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eZ80Acclaim!® Microcontrollers

eZ80Acclaim*Plus!* Development Kit

User Manual

UM024402-0812



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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 No.
Apr 2012	01	Original issue	n/a
Aug 2012	02	Added note about jumper settings, replaced figures 4–6, modified Table 2.	4 , 9 , 13 , 16

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).

Table of Contents

Revision History	iii
Safeguards	iv
List of Figures	vii
List of Tables	ix
The eZ80Acclaim <i>Plus!</i> Development Kit	1
Kit Contents	2
Kit Features	3
Supported Operating Systems	3
Installing the ZDSII Software and Documentation	3
Installing the USB Smart Cable Driver	4
Windows 7 32/64 Systems	4
Windows Vista 32/64 Systems	5
Windows XP Systems	6
Installing the FTDI USB-to-UART Driver	6
Connecting the eZ80Acclaim <i>Plus!</i> Development Board to your PC	8
Running the Sample Starter Project	10
Viewing the Starter Project Output via the ZDSII Instruction Set Simulator	12
Appendix A.eZ80Acclaim <i>Plus!</i> Development Board	13
Memory	15
Jumper Settings	16
Zilog Developer Studio	16
ZDSII Flash Loader Utility	17
ZDSII Sample Projects	17
Appendix B.Schematic Diagrams	18
Appendix C.Related Documentation	22
Customer Support	23

**eZ80Acclaim*Plus!* Development Kit
User Manual**



vi

List of Figures

Figure 1.	The eZ80Acclaim <i>Plus!</i> Development Kit	2
Figure 2.	A Successful USB-to-UART Driver Installation	7
Figure 3.	Connecting the Six-Conductor Ribbon Cable to the Serial or USB Smart Cable	8
Figure 4.	Debug Connector J1	9
Figure 5.	USB-to-UART Port 3 Connector	9
Figure 6.	The eZ80Acclaim <i>Plus!</i> Development Board	13
Figure 7.	eZ80Acclaim <i>Plus!</i> Development Kit Block Diagram	14
Figure 8.	Female Plug	15
Figure 9.	Schematic Diagram #1 of 4: USB and Serial Interfaces	18
Figure 10.	Schematic Diagram #2 of 4: EMAC Interface	19
Figure 11.	Schematic Diagram #3 of 4: Memory Interface	20
Figure 12.	Schematic Diagram #4 of 4: eZ80F91 MCU	21

**eZ80Acclaim*Plus!* Development Kit
User Manual**



viii

List of Tables

Table 1.	eZ80F910300KITG Contents	2
Table 2.	eZ80Acclaim <i>Plus!</i> Development Board Jumper Settings	16
Table 3.	eZ80F910300KITG Development Kit Sample Projects	17

**eZ80Acclaim*Plus!* Development Kit
User Manual**



X

The eZ80Acclaim*Plus!* Development Kit

Zilog's eZ80Acclaim*Plus!* Development Kit, part number eZ80F910300KITG, provides a general-purpose platform for creating a design based on the eZ80F91 microcontroller. The eZ80F91 MCU, a member of Zilog's eZ80Acclaim*Plus!* product family, which offers an on-chip EMAC and Flash memory.

► **Note:** Zilog recommends the eZ80Acclaim*Plus!* Development Kit for new designs. However, if you are already working with Zilog's [eZ80F91 Development Kit](#) (eZ80F910300ZCOG) or [eZ80F91 Modular Development Kit](#) (eZ80F910200KITG), Zilog recommends the development documentation that applies to these kits.

This document provides instructions for setting up and configuring your eZ80Acclaim*Plus!* Development Board and includes schematic diagrams and a discussion of Board features and ZDSII.

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

- [Installing the ZDSII Software and Documentation](#) on page 3
- [Installing the USB Smart Cable Driver](#) on page 4
- [Installing the FTDI USB-to-UART Driver](#) on page 6
- [Connecting the eZ80Acclaim*Plus!* Development Board to your PC on page 8](#)
- [Running the Sample Starter Project](#) on page 10

Further details, including memory configurations, jumper settings and a listing of sample projects can be found in [Appendix A. eZ80Acclaim*Plus!* Development Board](#) on page 13.

Figure 1 displays an image of the eZ80Acclaim*Plus!* Development Board.



Figure 1. The eZ80AcclaimPlus! Development Kit

Kit Contents

Table 1 lists the contents of the eZ80AcclaimPlus! Development Kit.

Table 1. eZ80F910300KITG Contents

Item	Description	Quantity
1	eZ80AcclaimPlus! Development Board	1
2	USB Smart Cable	1
3	6-Circuit Ribbon Cable	1
4	A (male) to Mini-B USB Cable	1
5	ZDSII – eZ80Acclaim! Software and Documentation CD-ROM	1
6	eZ80AcclaimPlus! User Manual (UM0244)	1

Kit Features

The key features of the eZ80Acclaim*Plus!* Development Kit are listed below.

- eZ80Acclaim*Plus!* Development Board, which includes:
 - eZ80F91 MCU operating at 50MHz, with 256KB of internal Flash memory and 8KB of internal SRAM memory
 - On-chip Ethernet Media Access Controller (EMAC)
 - 8MB of Flash memory
 - Up to 1MB of off-chip SRAM memory
 - A USB interface that provides:
 - Power to the Board with overcurrent protection
 - Connection to the eZ80F91 MCU's UART0 block
 - DB9 connected to the eZ80F91 MCU's UART1 block
 - Optional external power connection
 - Ethernet port and PHY
 - Real-Time Clock support
 - One 64-pin header with all available GPIO ports connected to it
- USB Smart Cable
- ZDSII Software and Documentation CD-ROM

Supported Operating Systems

The eZ80Acclaim*Plus!* Development Board supports the following operating systems:

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

Installing the ZDSII Software and Documentation

Prior to connecting the eZ80Acclaim*Plus!* Development Board to your development PC, locate the ZDSII CD-ROM in your eZ80Acclaim*Plus!* Development Kit, and observe the following steps to install your ZDSII software and documentation.

1. Insert the ZDSII disc into the CD-ROM drive. The DemoShield installation application should launch automatically. If DemoShield does not launch automatically, open Windows Explorer, browse to your CD-ROM drive, and double-click the `launch.exe` executable file to launch the DemoShield installer.
2. In the DemoShield main menu, click the **Install Products** button. From the list of products to install, you can choose to install only ZDSII or to install both ZDSII and all associated documentation. As an option, you can also copy the documentation directly from your CD-ROM drive to your hard disk.

► **Note:** The eZ80AcclaimPlus! Development Board is shipped with all settings at their defaults; these settings are listed in [Table 2](#) on page 16. It is important to determine that the settings on your Board are correct before you continue with installing and running the demo.

Installing the USB Smart Cable Driver

The USB Smart Cable can be installed on PCs that run on Windows 7 (32- and 64-bit), Windows Vista (32- and 64-bit) and Windows XP operating systems. The procedures in this section will guide you through the USB Smart Cable installation process.

Windows 7 32/64 Systems

Observe the following steps to install the USB Smart Cable on a Windows 7 system.

1. Connect the USB Smart Cable to a USB port on your development PC. When the PC detects the new hardware, it will display the Installing device driver software dialog.
2. Windows automatically searches for the driver; this process can take a few moments. Because there is no option to terminate this search process, wait for the search to complete.

If the driver was previously installed, Windows will automatically install the USB Smart Cable driver. If this is the case, skip ahead to [Step 9](#). If Windows cannot find the driver, close the search dialog and proceed to the next step.

3. From the **Start** menu, navigate via the **Search Programs and files** menu, and enter **Device Manager** in the Search field to cause the Device Manager to appear in a list of search results.
4. From this search list, click **Device Manager** to open the Device Manager dialog, which presents a list of devices that operate on your PC. Find **Other devices**, toggle it to view a sublist of additional devices, and right-click your mouse on **USB Smart Cable**.
5. In the submenu that appears, click **Update Driver Software....**

6. In the **Update Driver Software – USB Smart Cable** dialog that appears, click the **Browse my computer for driver Software** option.
7. Click the **Browse...** button to browse to one of the following driver directories, depending on the throughput of your PC.
On 32-bit Windows 7 systems, navigate to:

```
<ZDSII Installation Directory>\device drivers\USB\x32
<ZDSII Installation CD>\device drivers\USB\x32
```


On 64-bit Windows 7 systems, navigate to:

```
<ZDSII Installation Directory>\device drivers\USB\x64
<ZDSII Installation CD>\device drivers\USB\x64
```
8. Click **Next** to install the driver. On 32-bit: Windows systems, a security dialog will appear; select **Install this driver software anyway**.
9. Click **Close** after the Wizard finishes the installation.

Windows Vista 32/64 Systems

Observe the following steps to install the USB Smart Cable on a Windows Vista system.

1. Connect the USB Smart Cable to a USB port on the development PC.
2. After the PC detects the new hardware, it will display the Found New Hardware Wizard dialog box. Click **Locate and install driver software (recommended)**.
3. Depending on your development PC's User Account Control settings, Windows may ask for permission to continue the installation. Click **Continue**.
4. When the Insert the Disc dialog appears, select **I don't have the disc. Show me other options**. Click the **Next** button to display the **Windows couldn't find driver** dialog.
5. Select **Browse my computer for driver software (advanced)** to display the Browse For Driver dialog, which prompts you to key in or browse for the location of the driver's .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 Vista systems, navigate to:

```
<ZDSII Installation Directory>\device drivers\USB\x32
<ZDSII Installation CD>\device drivers\USB\x32
```

On 64-bit Vista systems, navigate to:

```
<ZDSII Installation Directory>\device drivers\USB\x64
<ZDSII Installation CD>\device drivers\USB\x64
```


6. When the Windows Security dialog prompts you whether to install or not install, click **Install this driver software anyway** and wait until the installation is completed (Windows may prompt you more than once).
7. When the software has been installed successfully, click **Close**.

Windows XP Systems

Observe the following steps to install the USB Smart Cable on a Windows XP system.

1. Connect the USB Smart Cable to a USB port on the development PC. When the PC detects the new hardware, it will display the Found New Hardware Wizard dialog.
2. In the Wizard, select **Install from a list or specific location (Advanced)**, and click **Next**.

► **Note:** If the Windows Hardware Installation dialog appears, click **Continue Anyway**.

3. In the Please choose your search and installations dialog, select **Search for the best driver in these locations and include this location in search**.
4. Use the **Browse...** button to navigate to one of the following paths:
`<ZDSII Installation Directory>\device drivers\USB\x32`
`<ZDSII Installation CD>\Device Drivers\USB\x32`
5. Click **Next** to locate the appropriate driver.
6. Click **Next**, then click **Finish** to complete the installation.

Installing the FTDI USB-to-UART Driver

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 eZ80AcclaimPlus! MCU. Observe the following procedure to perform these connections.

1. Ensure that the USB cable is not plugged in to the eZ80AcclaimPlus! Development Board's P3 connector.
2. Navigate to the following filepath and double-click the CDM20802_setup.exe file to begin the driver installation.

`<CDROM>\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...
```

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.
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 2.



Figure 2. 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)

Connecting the eZ80AcclaimPlus! Development Board to your PC

Observe the following procedure to connect the eZ80AcclaimPlus! Board to your PC.



Caution: Disconnect or turn off the power to the eZ80AcclaimPlus! Development Board before connecting or disconnecting the USB Smart Cable.

1. Connect one end of the 6-conductor ribbon cable provided in your Kit to the USB Smart Cable 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 Six-Conductor Ribbon Cable to the Serial or USB Smart Cable

2. Connect the other end of the ribbon cable to Debug Connector J1 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.

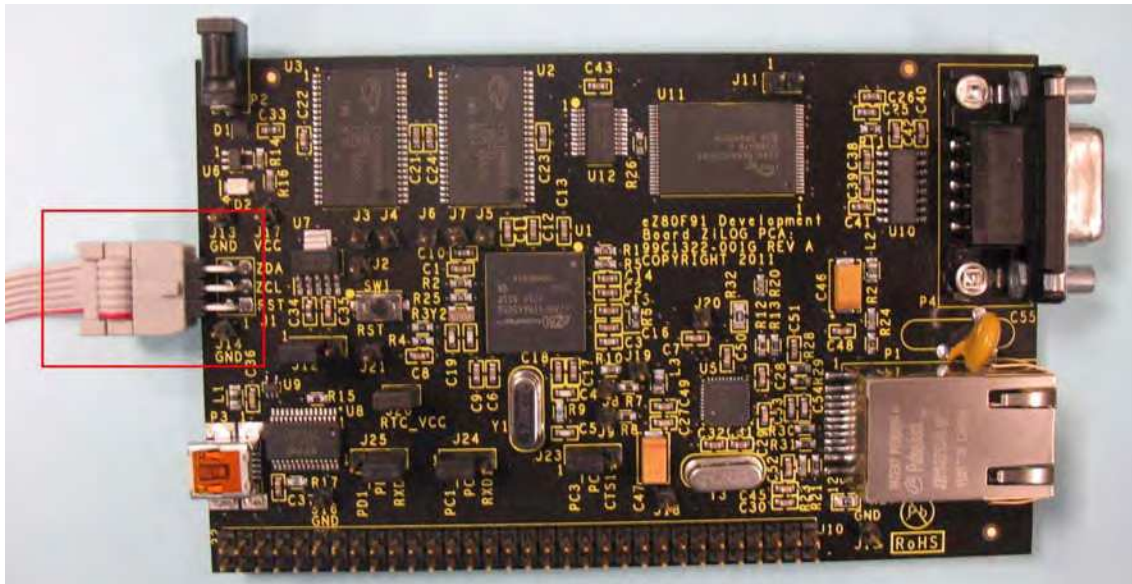


Figure 4. Debug Connector J1

3. With the USB A (male) to Mini-B cable, connect Port P3 on the eZ80AcclaimPlus! Development Board to a USB port on the development PC to apply power to the Development Board, as highlighted in Figure 5.

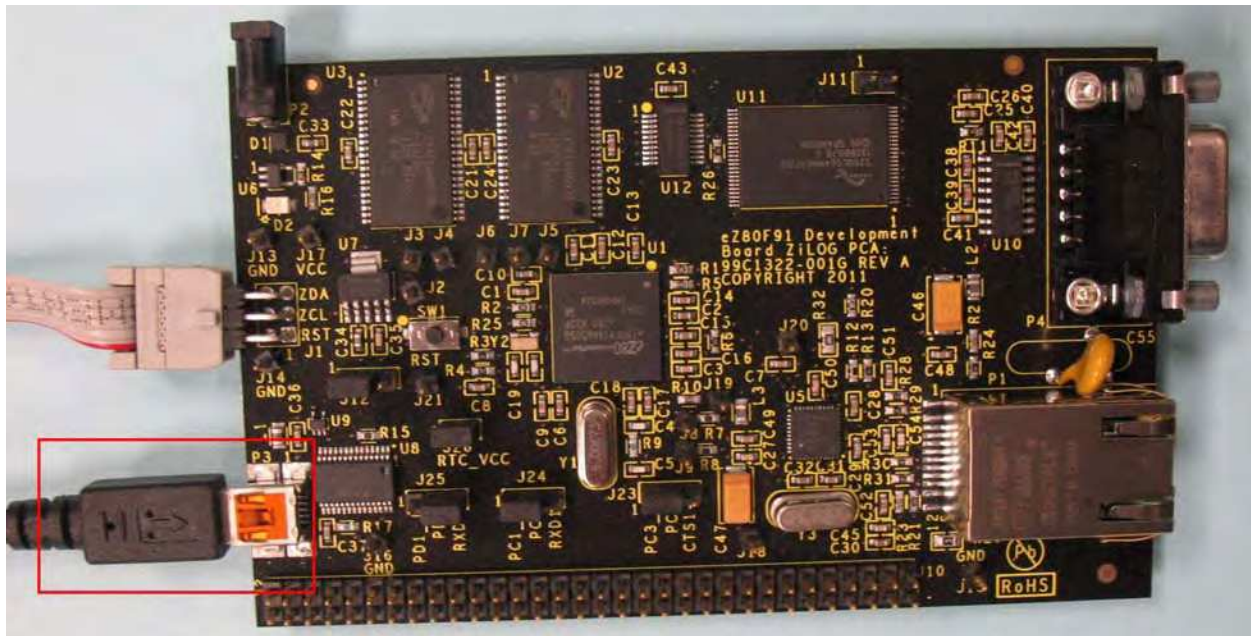


Figure 5. USB-to-UART Port 3 Connector

► **Note:** To use the USB port as a power source, adjust the shunt on J12 to the 1–2 position.

Running the Sample Starter Project

A sample starter program provided on the ZDSII CD-ROM demonstrates how to write proper code for the eZ80AcclaimPlus! Development Board. The starter program is written so that it will default to the UART-to-USB Port P3 on the Board. The program writes a few character strings either to this port, or to the simulated UART output window when running the *Simulator Debug Tool* (see the [Viewing the Starter Project Output via the ZDSII Instruction Set Simulator](#) section on page 12). Before running the starter program, however, the eZ80AcclaimPlus! Development Board must be connected to your PC.

After you create your own application program, you can use ZDSII to download the code you created into eZ80F91 memory for testing and debugging.

Procedure

Observe the following steps to build and run the sample starter program for viewing in a terminal emulation program on your PC, such as HyperTerminal.

► **Note:** While HyperTerminal is discussed in this document, it is not available on Windows 7 or Vista machines. As an alternative, consider using Tera Term, which is available for download from the Internet.

1. If you haven't already connected the UART-to-USB cable to the Board, return to the [Connecting the eZ80AcclaimPlus! Development Board to your PC](#) section on page 8.
2. Launch HyperTerminal. From the **File** menu, click **New Connection**.
3. In the **Name** field, enter a name that describes the connection.
4. In the **Icon** box, select an appropriate icon for your connection, then click **OK**.
5. In the **Connect To** dialog box, and from the **Connect using:** drop-down menu, choose the COM port that is connected to the UART-to-USB port on the eZ80AcclaimPlus! Development Board.
6. In the **Port Settings** dialog box, set the following options:
 - Bits per second: 57600
 - Data bits: 8
 - Parity: None

- Stop bits: 1
 - Flow control: None
7. Click **OK** to establish a connection between HyperTerminal and the Board.
 8. Launch ZDSII by navigating from the Windows **Start** menu to **Programs** → **Zilog ZDSII – eZ80Acclaim! <Version>** → **ZDSII – eZ80Acclaim! <Version>**.
 9. From the **File** menu in ZDSII, choose **Open Project**, and navigate to the following filepath:

```
c:\Program Files\Zilog\ZDSII_eZ80Acclaim!_<Version>\samples\StarterProject
```
 10. Select the `starter.zdsproj` project within this filepath and click **Open**. A list of source files will appear in the Workspace panel.
 11. Double-click the `main.c` file in the Workspace panel to open the file in ZDSII's Editor window. Refer to the header section of the `main.c` file for details about the project.
 12. From the **Build** menu, select **Set Active Configuration** to open the Select Configuration dialog box.
 13. Select **Debug**, then click **OK** to close the Select Configuration dialog box.
 14. From the **Project** menu in ZDSII, select **Settings** to open the Project Settings dialog box. In the Project Settings dialog box, select the **Debugger** page.
 15. In the Debugger page, select **eZ80F91ModDevKit_RAM** from the **Target** list.
 16. In the Debugger page, select **USB Smart Cable** from the **Debug Tool** drop-down menu.
 17. Click **OK** to close the Project Settings dialog box.
 18. If you are prompted to rebuild any affected files, click **Yes**. Otherwise, choose **Build** from the menu bar, then click **Rebuild All**.
 19. To run the application, select **Go** from the **Debug** menu. Until the default settings are changed, the following output will be presented in the HyperTerminal window:

```
Zilog Developer Studio  
i = 5  
d = 25  
f = 1.260000  
eZ80F91 5 25 1.260000
```

Viewing the Starter Project Output via the ZDSII Instruction Set Simulator

The eZ80Acclaim! Cycle-Accurate Instruction Set Simulator interfaces with the ZDSII Debugger to simulate the execution of programs without using an emulator or target hardware. The Instruction Set Simulator uses the command set of the Debugger to perform tasks such as simulating timers and interrupts.

To use the eZ80Acclaim! Instruction Set Simulator as an option, observe the following steps to view the output of the `starter.zdsproj` project in the ZDSII IDE.

1. In ZDSII, open the `starter.zdsproj` project.
2. From the **Project** menu in ZDSII, choose **Settings** to open the Project Settings dialog box. Click the **Debugger** tab.
3. In the Debugger dialog, select **eZ80F91ModDevKit_RAM** from the Target pane by clicking the checkbox next to the specific target name. Next, select **Simulator** from the **Debug Tool** drop-down menu.
4. Click **OK** to close the Project Settings dialog box.
5. If you are prompted to rebuild any affected files, click **Yes**. Otherwise, choose **Build** from the menu bar, then click **Rebuild All**.
6. When the build is complete, explore the Debug toolbar's many debugger features. To connect to the Simulator, choose **Reset** from the **Debug** menu.
7. Next, open the Simulated UART Output window to view the output of the program by navigation via the **View** menu to **Debug Windows** → **Simulated UART Output**.
8. To run the application, select **Go** from the **Debug** menu. Until the default settings are changed, the following output will be presented in the HyperTerminal window:

```
Zilog Developer Studio  
i = 5  
d = 25  
f = 1.260000  
eZ80F91 5 25 1.260000
```

9. Using the Simulator, you can now view the sample code to study how it works.

Appendix A. eZ80AcclaimPlus! Development Board

The purpose of the eZ80AcclaimPlus! Development Kit is to provide a set of hardware and software tools for applications based on the eZ80F91 microcontroller. An image of the eZ80AcclaimPlus! Development Board is shown in Figure 6; see Figure 7 for a block diagram.

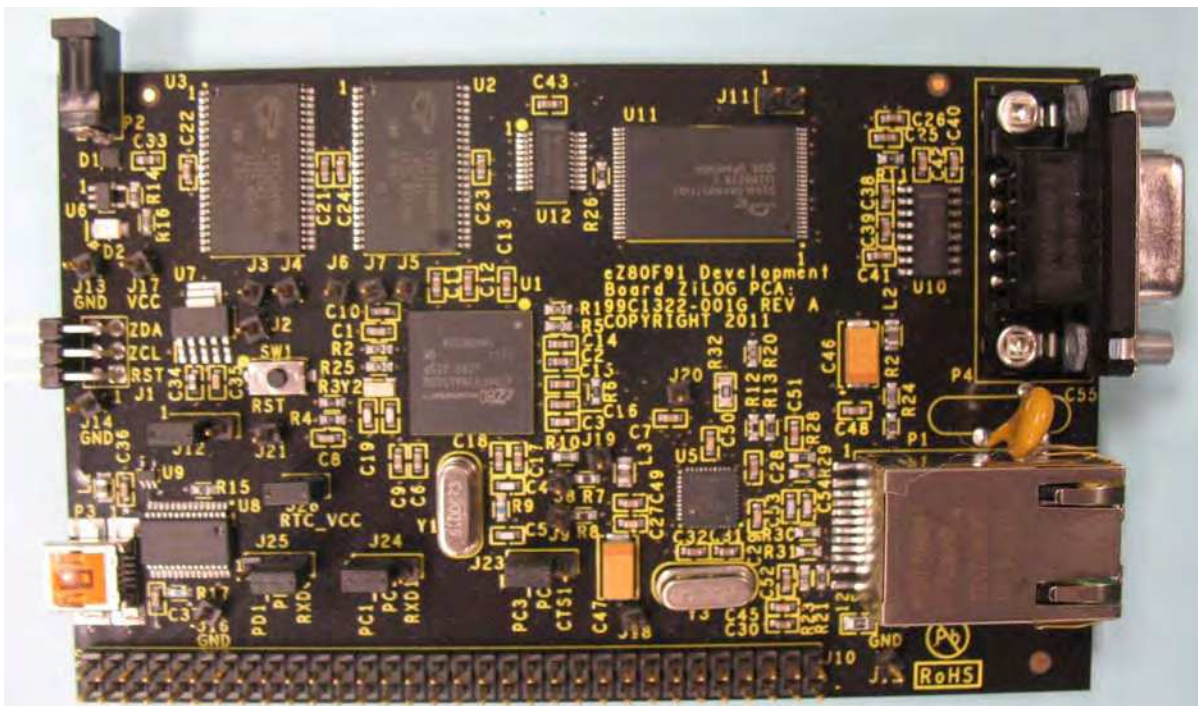


Figure 6. The eZ80AcclaimPlus! Development Board

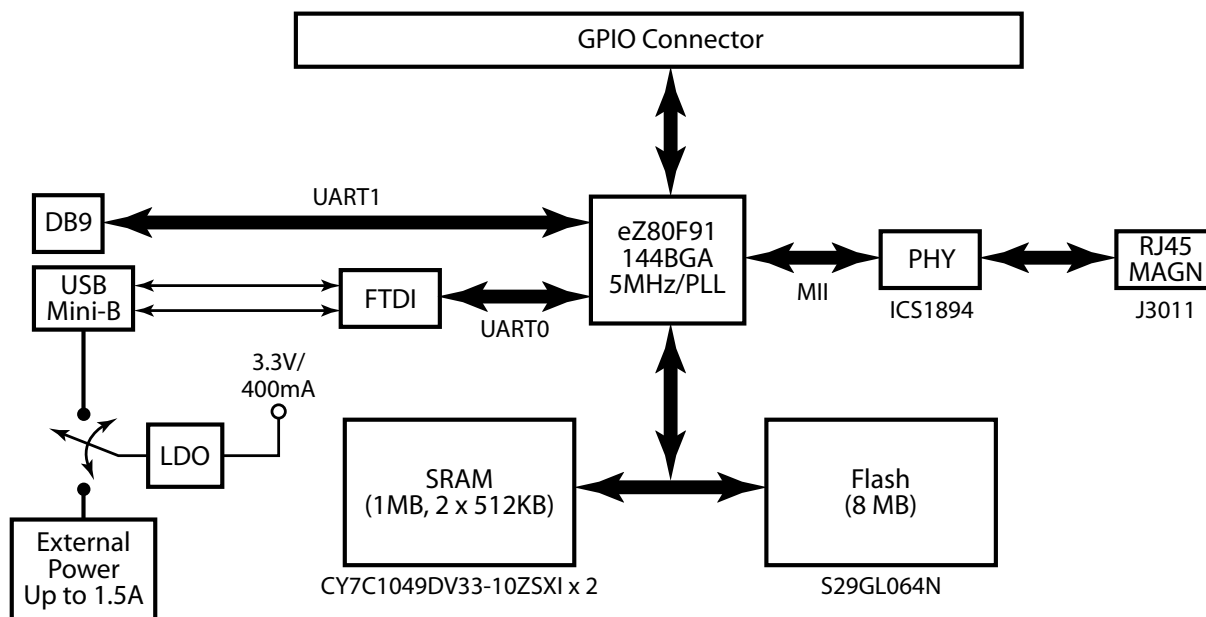


Figure 7. eZ80AcclaimPlus! Development Kit Block Diagram

► **Note:** Schematic diagrams for the eZ80AcclaimPlus! Development Board are provided in the [Schematic Diagrams](#) chapter on page 18.

The eZ80AcclaimPlus! Development Board is driven by the eZ80F91 MCU with an external 50MHz (Y1) crystal and an on-chip PLL programmed to run on the eZ80F91 MCU at its internal frequency of 50MHz. The chip employs an Ethernet Media Access Controller (EMAC) with a Media-Independent Interface (MII) that allows the eZ80F91 MCU to interface to all available industry-standard PHYs.

For this eZ80AcclaimPlus! implementation, the ICS1894-40 (U5) was selected to provide a suitable price/performance solution.

Debug connector (J1) provides access to the eZ80F91 MCU so that the user can download and control the execution of the sample projects provided with the Kit or his/her own project(s) using the USB Smart Cable included in the Kit.

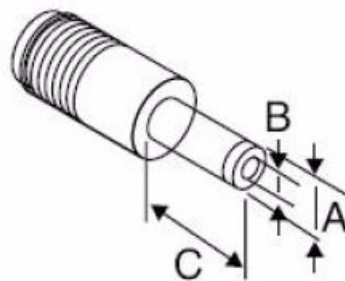
Memory

The eZ80Acclaim*Plus!* Development Board features the following memory configurations:

- 8KB on-chip SRAM
- 256KB on-chip Flash
- 1MB off-chip SRAM; U2 and U3 are accessible by chip selects CS1 and CS2
- 8MB off-chip Flash: U11 is accessible by chip select CS0

To learn more about the operation of the eZ80F91 MCU's internal memory, refer to the [eZ80F91 ASSP Product Specification \(PS0270\)](#).

1. The Board features two power source options. It can be powered by connecting Port P3 (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 a female plug to an external 5VDC source with at least 300–400mA of current to Port P2. A drawing of an optional external power supply plug is shown in Figure 8.



Legend

A = 3.5mm

B = 1.3mm

C = 6mm or longer

Figure 8. Female Plug

When the Board is powered via a USB connection, communication with the development PC can be established through the FT232RL chip (U8) to provide a USB-to-serial interface. The UART0 block of the eZ80F91 MCU is connected to this chip.

An on-board USB port (U6) provides overcurrent protection in the event of a short or if a device is connected to the Board that requires more than 500mA @3.3V. If either condition occurs, LED2 will illuminate.