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Contact us

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zilog
Embedded in Life
An IXYS Company

Z8051™ Family of 8-Bit Microcontrollers

Z51F0410 Evaluation Kit

User Manual

UM025704-0413

Z8051
DESIGN WITH FREEDOM

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Revision History

Each instance in the Revision History table below reflects a change to this document from its previous version.

Date	Revision Level	Description	Page
Apr 2013	04	Updated schematic diagrams.	37, 38
Dec 2012	03	Corrected Figures 5 and 7.	7,9
Dec 2012	02	Corrected formatting issue in Table 2.	16
Nov 2012	01	Original issue.	All

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Introduction

This manual describes how to set up Zilog's Z51F0410 Evaluation Kit (Zilog part number Z51F0410000KITG) and use it to evaluate your Z8051-based designs and applications.

The Kit features a small Evaluation Board consisting of two LEDs, two pushbuttons, port pin headers and a USB port. The Board features the Z51F0410 MCU in a 10-pin SSOP package, plus a DBG connector to connect the board to a host development PC using the Z8051 USB On-Chip Debugger (OCD) cable. For more details about the Z51F0410 MCU, please refer to the Z51F0410 Product Specification (PS0295).

This document guides you through the following tasks:

- Install the Z8051 OCD Software and Documentation – see page 5
- Configure the Z8051 OCD and Z51F0410 Evaluation Board – see page 15
- Build and Run the Z51F0410 Demo Project – see page 18

Figure 1 displays an image of the Z51F0410 Evaluation Kit.

Figure 1. The Z51F0410 Evaluation Kit

Kit Contents

Table 1 lists the contents of the Z51F0410 Evaluation Kit.

Table 1. Z51F0410000KITG Contents

Item	Description	Quantity
1	Z51F0410 Evaluation Board	1
2	Z8051 USB On-Chip Debugger (OCD)	1
3	Z8051 OCD Target Cable (10ckt)	1
4	USB Cable: A (male) to Mini-B	1
5	Z51F0410 Evaluation Kit Insert (FL0148)	1

Figure 2 displays an image of the Z51F0410 Evaluation Board.

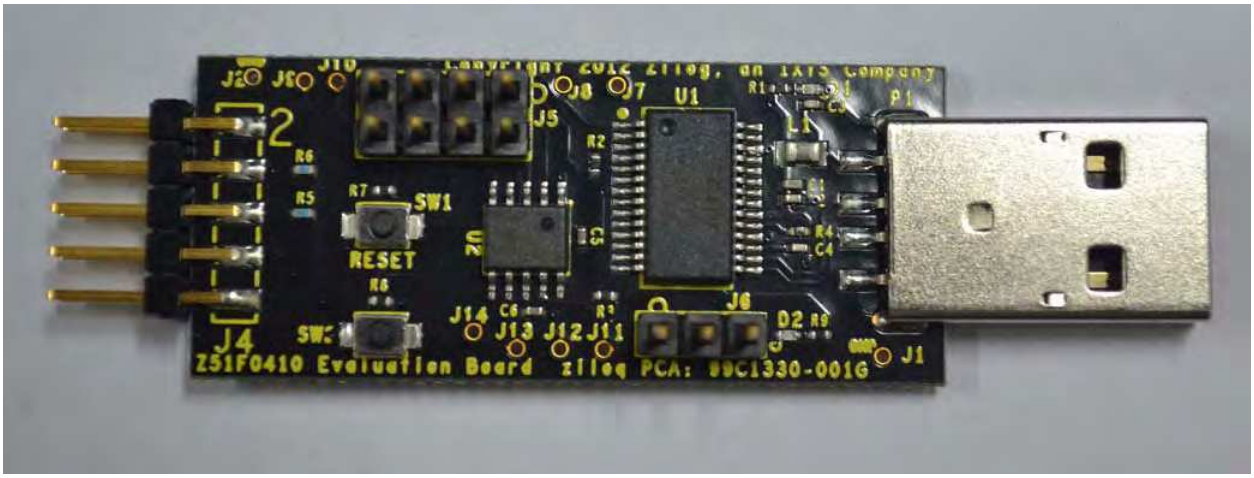

Figure 2. Z51F0410 Evaluation Board

Supported Operating Systems

The Z51F0410 Evaluation Board and the Z8051 On-Chip Debugger support the following operating systems:

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

Z51F0410 Evaluation Board Block Diagram

Figure 3 displays a block diagram of the Z51F0410 Evaluation Board.

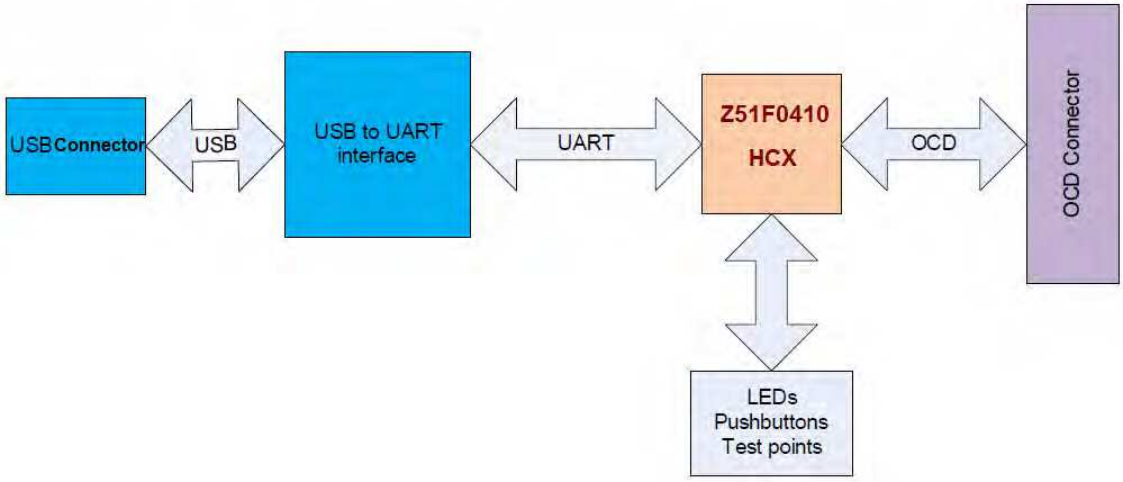

Figure 3. Block Diagram of the Z51F0410 Evaluation Board

Z51F0410 Evaluation Board Description

The Z51F0410 Evaluation Board contains the following components:

- Z51F0410: U2, 10-pin SSOP chip
- 1 green LED (D2) is connected to the GPIO pin of the Z51F0410 MCU
- 1 green LED (D1) to indicate USB power
- 2 pushbuttons:
  - SW1: RESET
  - SW2 is connected to the GPIO pin on the Z51F0410 MCU

- USB connector: P1
- OCD connector: J4, J3
- USB to UART interface: U1
- USB interface provides power and communication to the Board

- Test points J1 and J2 are connected to Ground; J7–J14 are connected to GPIO pin of U2

When the Board is connected to the USB port of the host PC, the green D1 LED will illuminate (turn ON).

Schematic diagrams of the Z51F0410 Evaluation Board are presented on pages 37 through 38 of this document.

The physical dimensions of the Board are: 1.75" x 0.75" (44.4mm x 19mm).

Install the Z8051 OCD Software and Documentation

The Z8051 On-Chip Debugger (OCD) interface is the interface by which your PC will communicate with the Z51F0410 MCU to download and execute code. In addition to the OCD, software such as development tools and sample applications will be installed.

Supported Operating Systems

The Software and Documentation for this reference design supports Microsoft Windows 7 (32-bit/64-bit), Windows Vista (32-bit/64-bit) and Windows XP.

Note: If you have already downloaded the Z8051 software and documentation from the Zilog Store and installed it following the procedure on the paper insert in your kit (FL0148), skip this section and proceed to the Z8051 OCD Driver Installation section, below.

Observe the following procedure to install the Z8051 On-Chip Debugger software and documentation on your computer.

1. Ensure that the OCD interface hardware is not connected to your PC.
2. In a web browser, download the Z8051 Software and Documentation v2.1 or later from the Zilog Store. When the download is complete, unzip the file to your hard drive and double-click to launch the installation file named `Z8051_<version>.exe`.
3. From the main menu, select **Go to the installation page**, then select one of the following options:
   - If you do not plan to use the Keil µVision4 IDE, select **Zilog OCD + Samples + SDCC**.
   - If you will be using the Keil µVision4 IDE, select **Zilog OCD + Samples + Keil µVision4 IDE Debugging Support**.
   - If you only plan to use the programming features and do not plan to perform any development, select **Zilog OCD**.
   - To install all files, select **All of the above**.

Note: In this filename, `<version_number>` refers to the version number of the OCD Software and Documentation release. For example, this version number may be `2.1`.

4. Follow the on-screen instructions to complete the OCD software installation.

Z8051 OCD Driver Installation

The driver programs for the Z8051 On-Chip Debugger are copied during the software and documentation installation. In the following procedure for PCs running Windows 7 32- and 64-bit operating systems, ensure that the target side of the OCD will remain unconnected while you install these drivers.

Note: If you are running Windows Vista, see Appendix B. on page 39 to install your device drivers. If you are running Windows XP, see Appendix C. on page 42.

1. Connect the OCD hardware to the USB port of your PC by connecting the A (male) end of the USB A (male)-to-Mini-B cable with the host PC's USB port. Connect the Mini-B end to the OCD device.
2. After the PC detects the new hardware, it will display the *Installing device driver software* dialog shown in Figure 4.

Figure 4. Install Device Driver Dialog, Windows 7

IMPORTANT NOTE: If you should encounter the scenarios presented in Figures 8 or 9, right-click your mouse on **ZILOG OCD I/F** (highlighted in Figure 8) or **Unknown device** (highlighted in Figure 9) and select **Update Driver Software...**

3. Select **Browse my computer for driver software (advanced)** to display the dialog shown in Figure 5, which prompts you to key in or browse for the location of the `.inf` file. Depending on the type of computer you use (32- bit or 64-bit), use the **Browse** button to navigate to one of the following paths, then click the **Next** button.
   – On 32-bit machines, use the following path:

     <Z8051 Installation>\Z8051_<version_number>\device drivers\OCD USB\x32

– On 64-bit machines, use the following path:
<Z8051 Installation>\Z8051_<version_number>\device drivers\OCD USB\x64

Note: In the above filepaths, `<Z8051 Installation>` refers to `C:\Program Files\zilog`.

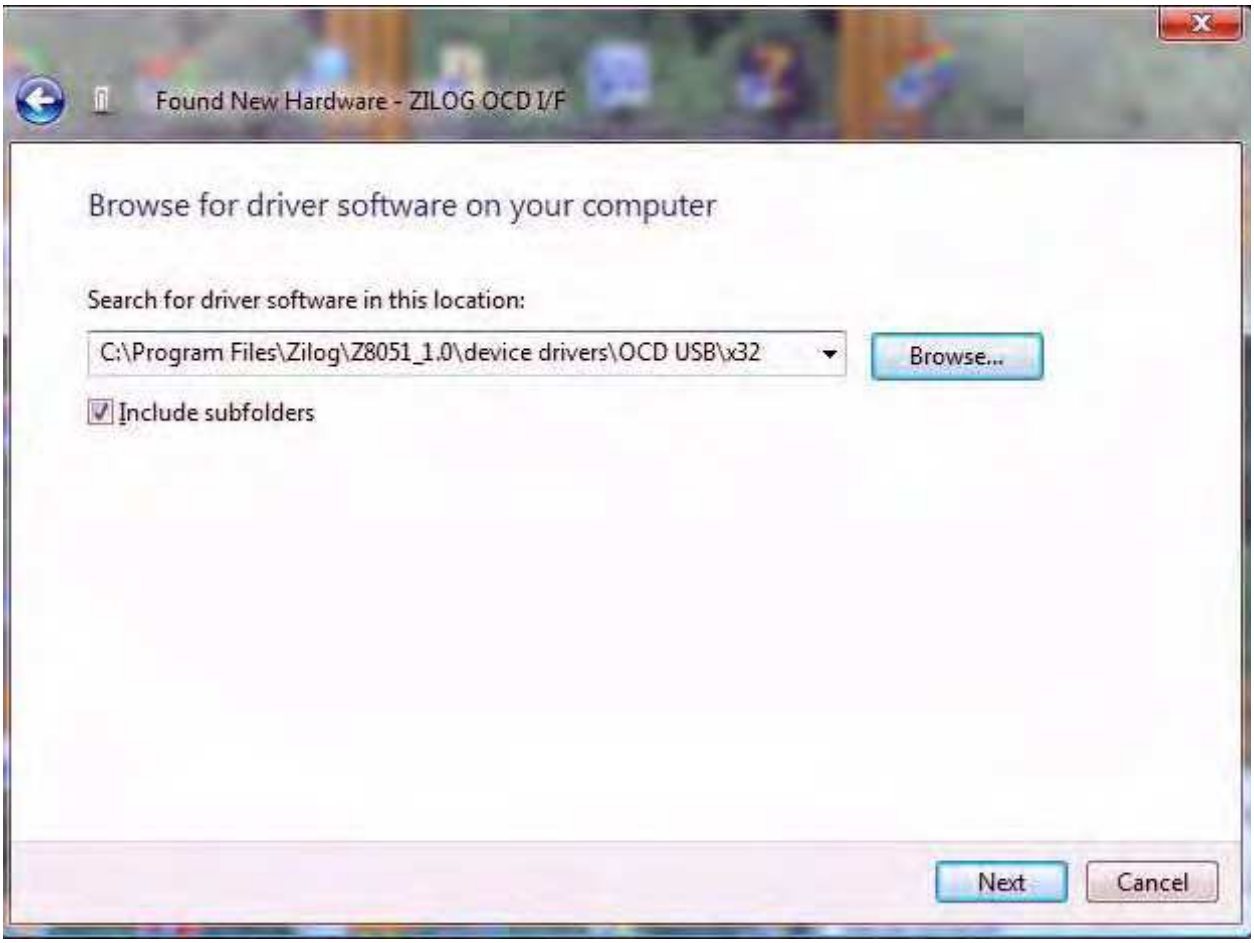

Figure 5. Browse For Driver Dialog, Windows Vista

4. When Windows prompts you whether to install or not install, as shown in Figure 6, click **Install this driver software anyway** and wait until the installation is completed (Windows may prompt you more than once).

Figure 6. Can't Verify Publisher Dialog, Windows Vista

5. When the installation is complete, the screen shown in Figure 7 will appear. Click **Close** to exit the OCD driver installation.

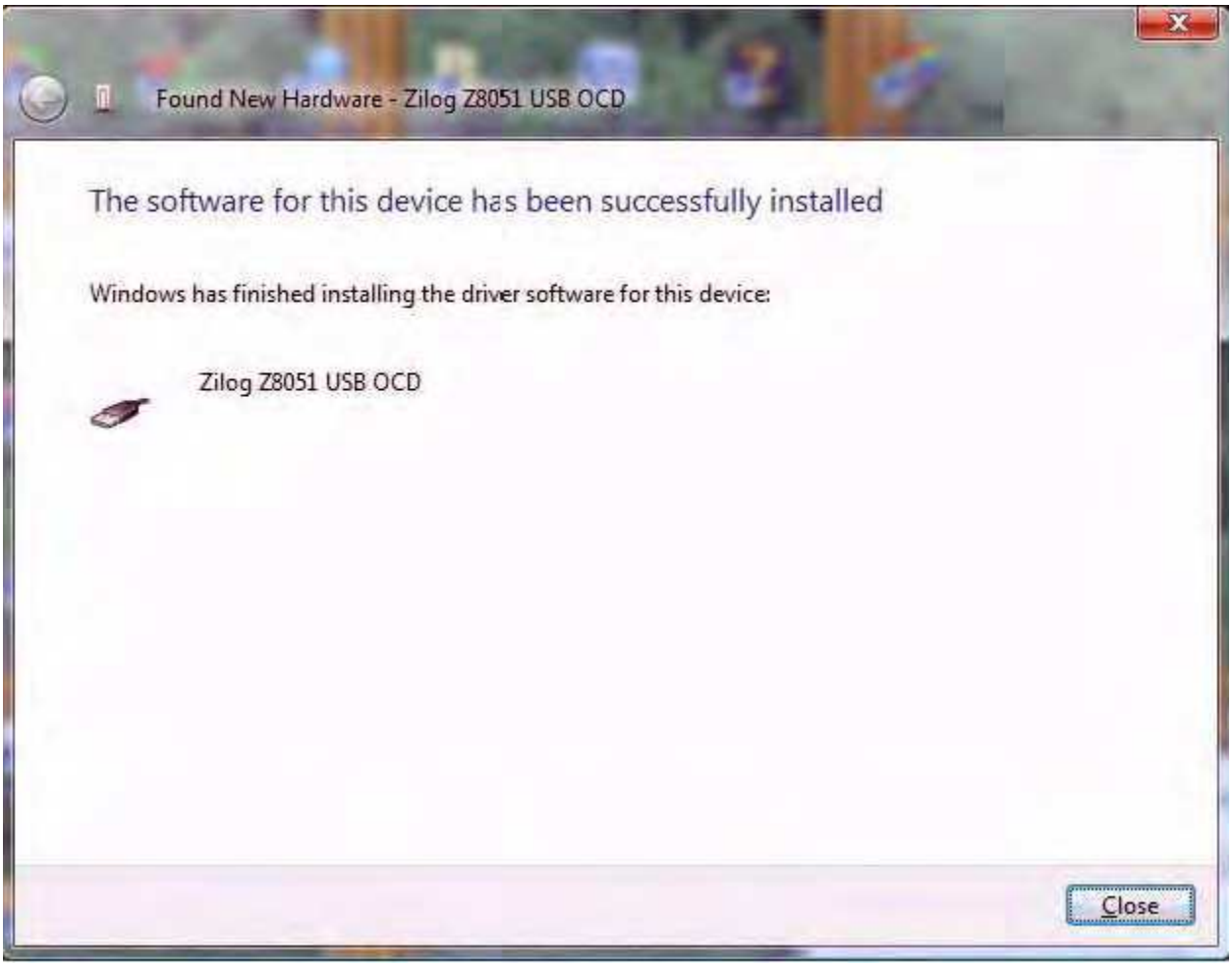

Figure 7. Successfully Installed Dialog, Windows Vista

Note: On some installations, the Found New Hardware screen shown in Figure 7 may also display the text string, `Zilog Z8051 USB OCD - No Firmware`. This occurrence is normal and can be disregarded.

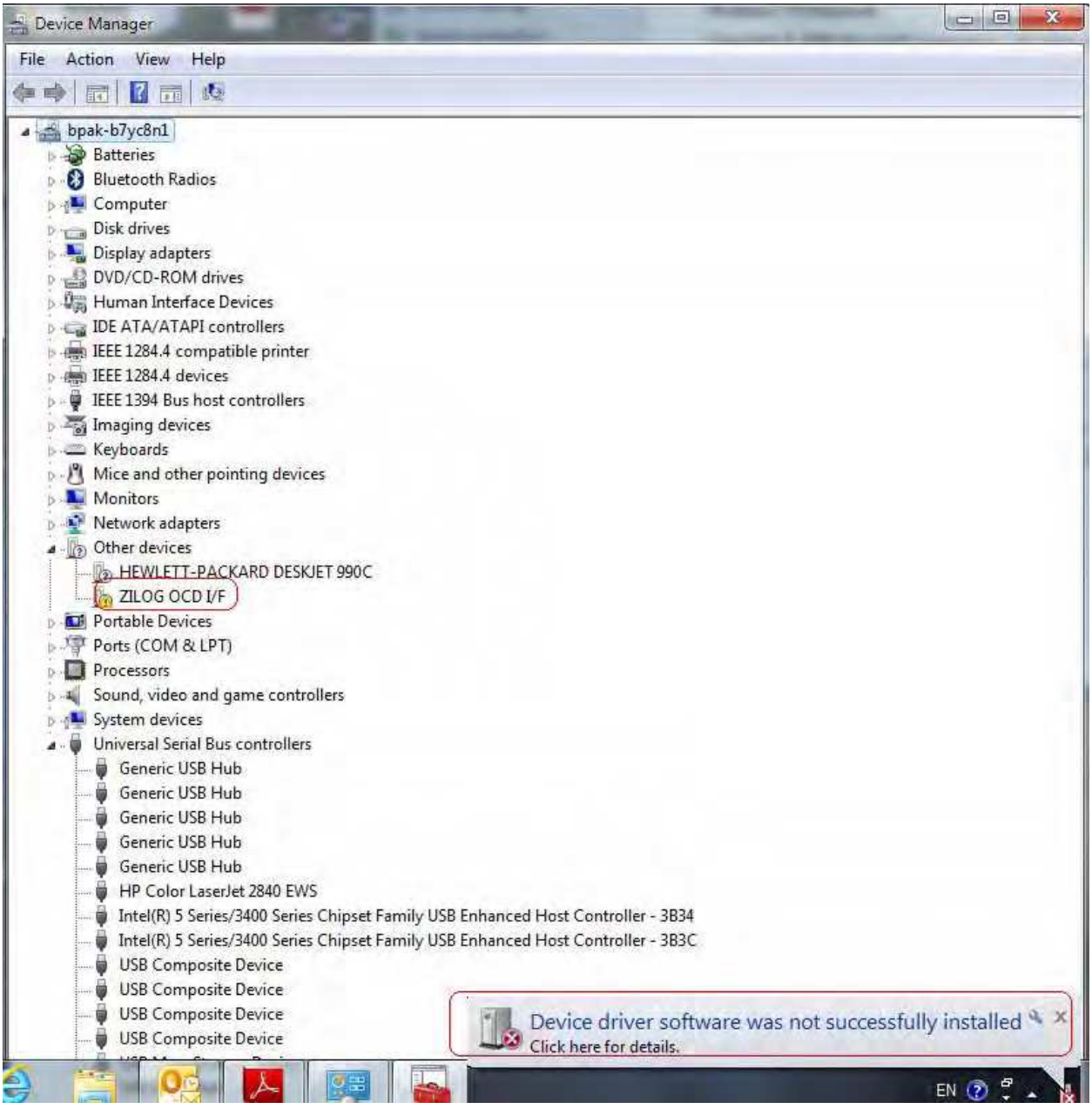

Figure 8. Unsuccessful Installation, Scenario 1

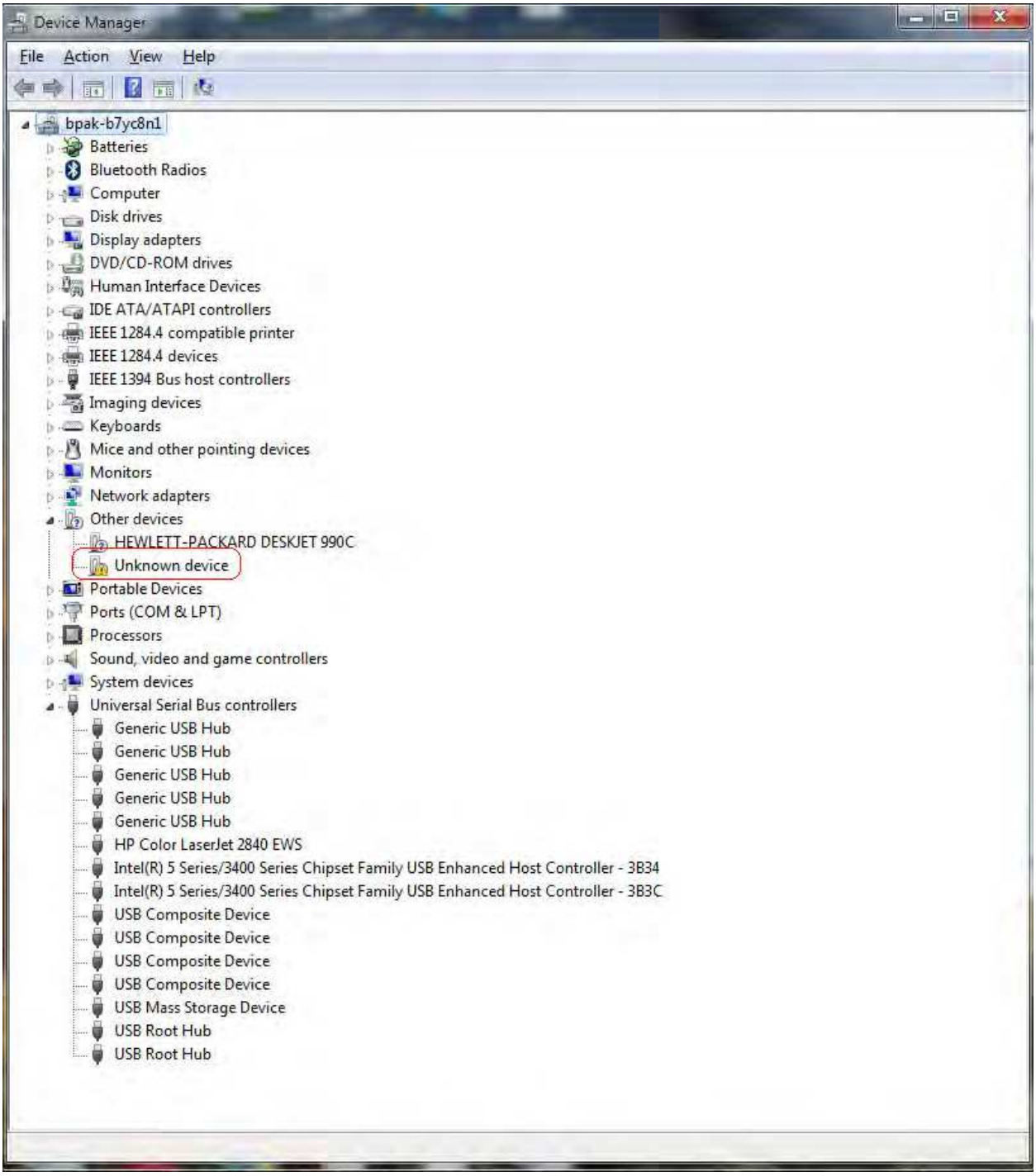

Figure 9. Unsuccessful Installation, Scenario 2

6. If *Zilog Z8051 USB OCD* appears in the Device Manager (as highlighted in Figure 10), the OCD driver software has been successfully installed.

Figure 10. Device Manager Dialog, Windows 7

FTDI USB-to-UART Driver Installation

An FTDI USB-to-UART driver is required to allow your PC to communicate through its USB port to the on-chip UART of the Z51F0410 MCU. Observe the following procedure to perform these connections.

1. Ensure that the Z51F0410 Evaluation Board's P1 connector is not plugged in to the host PC's USB port.
2. Navigate to the following filepath and double-click the `CDM20802_setup.exe` file to begin the driver installation.

   <Z8051 Installation>\Z8051_*<version_number>*\device drivers\FTDI Uart

3. The installation process will begin and you should observe output similar to the following messages on the screen of your PC:

```
32-bit OS detected
<installation path>\dpinstx86.exe
Installation driver
FTDI CDM driver installation process completed.
```

Note: The above message may appear for a short time, but will then disappear from your window. This occurrence is normal.

4. When the installation is complete, plug in the Board's P1 connector into the USB port of your PC. Refer to Figure 13 on page 16 for guidance.
5. If the driver installation was successful, the *Ports (COM & LPT)* section of the Device Manager will display *USB Serial Port (COMx)* or similar message, as highlighted in Figure 11.

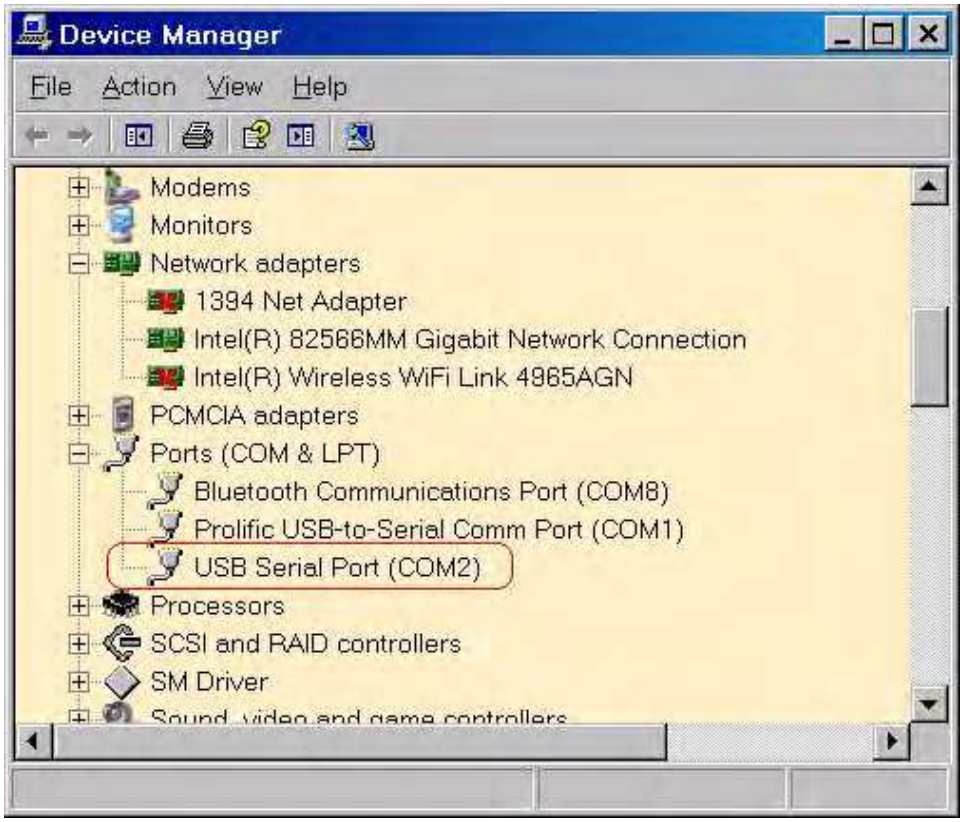

Figure 11. A Successful USB-to-UART Driver Installation

Note:
1. To launch the Device Manager on Windows 7 systems, launch the Start menu, enter *device manager* in the **Search programs and files** field, and press the Enter key.
2. To open the Device manager on earlier Windows systems, navigate via the following path:

   Start → Control Panel → System → Hardware → Device Manager → Ports (COM& LPT)

Configure the Z8051 OCD and Z51F0410 Evaluation Board

Observe the following procedure to set up and configure the Z8051 On-Chip Debugger and the Z51F0410 Board.

Caution: Steps number 1 to 4 present the power-up sequence. Carefully follow these steps to avoid encountering an improper connection or disconnection.

1. Connect the Z8051 On-Chip Debugger (OCD) to the host PC's USB port.
2. Connect one end of the 10-circuit cable to the Z8051 OCD.
3. Connect the other end of the 10-circuit cable connector to the Z51F0410 Board's J4 and J3 connectors. Pin 1 of the cable connector is indicated by a red stripe, as shown in Figure 12.

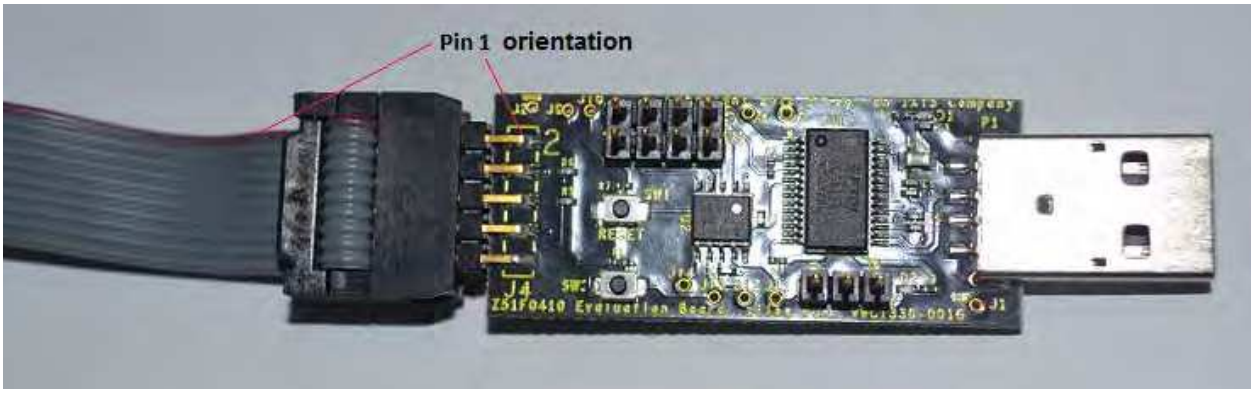

Figure 12. Connecting the 10-Circuit Cable to the Board

4. Set the jumpers as indicated in Table 2.

Table 2. Jumper Settings

Jumper	Description	State	Function	Factory Setting
J5	TxD	1–2	TxD_0	IN
		3–4	TxD_1	
	RxD	5–6	RxD_0	IN
		7–8	RxD_1	
J6	D2 LED	1–2	DSDA	IN
		2–3	RxD_1	

5. Connect P1 on the Z51F0410 Board to the host PC's USB port to apply power to the Board, as shown in Figure 13.

Notes: 1. Upon applying power, the green LED (D1) will be illuminated.

2. When recycling power, Zilog recommends waiting for at least 5 seconds before reapplying power to allow a proper power-on reset.

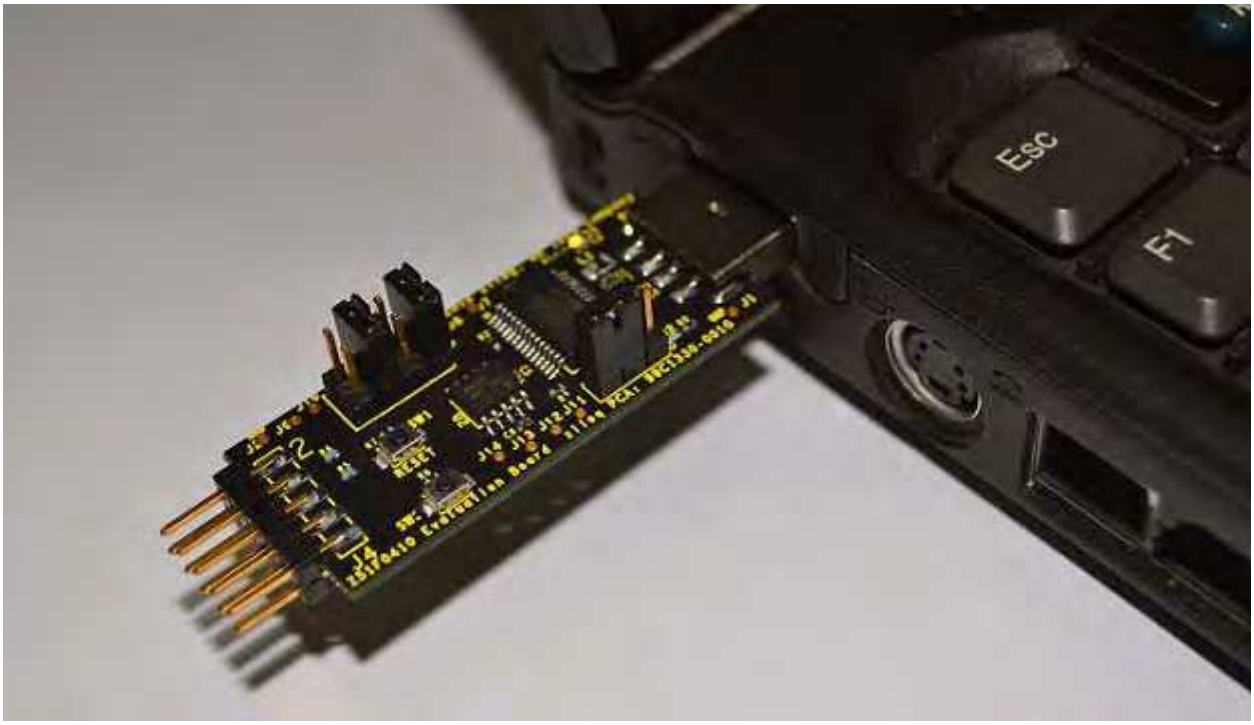

Figure 13. Connecting the Evaluation Board's P1 Port to the USB Port

Figure 14 shows an example of a completed hardware and software setup.

Figure 14. An Example Setup

Build and Run the Z51F0410 Demo Project

Observe the following procedure to build and run the Z51F0410 demo project.

Note: If you plan to use the Keil µVision IDE, please skip to the Using the Keil µVision IDE on a Demo Project section on page 25.

1. Browse to the following location and double-click the `build_sdcc.bat` batch file to build the project:

   <Z8051 Installation>\Z8051_*<version_number>*\samples\Z51F0410\Demo\build_sdcc.bat

Note: Refer to the Z8051 Tools Product User Guide (PUG0033) for additional information about these project files and Small Device C Compiler (SDCC) development tools.

2. When the build is complete, the command window will prompt the user to press any key to continue. Proceed by pressing any key on your keyboard; as a result, a hex file for the demo will be created in the following path:

   <Z8051 Installation>\Z8051_*<version_number>*\samples\Z51F0410\Demo\demo.hex

3. Set up the OCD and Evaluation Board. If you have not already configured these items, please return to the Configure the Z8051 OCD and Z51F0410 Evaluation Board section on page 15.
4. Run the Z8051 OCD software. From the **Start** menu, navigate to **All Programs → Zilog Z8051 SW and Docs <version_number> → Zilog Z8051 OCD <version_number>**. Once launched, the program will display *Connected*, as shown in Figure 15.

Note: If you encounter a message that says `Disconnected`, return to the Configure the Z8051 OCD and Z51F0410 Evaluation Board section on page 15 to configure the proper power-up sequence. If the problem persists, Zilog recommends that you review the Z8051 OCD Driver Installation and FTDI USB-to-UART Driver Installation sections.