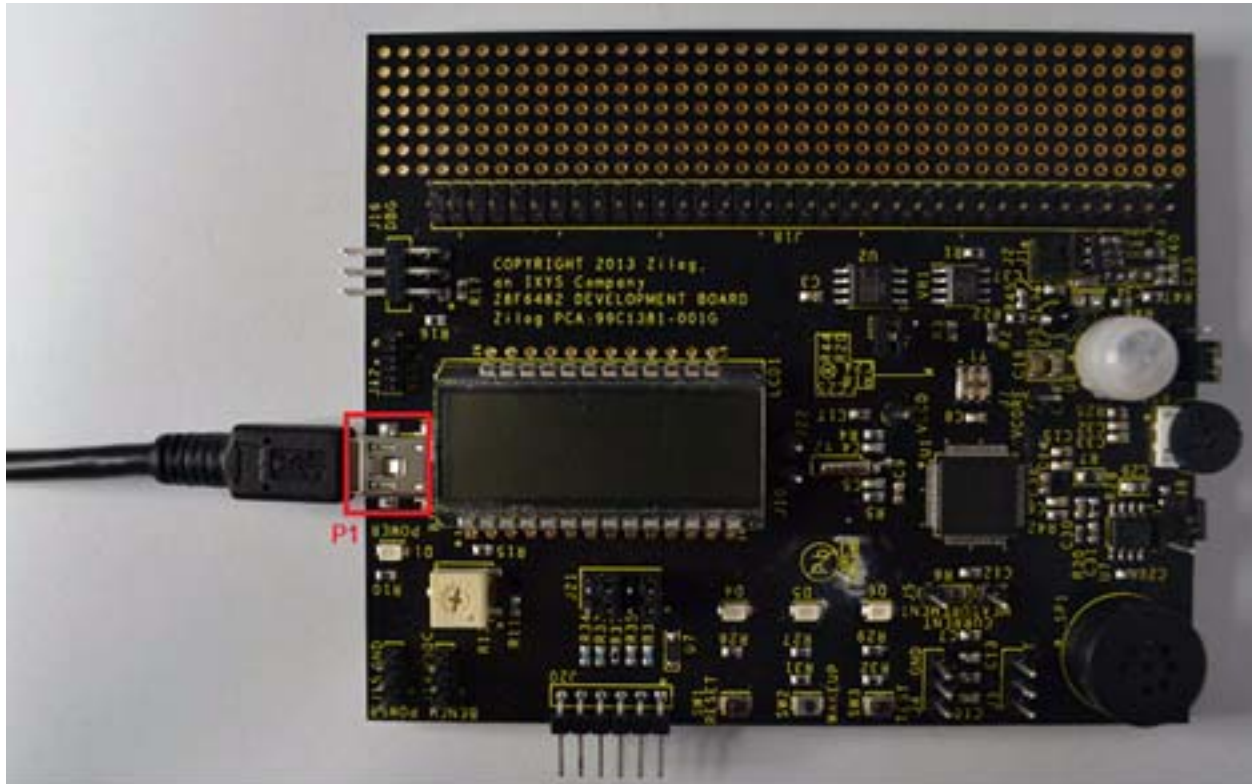
Figure 5. Power Supply Port P1 Connector

Start the Z8F6482 Demonstration Program

The F6482 Series Development Kit includes a sample program that demonstrates a blinking LED application. An optional terminal emulation program and a 3rd Party USB to TTL Serial converter (not supplied) maybe used and must be configured for 57600-8-N-1 with no flow control, as described in the HyperTerminal Configuration section on page 12. To get started with the Z8F6482 demonstration, observe the following procedure.

1. Launch ZDSII by navigating from the Windows Start menu to **Programs → Zilog ZDSII – Z8 Encore! <version> → ZDSII – Z8 Encore! <version>**.

2. From the File menu in ZDSII, select **Open Project** as shown in Figure 6, and navigate via the following filepath.

    <ZDS Install>\samples\XP_F6482\XP_F6482_LedBlink_C

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Figure 6. Open Project from the ZDSII File Menu

3. Select the `ledblink.zdsproj` project from within the XP_F6482_ledBlink_C folder and click **Open**, as shown in Figure 7. A list of source files will appear in the workspace panel.
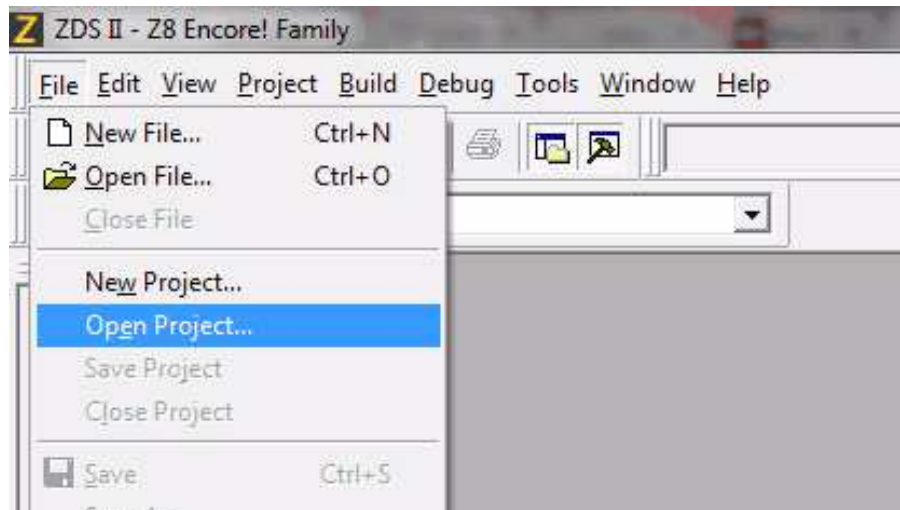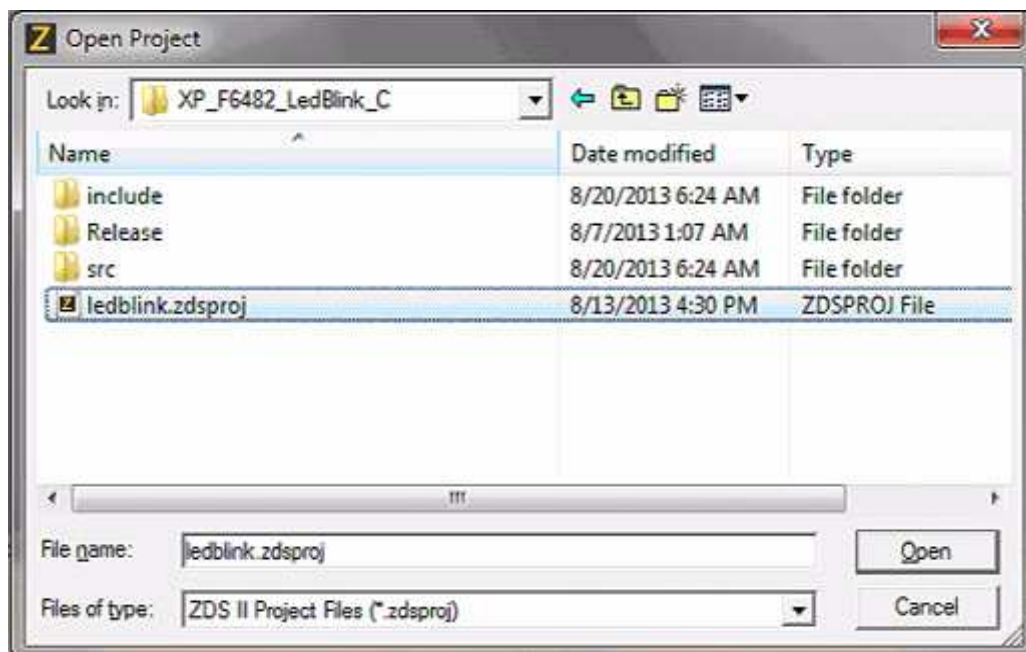

Figure 7. Select the ledblink.zdsproj Project

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4. From the **Build** menu, select **Set Active Configuration** to open the Select Configuration dialog box.

5. Select **Debug**, then click **OK** to close the Select Configuration dialog box.

6. From the Project menu in ZDSII, select **Settings** to open the Project Settings dialog box. In the Project Settings dialog box, click the **Debugger** tab.

7. On the Debugger page, select **Z8F64820100ZCOG** from the Target list, then select **USB SmartCable** from the Debug Tool drop-down menu, as shown in Figure 8.
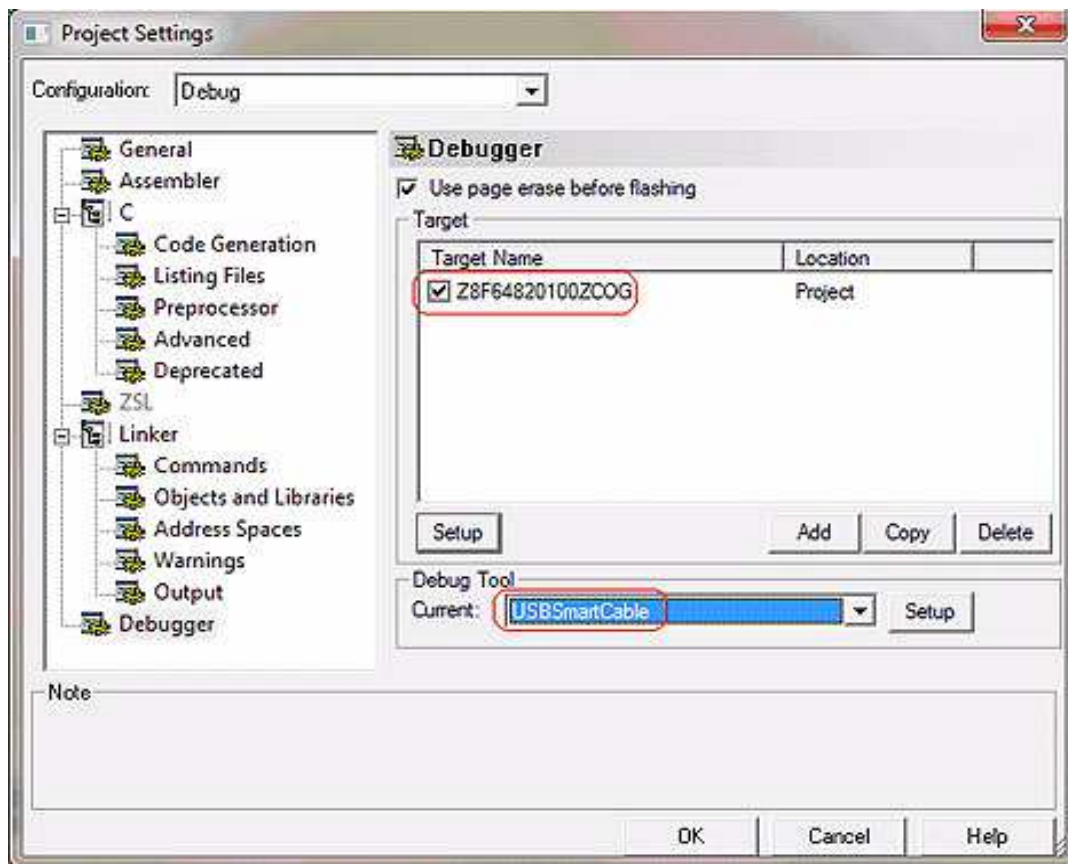
Figure 8. Select Z8F64820100ZCOG and USB SmartCable

8. Click **OK** to close the Project Settings dialog box.

9. If you are prompted to rebuild any affected files, click **Yes**. Otherwise, choose **Build** from the menu bar, then click **Rebuild All**.

10. To run the application, select **Go** from the Debug menu, as indicated in Figure 9. As a result, LEDs D4, D5, and D6 will blink in sequence.

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Figure 9. Select Go from the Debug Menu

11. After the application has started, console output should be visible in the terminal emulation program, as shown in Figures 10 and 11.
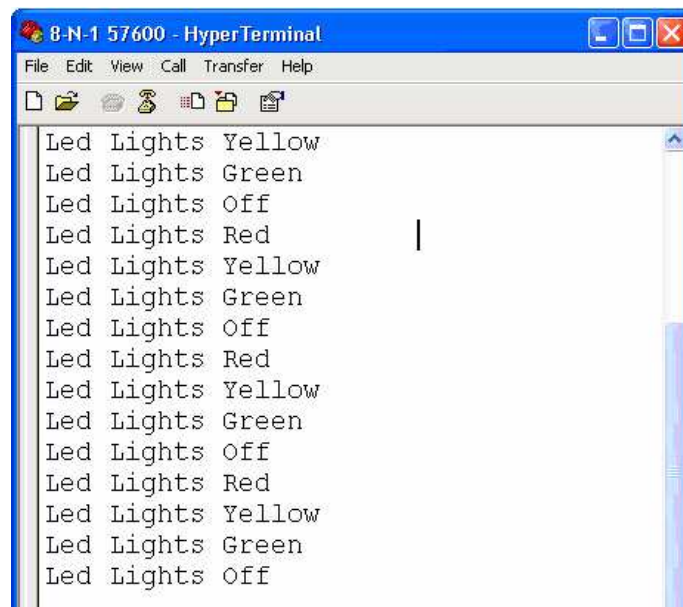
Figure 10. Console Output Using Hyperterminal (Windows XP)

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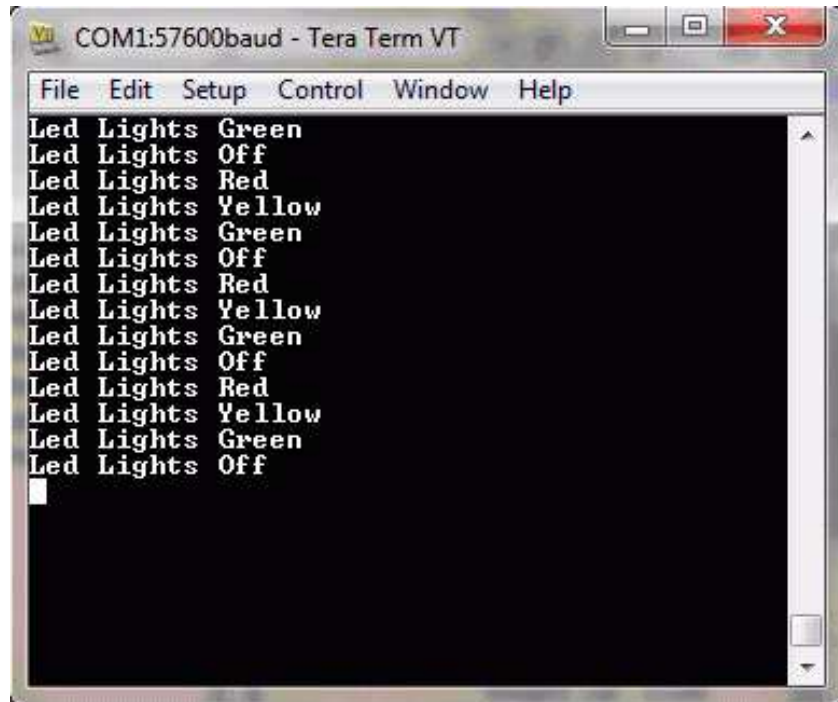
Figure 11. Console Output Using Tera Term (Windows 7)

HyperTerminal Configuration

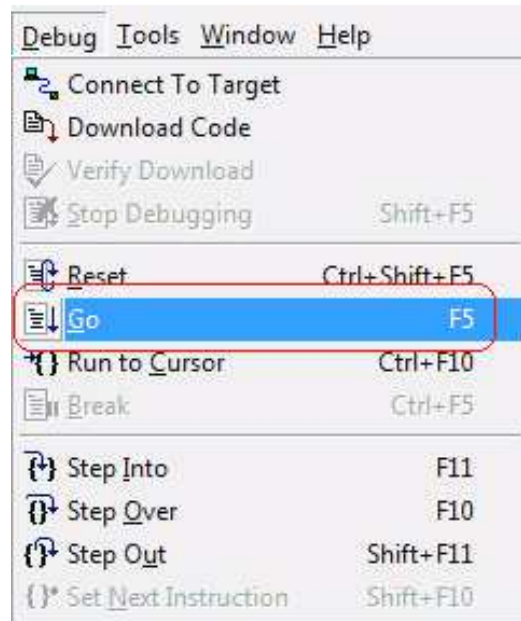A communications program such as HyperTerminal can be used on Windows XP systems to view messages from the F6482 Series Development Board. The following procedure examines how to configure HyperTerminal for the Z8F6482 demonstration project.

> **Note:** The HyperTerminal application is not available in Windows Vista and Windows 7 systems. If you are using either of these operating systems, consider using/installing different communication software such as Tera Term; see

1. Connect a 3rd Party USB to TTL Serial converter to J20 on the Development Board using the connections shown in Table 2.

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Table 2. USB to TTL Serial Converter Connections

Z8F6482 Board	USB to TTL Serial Converter
J20-1 VCC	5V
J20-4 RXD	TXD
J20-5 TXD	RXD
J20-6 GND	GND

2. Connect the other end to your PC.

3. In HyperTerminal, choose **File Properties**; then, if your PC has a serial interface, select the COM port assigned to your serial port. If you do not have a serial port on your PC, use a USB-to-serial adapter (not included in the kit).

4. From the Windows Control Panel, navigate via the **Device Manager** to **Ports (COM & LPT)** to determine the correct COM port assigned to your adapter. Configure this port to reflect the following settings:
   – 57600 bps
   – 8 data bits
   – No parity
   – 1 stop bit
   – No flow control

5. In HyperTerminal, click the **Call** button to connect to the F6482 Series Development Board. When connected, you should be able to see the demonstration program menu shown in Figure 11.

F6482 Series Development Board

The purpose of the F6482 Series Development Kit is to provide a set of hardware and software tools for applications based on the Z8F6482 microcontroller. An image of the F6482 Series Development Board is shown in Figure 12; a block diagram is shown in Figure 13.

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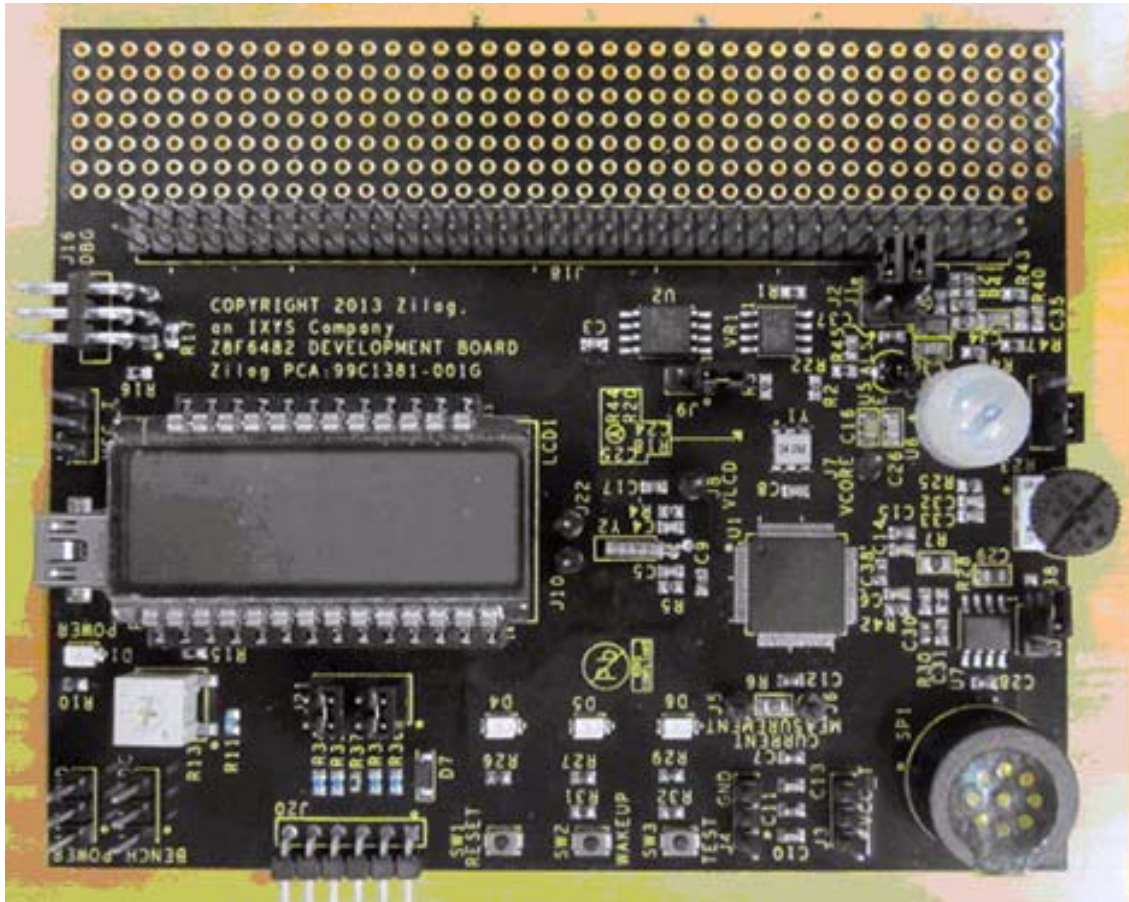
Figure 12. The F6482 Series Development Board

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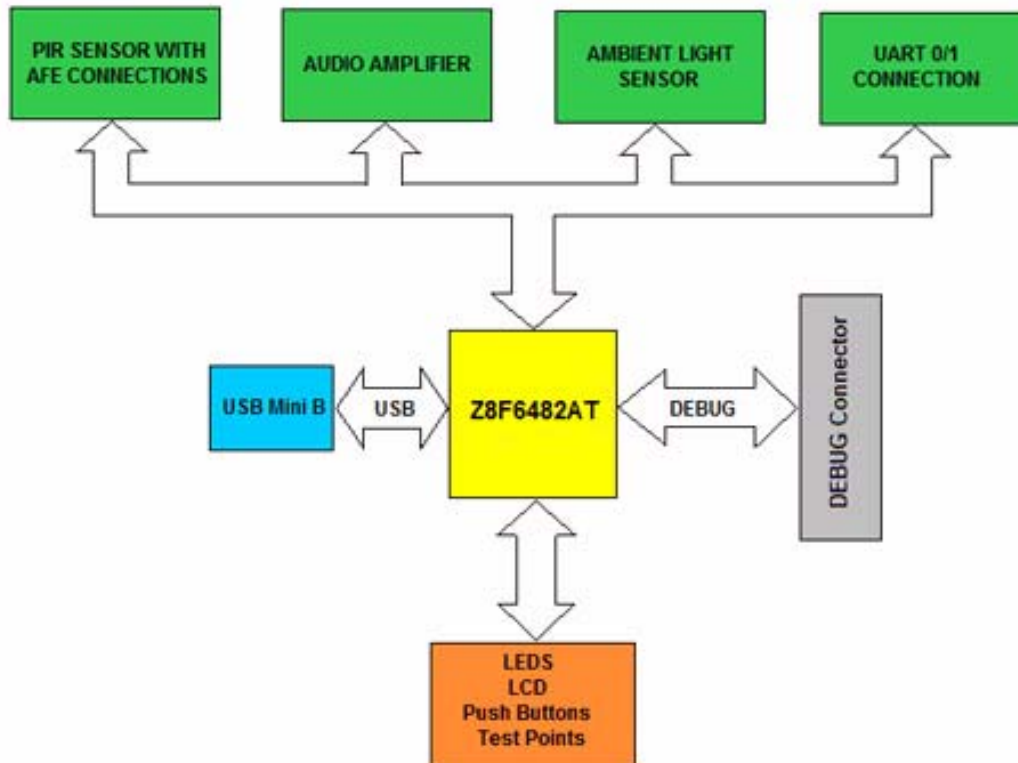
Figure 13. F6482 Series Development Kit Block Diagram

Power Sources

The Board features two power source options. It can be powered by connecting Port P1 (USB Mini-B) to the USB port of the development PC using the USB A-to-USB Mini-B cable included in the Kit. The other option is to connect an external 5 VDC source with at least 300–400 mA of current to J14 (5 VDC) and J15 (GND).

- USB power at P1
- External power across J14 and J15

Z8F6482 MCU Features

The Z8F6482 MCU is a member of Zilog's Z8 Encore! XP Family of microcontroller products. Key features include:

- 24 MHz eZ8 CPU core

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- 16 KB, 32 KB, 60 KB or 64 KB Flash memory with in-circuit programming capability

- 2 KB or 3.75 KB internal RAM

- 128 B Non-Volatile Data Storage (NVDS)

- Up to 17-channel, 12-bit Analog-to-Digital Converter (ADC) that can be configured for internal or external voltage reference and single-ended or differential inputs

- 12-bit Digital-to-Analog Converter (DAC)

- Integrated LCD driver with blinking and contrast control for up to 96 segments

- 128-bit Advanced Encryption Standard (AES) encryption/decryption hardware accelerator according to FIPS PUB 197

- Real-Time Clock (RTC) supporting both Counter and Clock modes

- On-chip temperature sensor

- Two on-chip analog comparators (32-pin and 64-pin with LCD packages contain only one)

- Two on-chip, low-power operational amplifiers (32-pin and 64-pin with LCD packages contain only one)

- 8-channel event system provides communication between peripherals for autonomous triggering

- Full-speed Universal Serial Bus (USB 2.0) device supporting eight endpoints with integrated USB PHY (not available on 64-pin package with LCD)

- Two full-duplex 9-bit UART ports with the support of Local Interconnect Network (LIN) and Digital Addressable Lighting Interface (DALI) protocols (32-pin and 64-pin with LCD packages contain only one)

- RS-485 Multidrop Mode up to 250 Kbit/sec (DMX support) integrated with UARTs

- Two Enhanced Serial Peripheral Interface (ESPI) controllers (32-pin and 44-pin packages contain only one)

- I^{2}C controller which supports Master/Slave modes

- Four-channel DMA controller

- Three enhanced 16-bit timers with Capture, Compare, and PWM capability

- Two additional basic 16-bit timers with interrupts (shared as UART Baud Rate Generator)

- 16-bit multi-channel timer which supports four Capture/Compare/PWM modules (not available on 32-pin and 64-pin with LCD packages)

- Watchdog Timer (WDT)

- 26 to 67 General-Purpose Input/Output (GPIO) pins, depending upon package

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- Up to 41 interrupt sources with up to 30 interrupt vectors

- On-Chip Debugger (OCD)

- Power-On Reset (POR) and Voltage Brown-Out (VBO) protection

- Built-in Low-Voltage Detection (LVD) with programmable voltage threshold

- Low Frequency Crystal Oscillator (LFXO) operating at 32.768 kHz with low power consumption

- Internal clock sources and clock multiplication, including an Internal Precision Oscillator (IPO), Digitally Controlled Oscillator (DCO), Watchdog Timer Oscillator (WTO), Frequency Locked Loop (FLL) and Phase Locked Loop (PLL)

- High Frequency Crystal Oscillator (HFXO) operating in the 1–25 MHz range

- Wide 1.8 V–3.6 V operating voltage range

- 32-, 44-, 64-, and 80-pin packages

- –40°C to +85°C (extended) operating temperature range

To learn more, refer to the F6482 Series Product Specification (PS0294).

SBLCDA4 LCD

The seven-segment LCD panel used at LCD1 on the F6482 Series Development Board is an SBLCDA4 device manufactured by Softbaugh. The display footprint and pin labels for this device are shown in Figure 14.