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***Z8051™ Family of 8-Bit Microcontrollers***

# **Z51F3220 Development Kit**

**User Manual**

UM024307-1112





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

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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
Nov 2012	07	Corrected pin values in Default Jumper Settings table.	<a href="#">6</a>
Sep 2012	06	Replaced incorrect screen in Figure 27.	<a href="#">31</a>
Sep 2012	05	Updates for Z8051 Installation Software release 2.0.	<a href="#">20</a> , <a href="#">26</a> , <a href="#">33</a> , <a href="#">45–46</a>
Apr 2012	04	Updated for improved usability.	All
Mar 2012	03	Added a G to end of part number to indicate RoHS compliance; added Figure 21.	<a href="#">25</a>
Mar 2012	02	Corrected filepaths in the Build and Run the Z51F3220 Demo Project section.	<a href="#">20</a>
Feb 2012	01	Original issue.	All

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# Introduction

This manual describes how to set up Zilog's Z51F3220 Development Kit (Zilog part number Z51F3220000ZCOG) and use it to evaluate your Z8051-based designs and applications.

The Kit features a development board consisting of five LEDs, five pushbuttons, a buzzer, four 7-segment LCD digits, port pin headers and a UART-to-USB port. The Board features the Z51F3220 MCU in a 44-pin MQFP 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 Z51F3220 MCU, please refer to the [Z51F3220 Product Specification \(PS0299\)](#).

This document guides you through the following tasks:

- [Install the Z8051 OCD Software and Documentation](#) – see page 7
- [Configure the Z8051 OCD and Z51F3220 Development Board](#) – see page 17
- [Build and Run the Z51F3220 Demo Project](#) – see page 20

Figure 1 displays an image of the Z51F3220 Development Kit.



Figure 1. The Z51F3220 Development Kit

## Kit Contents

Table 1 lists the contents of the Z51F3220 Development Kit.

Table 1. Z51F3220000ZCOGG Contents

Item	Description	Quantity
1	Z51F3220 Development 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	2
5	Z8051 OCD Software and Documentation CDROM	1
6	Z51F3220 Development Kit Insert (FL0139)	1

[Appendix 2](#) on page 3 displays an image of the Z51F3220 Development Board.

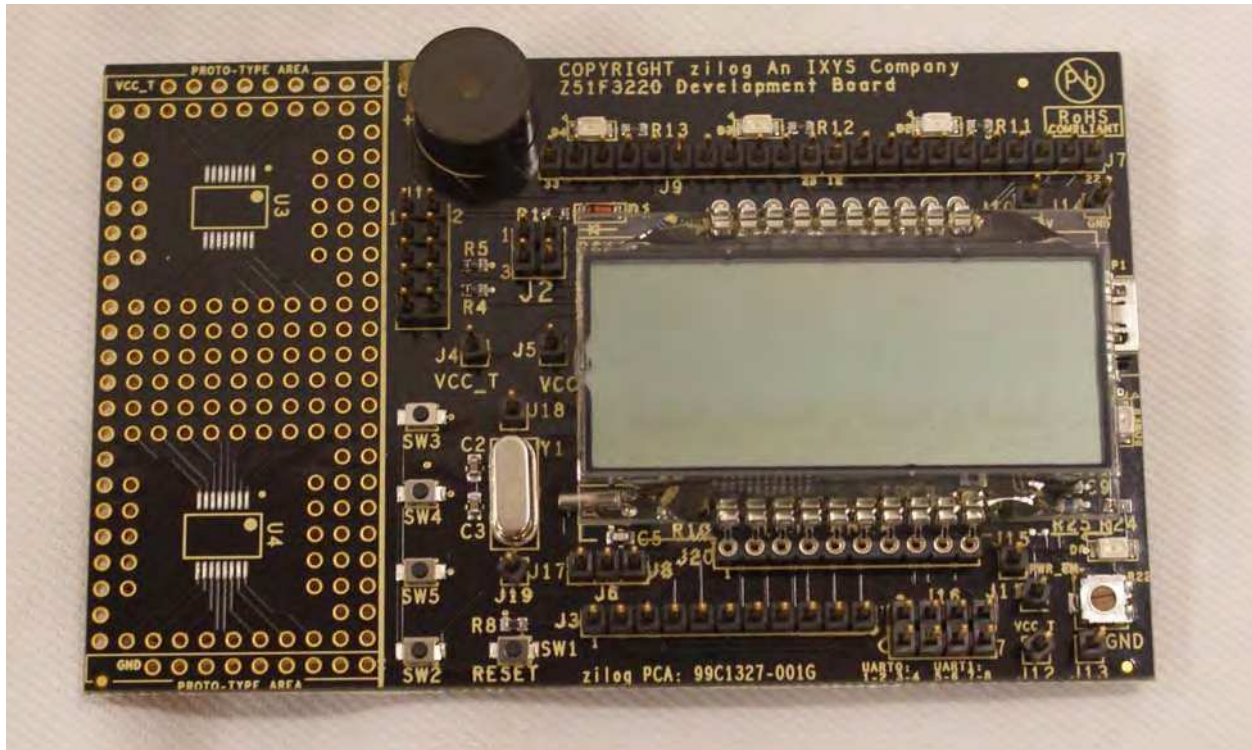


Figure 2. Z51F3220 Development Board

## Supported Operating Systems

The Z51F3220 Development 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)

## Z51F3220 Development Board Block Diagram

Figure 3 displays a block diagram of the Z51F3220 Development Board.

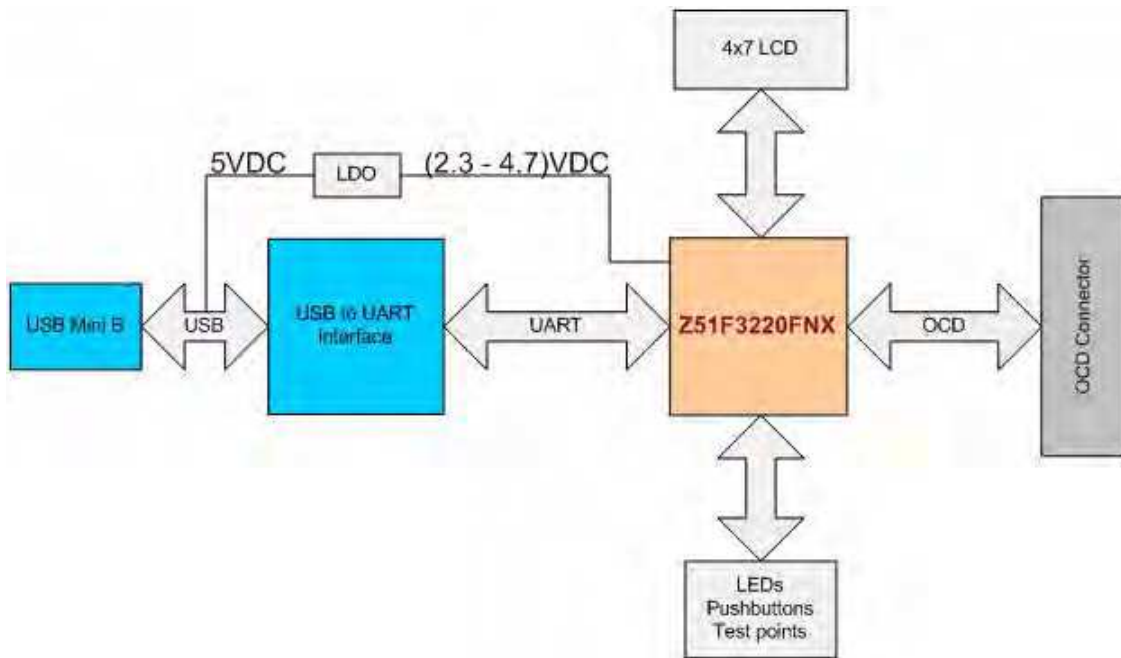


Figure 3. Block Diagram of the Z51F3220 Development Board

## Z51F3220 Development Board Description

The Z51F3220 Development Board consists of the following components:

- Z51F3220: U2, 44-pin MQFP chip
- 3 LEDs: Green (D2), Red (D3) and Yellow (D4) connected to the GPIO pins of the Z51F3220 MCU
- 1 green LED to indicate USB power: D5
- 1 red LED to indicate an overcurrent condition: D6
- 5 pushbuttons:
  - SW1: RESET
  - SW2–SW5: connected to the GPIO pins of the Z51F3220 MCU
- USB connector: P1
- OCD connector: J1
- USB-to-UART interface: U7



- USB interface providing power and communication to the Board through adjustable LD0: U5
- Power supply level that can be adjusted with potentiometer R22
- Overcurrent protection circuit on the Board: U6 and D6
- External source of reference voltage (2.5V) for the on-chip ADC: VR1
- MCU current consumption measurement resistor R7 with test points J4 and J5
- Buzzer: U1
- 4-digit, 7-segment LCD panel
- Test points, headers and prototype area with two footprints

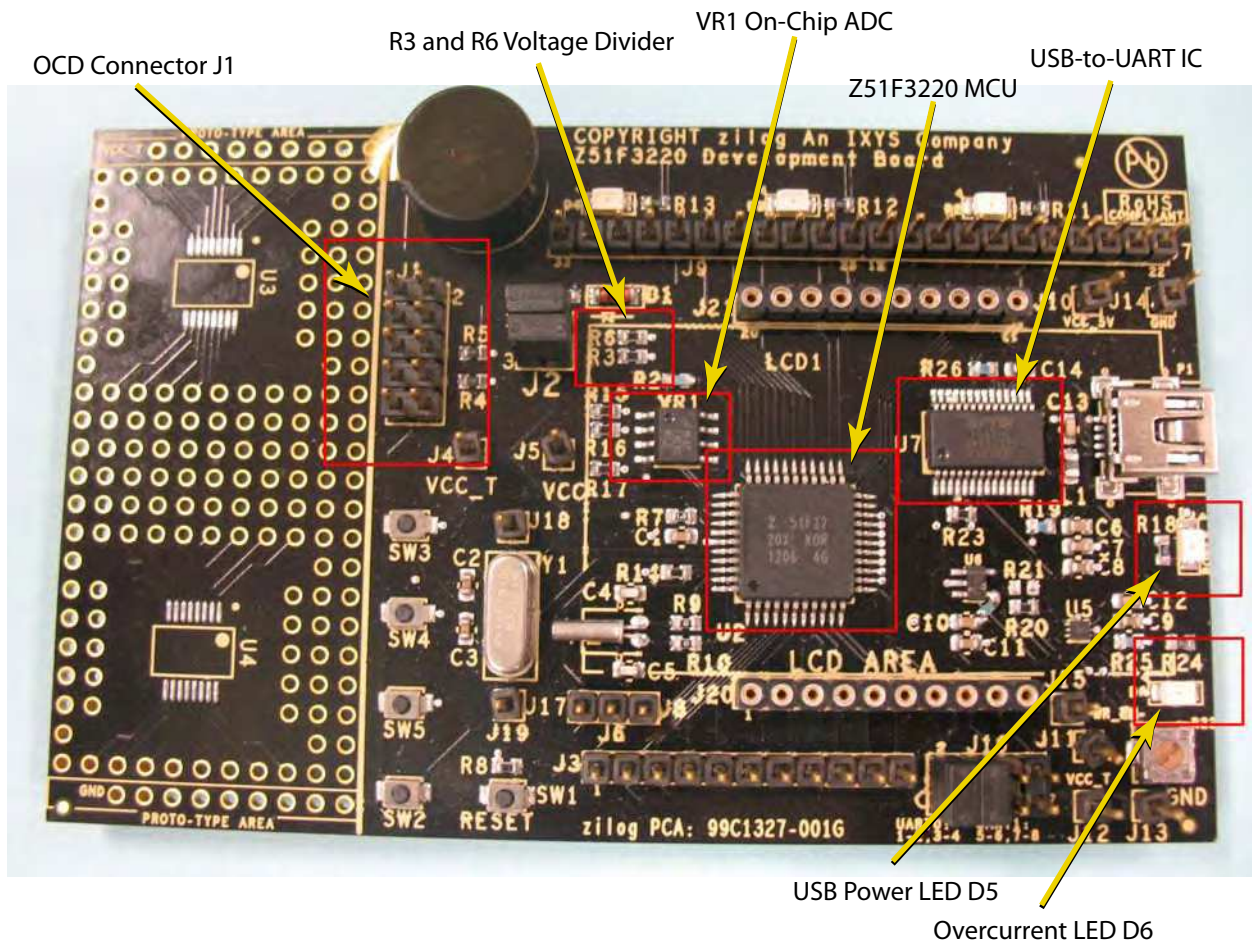


Figure 4. Z51F3220 Development Board: Highlighted Components

By default, the Z51F3220 Development Board is set up with preinstalled shunts on J16 jumper pins 1–2 and 3–4 to allow the interfacing of the Z51F3220 MCU’s UART0 to the USB port. When the Board is connected to the USB port of the host PC, LED D5 will be ON. The default settings and functionalities of these shunts are listed in Table 2.

**Table 2. Default Jumper Settings**

Headers	Pins	Functionality	Notes
J16	1–2, 3–4	UART0 to USB	Default
J16	5–6, 7–8	UART1 to USB	
J2	1–2	$V_{CC}$ is being measured by AN1	Default
J2	3–4	External $V_{REF}$ , 2.5V is used for ADC	Default

As indicated in the table, should you decide to use the the Z51F3220 MCU’s UART1 block as the interface for your own project (currently not supported in this release), move the J16 shunts to positions 5–6 and 7–8.

By default, Input 1 of the ADC is used to measure the supply voltage. This measurement point is taken from a middle point in the voltage divider circuit that includes resistors R3 and R6; the scaling is performed by software so that the LCD always displays the actual voltage. For a visual representation, see the schematic diagram in [Figure 32](#) on page 37.

If a short on the Board should occur, or if its attached component(s) require more than 500mA, the overcurrent protection functionality will trigger the red LED D6 to illuminate. In this instance, power to the Board will be terminated, and the USB port of the PC will be protected from shorting.

Schematic diagrams of the Z51F3220 Development Board are presented [on pages 37 and 38](#) of this document.

The physical dimensions of the Board are 4.01" x 2.50" (101.8mm x 63.5mm).



# 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 Z51F3220 MCU to download and execute code. In addition to the OCD, software such as development tools and sample applications will be installed.

---

► **Note:** If you have already installed the Z8051 software and documentation from the CD-ROM following the procedure on the paper insert in your kit (FL0139), 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. Insert the Z8051 Software and Documentation CD into your computer's CD-ROM drive. The setup program launches automatically. If the setup program does not launch automatically, open Windows Explorer, browse to your CD-ROM drive, and double-click the file labeled `z8051_<version_number>.exe`.

---

► **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 1.0.

---

3. 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 the 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 A](#) on page 39 to install your device drivers. If you are running Windows XP, see [Appendix B](#) on page 42.

---

1. Connect the OCD hardware to the USB port of your PC by connecting the A (male) end of one of the two USB A (male)-to-Mini-B cables 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 5.



Figure 5. Install Device Driver Dialog, Windows 7

**IMPORTANT NOTE:** If you should encounter the scenarios presented in Figures 9 or 10, right-click your mouse on **ZILOG OCD I/F** (highlighted in Figure 9) or **Unknown device** (highlighted in Figure 10) and select **Update Driver Software...**

3. Select **Browse my computer for driver software (advanced)** to display the dialog shown in Figure 6, 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

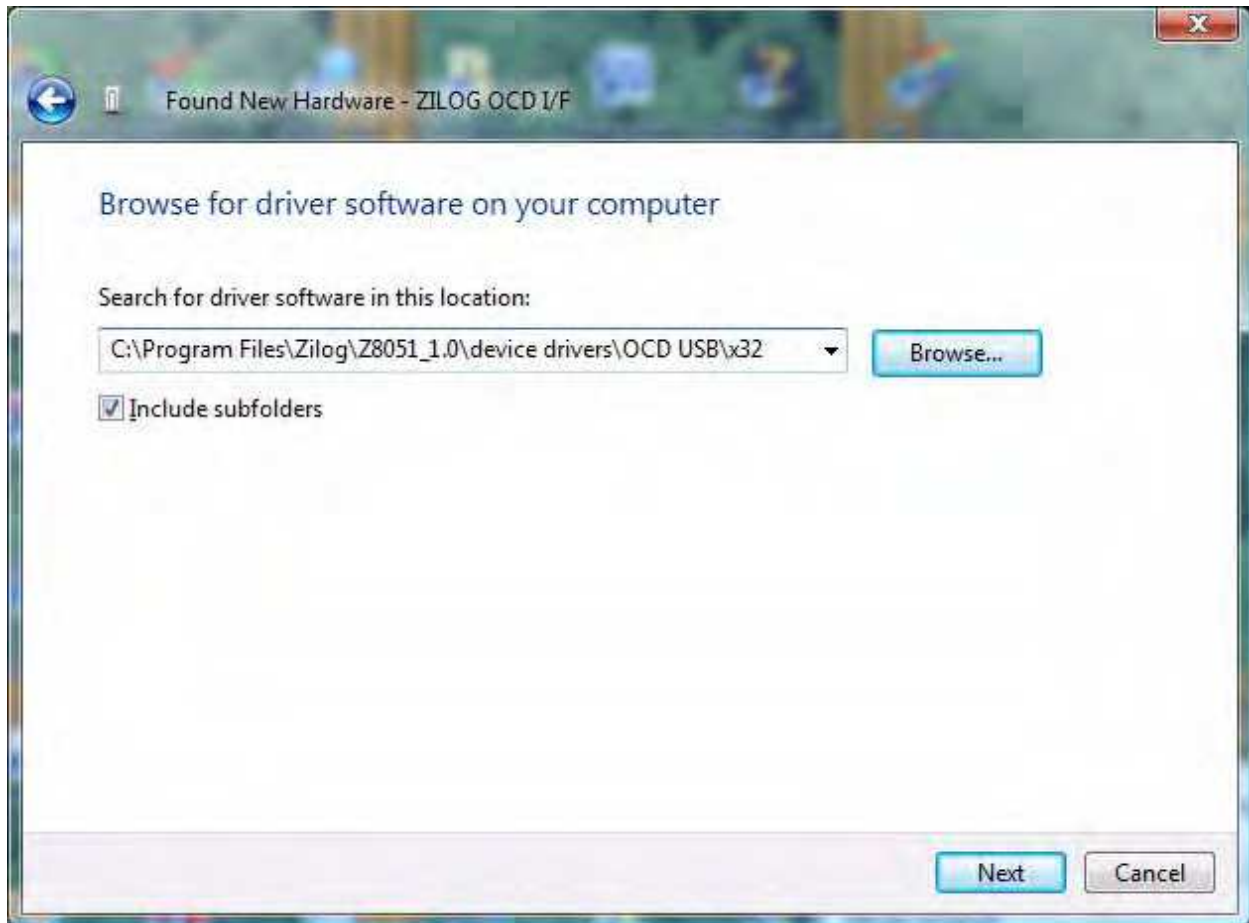


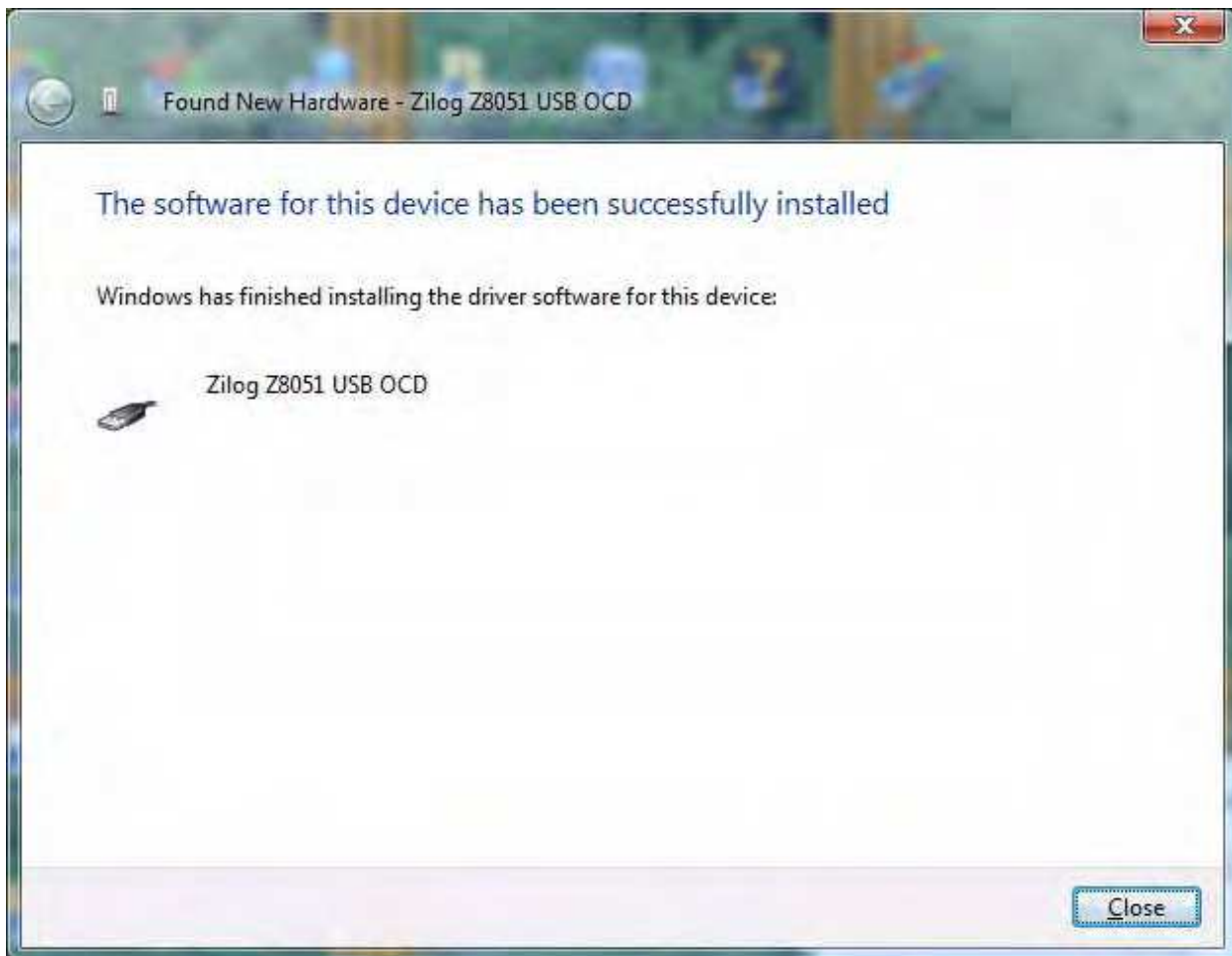
Figure 6. Browse For Driver Dialog, Windows Vista

4. When Windows prompts you whether to install or not install, as shown in Figure 7, click **Install this driver software anyway** and wait until the installation is completed (Windows may prompt you more than once).



Figure 7. Can't Verify Publisher Dialog, Windows Vista

5. When the installation is complete, the screen shown in Figure 8 will appear. Click **Close** to exit the OCD driver installation.



**Figure 8. Successfully Installed Dialog, Windows Vista**

---

► **Note:** On some installations, the Found New Hardware screen shown in Figure 8 may also display the text string, Zilog Z8051 USB OCD - No Firmware. This occurrence is normal and can be disregarded.

---

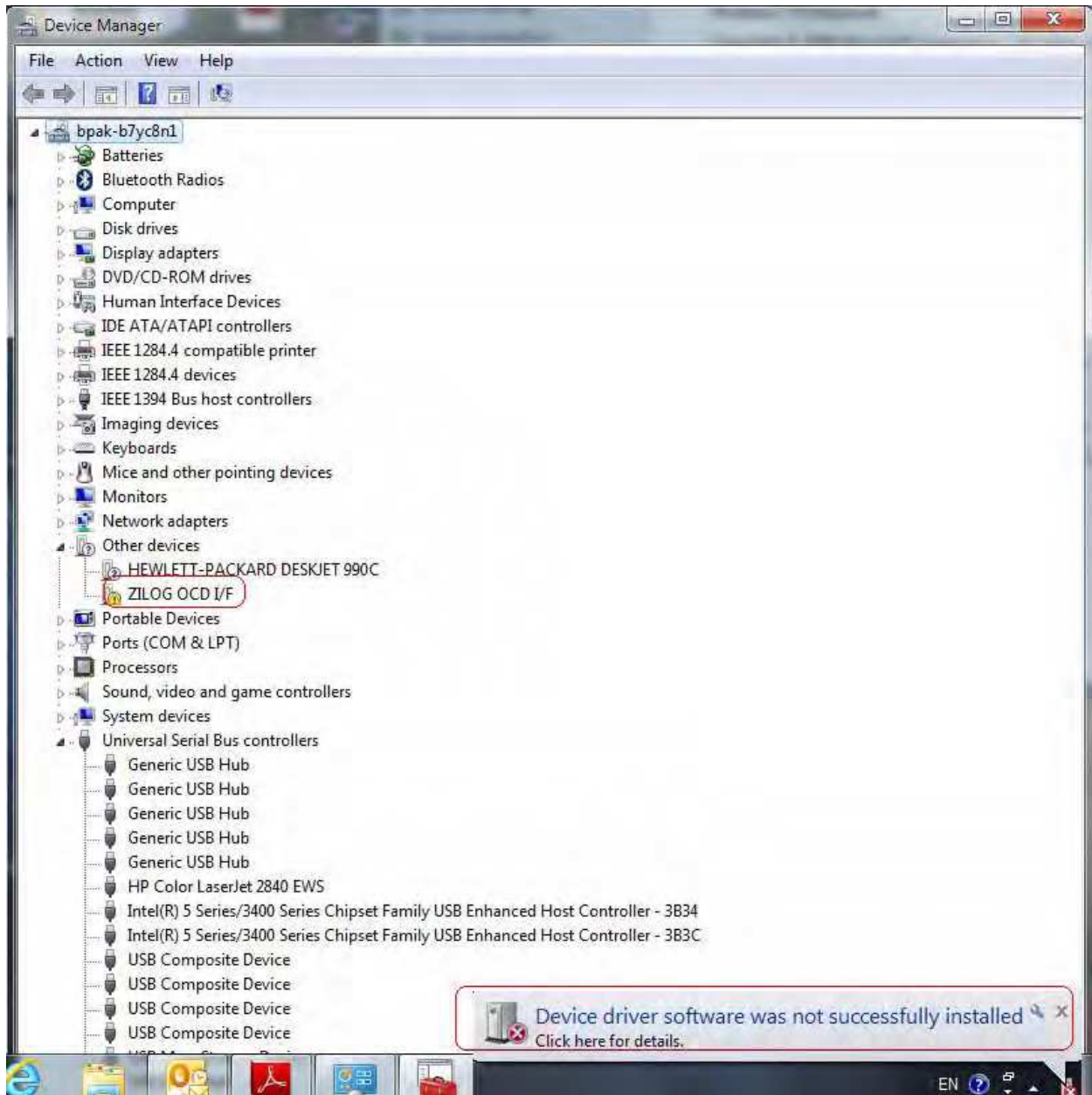


Figure 9. Unsuccessful Installation, Scenario 1



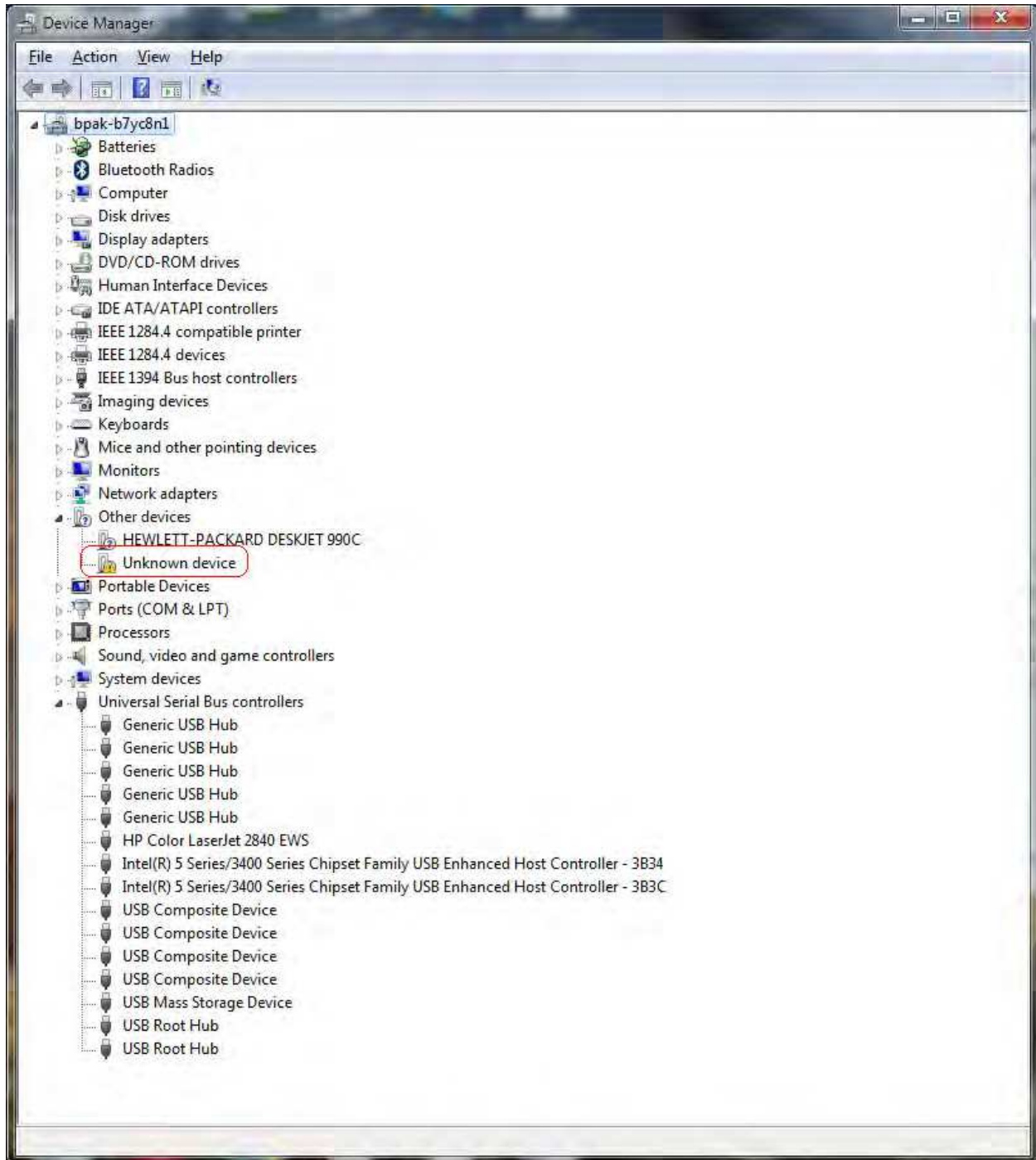


Figure 10. Unsuccessful Installation, Scenario 2

6. If *Zilog Z8051 USB OCD* appears in the Device Manager (as highlighted in Figure 11), the OCD driver software has been successfully installed.

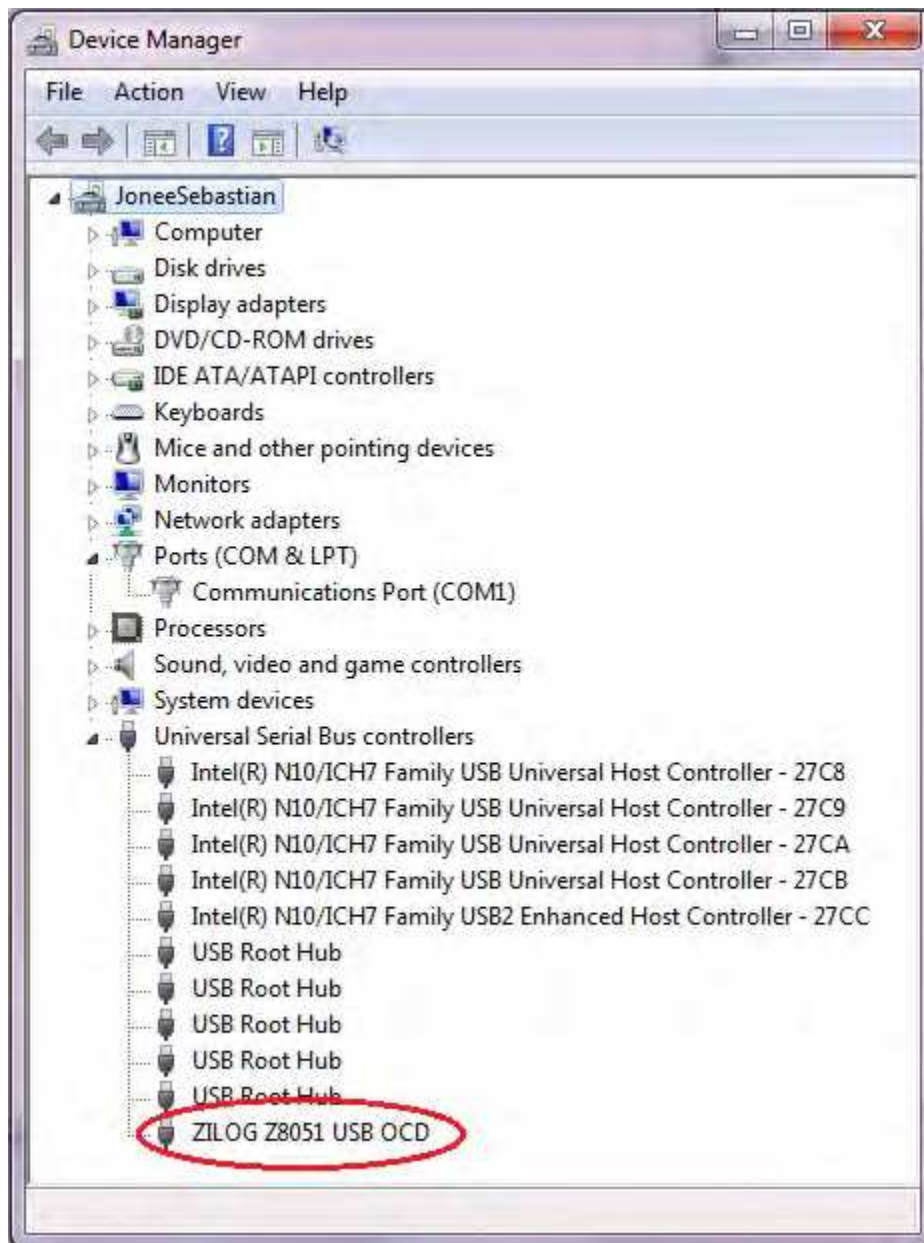


Figure 11. Device Manager Dialog, Windows 7

## 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 Z51F3220 MCU. Observe the following procedure to perform these connections.

1. Ensure that the USB cable is not plugged in to the Z51F3220 Development Board's P1 connector.
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:

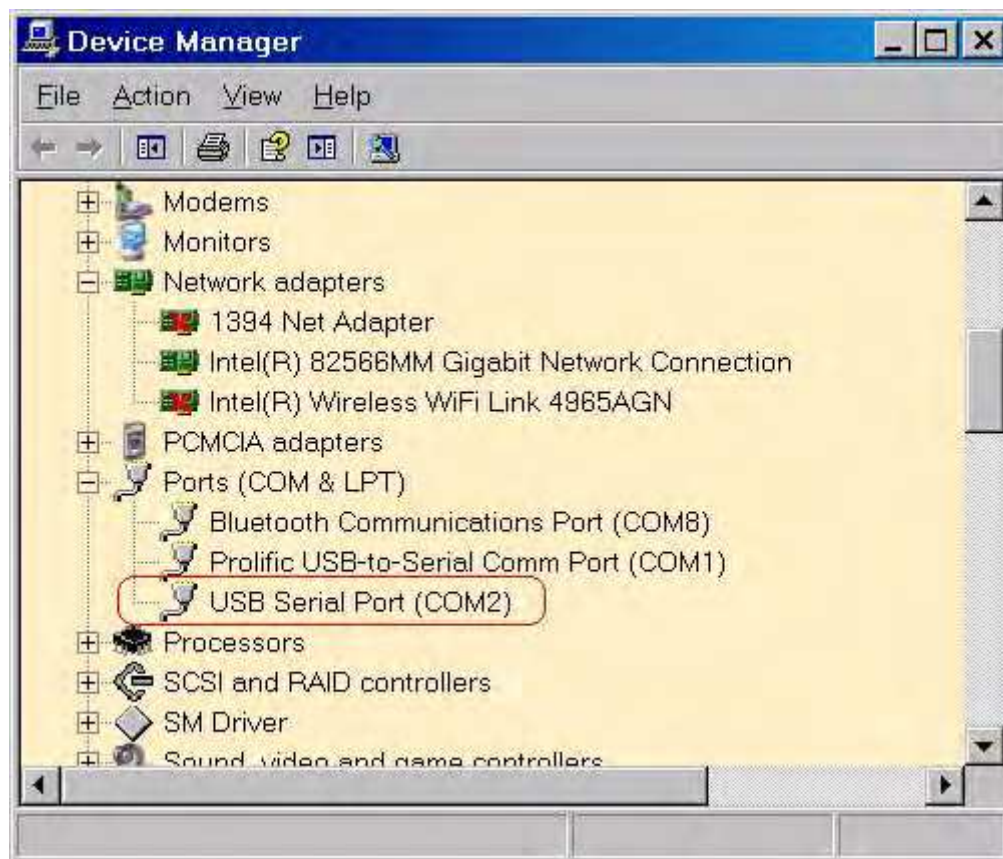
```
32-bit OS detected  
<installation path>\dpinstx86.exe  
Installation driver  
FTDI CDM driver installation process completed.
```

---

► **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 Mini-B connector of the second USB cable into the Board, and the larger A connector into the USB port of your PC. Refer to [Figure 15](#) on page 19 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 12](#).



**Figure 12. A Successful USB-to-UART Driver Installation**

---

► **Note:** 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.

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 Z51F3220 Development Board

Observe the following procedure to set up and configure the Z8051 On-Chip Debugger and the Z51F3220 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 Z51F3220 Board's J1 connector. Pin 1 of the cable connector is indicated by a red stripe, as shown in Figure 13.

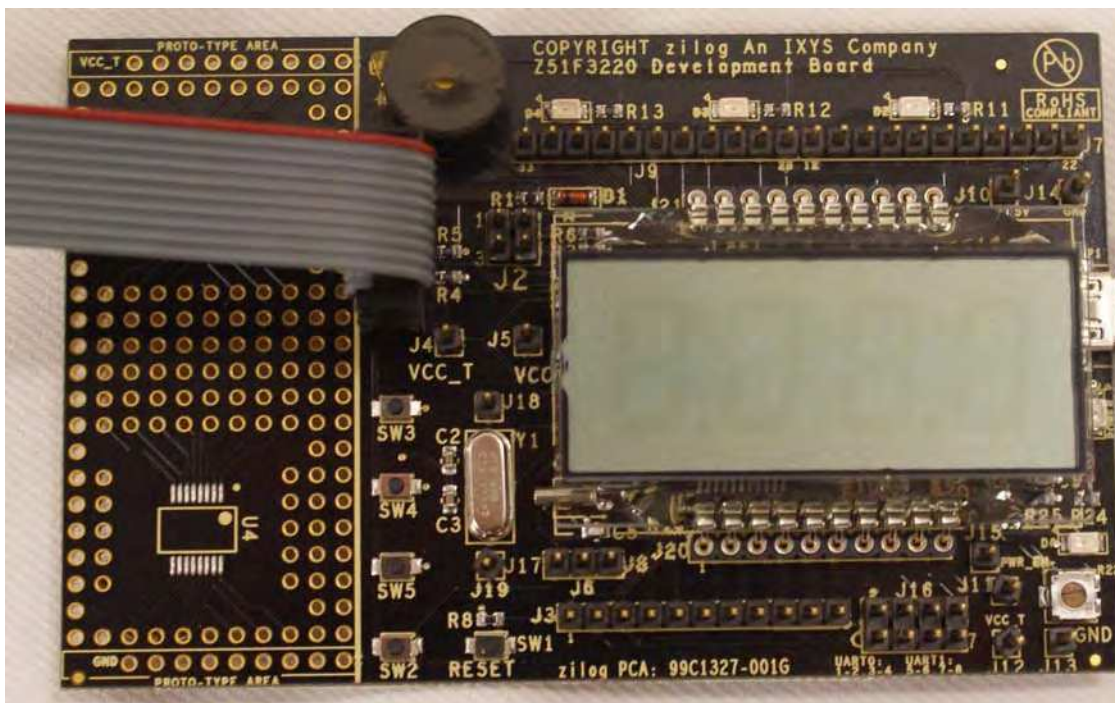


Figure 13. Connecting the 10-Circuit Cable to the Board

4. Using the second USB-to-Mini-B cable, connect the standard USB end to the host PC's USB port.
5. Connect the other end of this second Mini-B cable to the Z51F3220 Board's P1 connector to apply power to the Board. Note that the green LED D5 is ON; see Figure 14.

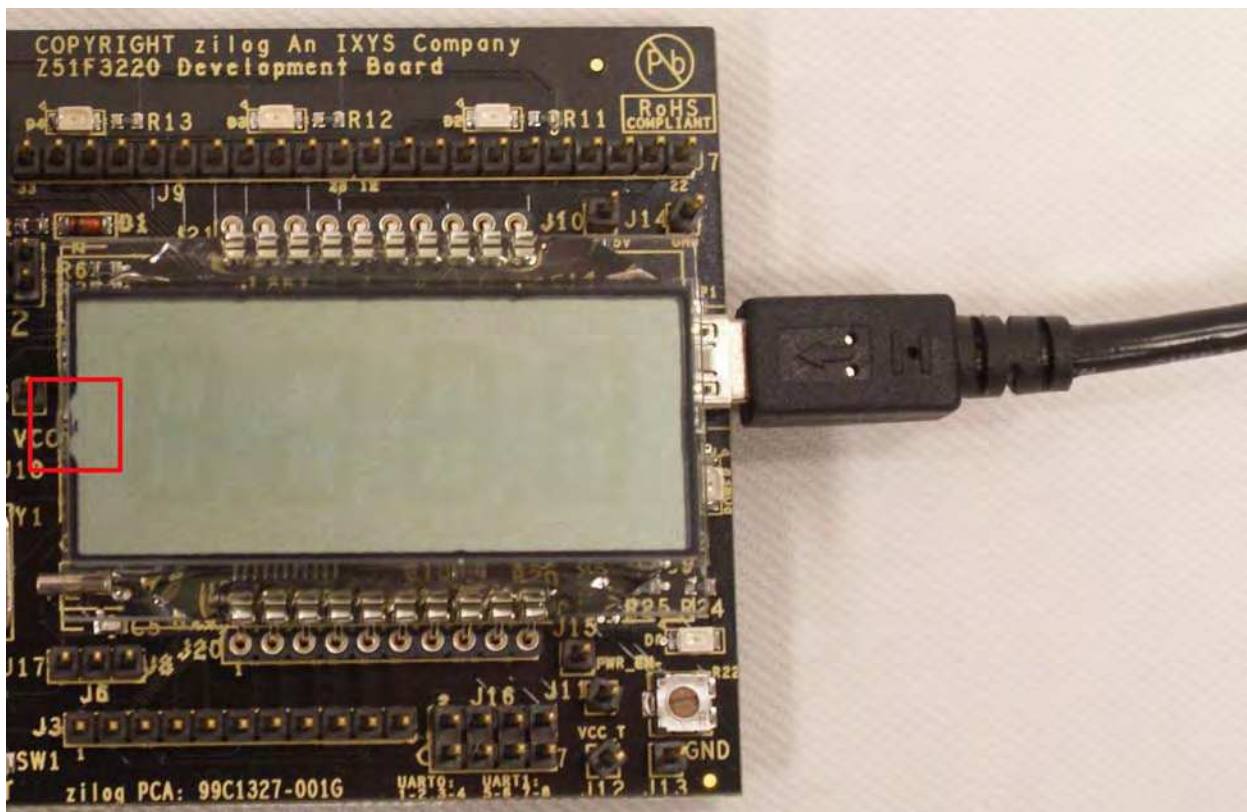


Figure 14. Connecting the USB Mini-B Cable to the Board

► **Note:** In the event that you later remove the LCD panel from the Board, observe its orientation in Figure 14. The panel's small plastic notch should be located in the position indicated by the red square.

Figure 15 shows an example of a completed hardware and software setup.