Regulatory Compliance

The Blackfin USB-LAN EZ-Extender is designed to be used solely in a laboratory environment. The board is not intended for use as a consumer end product or as a portion of a consumer end product. The board is an open system design which does not include a shielded enclosure and therefore may cause interference to other electrical devices in close proximity. This board should not be used in or near any medical equipment or RF devices.

The Blackfin USB-LAN EZ-Extender has been certified to comply with the essential requirements of the European EMC directive 89/336/EEC amended by 93/68/EEC and therefore carries the “CE” mark.

The Blackfin USB-LAN EZ-Extender has been appended to Analog Devices, Inc. Technical Construction File (TCF) referenced ‘DSPTOOLS1’ dated December 21, 1997 and was awarded CE Certification by an appointed European Competent Body as listed below.

Technical Certificate No: Z600ANA1.022

Issued by:
Technology International (Europe) Limited
60 Shrivenham Hundred Business Park
Shrivenham, Swindon, SN6 8TY, UK

The Blackfin USB-LAN EZ-Extender contains ESD (electrostatic discharge) sensitive devices. Electrostatic charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused extender boards in the protective shipping package.
CONTENTS

PREFACE

Product Overview ................................................................. viii
Purpose of This Manual ........................................................ ix
Intended Audience ............................................................... ix
Manual Contents ................................................................. x
What’s New in This Manual .................................................... xi
Technical Support ............................................................... xi
Supported Products ............................................................. xii
Product Information ........................................................... xii
  Analog Devices Web Site .................................................... xii
  EngineerZone ................................................................. xiii
Related Documents ......................................................... xiv

USB-LAN EZ-EXTENDER INTERFACES

USB-LAN EZ-Extender Setup .................................................. 1-1
  USB Software ............................................................. 1-2
  Ethernet Software ........................................................ 1-3
USB 2.0 Interface ............................................................ 1-3
Ethernet Interface ........................................................... 1-4
Contents

Optional ADSP-BF537 EZ-KIT Lite Interfaces ........................................ 1-5
Power-Over-Ethernet ............................................................................. 1-5
MII Interface ...................................................................................... 1-6

USB-LAN EZ-EXTENDER HARDWARE REFERENCE

System Architecture .............................................................................. 2-2
Jumper Settings .................................................................................... 2-3
  Power Select Jumper (JP1) .............................................................. 2-4
  LAN Power Jumper (JP2) ............................................................. 2-5
  Link Jumper (JP3) ......................................................................... 2-5
Switch Settings .................................................................................... 2-6
  ADDR Enable Switch (SW1.1) ...................................................... 2-6
  FLAGS Enable Switch (SW1.2) ..................................................... 2-7
  USB IRQ Enable Switch (SW1.3) .................................................. 2-7
  Test Mode Enable Switch (SW1.4) ............................................... 2-7
  Serial ROM Enable Switch (SW2.1) .......................................... 2-8
  IOS[2:0] Switch (SW2.2, SW2.3, SW2.4) ................................... 2-9

USB-LAN EZ-EXTENDER BILL OF MATERIALS

USB-LAN EZ-EXTENDER SCHEMATIC

INDEX
Thank you for purchasing the Blackfin® USB-LAN EZ-Extender®, Analog Devices, Inc. extender board to the EZ-KIT Lite® evaluation system for the ADSP-BF533, ADSP-BF537, and ADSP-BF561 Blackfin processors.

Blackfin processors are embedded processors that support a Media Instruction Set Computing (MISC) architecture. This architecture is the natural merging of RISC, media functions, and digital signal processing characteristics towards delivering signal processing performance in a microprocessor-like environment.

EZ-KIT Lites and USB-LAN EZ-Extenders are designed to be used in conjunction with the CrossCore® Embedded Studio (CCES) and VisualDSP++® software development environments. The development environment facilitates advanced application code development and debug, such as:

- Create, compile, assemble, and link application programs written in C++, C, and USB-LAN EZ-Extender assembly
- Load, run, step, halt, and set breakpoints in application programs
- Read and write data and program memory
- Read and write core and peripheral registers
- Plot memory

To learn more about Analog Devices development software, go to http://www.analog.com/processors/tools.
Product Overview

The Blackfin USB-LAN EZ-Extender is a separately sold extender board that plugs onto the expansion interface of the ADSP-BF533, ADSP-BF537, or ADSP-BF561 EZ-KIT Lite evaluation system.

The extender board aids the design and prototyping phases of the ADSP-BF533, ADSP-BF537, or ADSP-BF561 processor targeted applications.

The board extends the capabilities of the evaluation system by providing a connection between the asynchronous memory bus of the Blackfin processor (asynchronous memory bank 3) and either a USB 2.0 or a 10/100 Mbps Ethernet device.

Please visit www.analog.com/EX1-USBLAN for additional information, including CCES support.

The following is a list of the Blackfin USB-LAN EZ-Extender interfaces.

- USB 2.0 interface:
  - PLX Technology NetChip 2272 device
  - USB driver and application code
  - USB logo certified

- Ethernet interface:
  - SMSC LAN 91C111 device supported on the ADSP-BF533 and ADSP-BF561 EZ-KIT Lites
  - IEEE802.3.AF compliant Power-Over-Ethernet (PoE) application on the ADSP-BF537 EZ-KIT Lite
Preface

• SMSC Media Independent Interface (MII) connector to evaluate different PHYs with the ADSP-BF537 EZ-KIT Lite

• Ethernet stack and application code
  • No power supply required: derives power from the EZ-KIT Lite
  • CE certified
  • Dimensions: 3.13 in. (height) x 3.6 in. (width)

Before using any of the interfaces, follow the setup procedure in “USB-LAN EZ-Extender Setup” on page 1-1.

Example programs are available to demonstrate capabilities of the Blackfin USB-LAN EZ-Extender board.

Purpose of This Manual

The Blackfin USB-LAN EZ-Extender Manual describes operation and configuration of the extender board’s components. A schematic and a bill of materials are provided as a reference for future Blackfin processor board designs.

Intended Audience

This manual is a user’s guide and reference to the Blackfin USB-LAN EZ-Extender. Programmers who are familiar with the Analog Devices Blackfin processor architecture, operation, and development tools are the primary audience for this manual.
Programmers who are unfamiliar with Analog Devices processors can use this manual but should supplement it with other texts that describe your target architecture. For the locations of these documents, see “Related Documents”.

Programmers who are unfamiliar with CCES or VisualDSP++ should refer to the online help and user’s manuals.

Manual Contents

The manual consists of:

- Chapter 1, “USB-LAN EZ-Extender Interfaces” on page 1-1
  Provides basic board information.

- Chapter 2, “USB-LAN EZ-Extender Hardware Reference” on page 2-1
  Provides information on the hardware aspects of the board.

- Appendix A, “USB-LAN EZ-Extender Bill of Materials” on page A-1
  Provides a list of components used to manufacture the EZ-Extender board.

- Appendix B, “USB-LAN EZ-Extender Schematic” on page B-1
  Provides the resources to allow EZ-KIT Lite board-level debugging or to use as a reference design. Appendix B is part of the online help.
What’s New in This Manual

This is revision 2.2 of the Blackfin USB-LAN EZ-Extender Manual. The manual has been updated to include CCES information. In addition, modifications and corrections based on errata reports against the previous manual revision have been made.

For the latest version of this manual, please refer to the Analog Devices Web site.

Technical Support

You can reach Analog Devices processors and DSP technical support in the following ways:

- Post your questions in the processors and DSP support community at EngineerZone®:
  http://ez.analog.com/community/dsp

- Submit your questions to technical support directly at:
  http://www.analog.com/support

- E-mail your questions about processors, DSPs, and tools development software from CrossCore Embedded Studio or VisualDSP++:
  Choose Help > Email Support. This creates an e-mail to processor.tools.support@analog.com and automatically attaches your CrossCore Embedded Studio or VisualDSP++ version information and license.dat file.

- E-mail your questions about processors and processor applications to:
  processor.support@analog.com or processor.china@analog.com (Greater China support)
Supported Products

- In the USA only, call 1-800-ANALOGD (1-800-262-5643)
- Contact your Analog Devices sales office or authorized distributor. Locate one at:
  www.analog.com/adi-sales
- Send questions by mail to:
  Processors and DSP Technical Support
  Analog Devices, Inc.
  Three Technology Way
  P.O. Box 9106
  Norwood, MA 02062-9106
  USA

Supported Products

The Blackfin USB-LAN EZ-Extender is designed as an extender board to the ADSP-BF533, ADSP-BF537, and ADSP-BF561 EZ-KIT Lite evaluation systems.

Product Information

Product information can be obtained from the Analog Devices Web site and the online help.

Analog Devices Web Site

To access a complete technical library for each processor family, go to http://www.analog.com/processors/technical_library. The manuals selection opens a list of current manuals related to the product as well as a link to the previous revisions of the manuals. When locating your manual title, note a possible errata check mark next to the title that leads to the current correction report against the manual.

Also note, MyAnalog is a free feature of the Analog Devices Web site that allows customization of a Web page to display only the latest information about products you are interested in. You can choose to receive weekly e-mail notifications containing updates to the Web pages that meet your interests, including documentation errata against all manuals. MyAnalog provides access to books, application notes, data sheets, code examples, and more.

Visit MyAnalog to sign up. If you are a registered user, just log on. Your user name is your e-mail address.

EngineerZone

EngineerZone is a technical support forum from Analog Devices. It allows you direct access to ADI technical support engineers. You can search FAQs and technical information to get quick answers to your embedded processing and DSP design questions.

Use EngineerZone to connect with other DSP developers who face similar design challenges. You can also use this open forum to share knowledge and collaborate with the ADI support team and your peers. Visit http://ez.analog.com to sign up.
Related Documents

For additional information about the product, refer to the following publications.

Table 1. Related Processor Publications

<table>
<thead>
<tr>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ADSP-BF531/ADSP-BF532/ADSP-BF533 Blackfin Embedded Processor Data Sheet</td>
<td>General functional description, pinout, and timing of the processor</td>
</tr>
<tr>
<td>• ADSP-BF534/ADSP-BF536/ADSP-BF537 Blackfin Embedded Processor Data Sheet</td>
<td></td>
</tr>
<tr>
<td>• ADSP-BF561 Blackfin Embedded Symmetric Multiprocessor Data Sheet</td>
<td></td>
</tr>
<tr>
<td>• ADSP-BF533 Blackfin Processor Hardware Reference</td>
<td>Description of the internal processor architecture and all register functions</td>
</tr>
<tr>
<td>• ADSP-BF537 Blackfin Processor Hardware Reference</td>
<td></td>
</tr>
<tr>
<td>• ADSP-BF561 Blackfin Processor Hardware Reference</td>
<td></td>
</tr>
<tr>
<td>Blackfin Processor Programming Reference</td>
<td>Description of all allowed processor assembly instructions</td>
</tr>
</tbody>
</table>
1 USB-LAN EZ-EXTENDER INTERFACES

This chapter provides the setup procedures for both the Blackfin USB-LAN EZ-Extender and the EZ-KIT Lite (ADSP-BF533, ADSP-BF537 or ADSP-BF561) and describes the interfaces the extender supports.

The information is presented in the following order.

- “USB-LAN EZ-Extender Setup” on page 1-1
- “USB 2.0 Interface” on page 1-3
- “Ethernet Interface” on page 1-4
- “Optional ADSP-BF537 EZ-KIT Lite Interfaces” on page 1-5

USB-LAN EZ-Extender Setup

It is very important to set up all components of the system containing the Blackfin USB-LAN EZ-Extender, then apply power to the system. The following procedure is recommended for the correct setup.

Power your system after these steps are completed:

1. Read the applicable design interface section in this chapter—the text provides an overview of the interface capabilities.

2. Read “System Architecture” on page 2-2 to understand the physical connections of the extender board. For detailed information, refer to “USB-LAN EZ-Extender Schematic” on page B-1.
3. Remove any rubber feet that may be attached to the EZ-KIT Lite. Install the four nylon feet and screws provided with the USB-LAN EZ-Extender in place of the rubber feet, in the mounting holes of the EZ-KIT Lite’s printed circuit board (PCB). Flip the EZ-KIT Lite upside down so that the three expansion headers (J1–3) are facing up.

4. Set the switches and jumpers on the USB-LAN EZ-Extender board. Use the block diagram in Figure 2-1 on page 2-2 in conjunction with “Jumper Settings” on page 2-3 and “Switch Settings” on page 2-6.

5. Set the switches and jumpers on the EZ-KIT Lite board. If not already, familiarize yourself with the EZ-KIT Lite documentation and schematic drawings (see “Product Information”).

Compare the expansion interface signals of the USB-LAN EZ-Extender board with the EZ-KIT Lite signals to ensure there is no contention. For example, it may be necessary to disable other devices connected to the expansion interface of the processor and disable the push buttons on the EZ-KIT Lite.

6. Install the USB-LAN EZ-Extender on the EZ-KIT Lite via the three-connector expansion interface.

7. Configure any other interfacing boards; for example, another EZ-Extender board.

**USB Software**

For information on the USB software (host-side and device-side), refer to the readme text files in the Examples folder of the installation directory.
**Ethernet Software**

For information on the LAN software, refer to the readme text files in the Examples folder of the installation directory.

**USB 2.0 Interface**

The Blackfin USB-LAN EZ-Extender enables a connection between a USB 2.0 chip and Blackfin processor without any other programmable logic. The PLX Technology’s NetChip 2272 device ties directly to the asynchronous memory bank 3 of the Blackfin processor. You can read from and write to the USB 2.0 controller by addressing the named memory bank directly.

You can reset the NetChip 2272 processor by asserting LOW these flag pins:

- **PF11** on the ADSP-BF533 processor
- **PF6** on the ADSP-BF537 processor
- **PF11** on the ADSP-BF561 processor

The flag pins can be used for push buttons or LEDs on the respective EZ-KIT Lite; consequently, you must make the proper changes to that EZ-KIT Lite. The switch settings required for each of the respective EZ-KIT Lites are described in the readme text files in the Examples folder of the installation directory. The readme file describes the USB software, source code, drivers, and explains how to run a USB-based application.

ℹ️ For correct switch settings, refer to the schematic drawing of the respective device.
The USB IRQ line of the extender connects to PF10 on the ADSP-BF533/ADSP-BF561 processors and PF7 on the ADSP-BF537 processors. The flag pins can be used for push buttons or LEDs on the respective EZ-KIT Lites; consequently, you must make the proper changes to that EZ-KIT Lite.

When writing to and reading from the USB device using the EZ-KIT Lite, use memory addresses from Table 1-1.

Table 1-1. USB Device Memory

<table>
<thead>
<tr>
<th>Device Connects to</th>
<th>Starting Address</th>
<th>Ending Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADSP-BF533 EZ-KIT Lite</td>
<td>0x2030 0000</td>
<td>0x2030 007F</td>
</tr>
<tr>
<td>ADSP-BF537 EZ-KIT Lite</td>
<td>0x2030 0000</td>
<td>0x2030 007F</td>
</tr>
<tr>
<td>ADSP-BF561 EZ-KIT Lite</td>
<td>0x2C00 0000</td>
<td>0x2C00 007F</td>
</tr>
</tbody>
</table>

The USB-LAN EZ-Extender allows you to connect a 10/100 Mbps Ethernet chip to a Blackfin processor. The SMSC LAN91C111 device ties directly to the asynchronous memory bank 3 of the processor. You can read from and write to the Ethernet controller by addressing the named memory bank directly.

You can reset the Ethernet device by asserting the board reset on the ADSP-BF533 and ADSP-BF561 EZ-KIT Lites. The reset connects to a supervisory reset circuit managed by the Analog Devices ADM708 IC. ADM708 also asserts a reset to the Ethernet device at power-up.

The Ethernet IRQ line connects to the PF9 flag pin of the ADSP-BF533 processor and PF9 of the ADSP-BF561 processor. The flag pins can be used for push buttons or LEDs on the respective EZ-KIT Lites; consequently, you must make the proper changes to that EZ-KIT Lite. The switch settings required for each of the respective EZ-KIT Lites are
described in the readme text files in the Examples folder of the installation directory. The readme file describes the LAN software, source code, drivers, and explains how to run an Ethernet application.

For correct switch settings, refer to the schematic drawing of the respective device.

When writing to and reading from the Ethernet device using the EZ-KIT Lite, use memory ranges from Table 1-2.

Table 1-2. LAN Device Memory

<table>
<thead>
<tr>
<th>Device Connects to</th>
<th>Starting Address</th>
<th>Ending Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADSP-BF533 EZ-KIT Lite</td>
<td>0x2031 0000</td>
<td>0x2031 FFFF</td>
</tr>
<tr>
<td>ADSP-BF561 EZ-KIT Lite</td>
<td>0x2C01 0000</td>
<td>0x2C01 FFFF</td>
</tr>
</tbody>
</table>

Optional ADSP-BF537 EZ-KIT Lite Interfaces

“Power-Over-Ethernet” and “MII Interface” are two optional interfaces of the ADSP-BF537 EZ-KIT Lite. A description of each interface is as follows.

Power-Over-Ethernet

When used in conjunction with the ADSP-BF537 EZ-KIT Lite, the Blackfin USB-LAN EZ-Extender allows you to power both the EZ-KIT Lite and extender via a 10/100 Mbps switch or a Midspan device that supports IEEE802.3.AF.

The ADSP-BF537 EZ-KIT Lite and extender must not be powered via the 7.5V supply when in Power-over-Ethernet (PoE) mode. You can make the appropriate jumper changes to the EZ-KIT Lite and extender, then connect the kit to the extender to power both boards via the switch or the
Midspan device. You must use a switch or a Midspan device that supports power via the data pairs. The PoE circuitry does not work if a Midspan device powers only over the spare pins.

Table 1-3 shows a recommended Midspan device that supports both power over the spare pins and power over the data pairs.

Table 1-3. Midspan Device

<table>
<thead>
<tr>
<th>Power Sourcing Equipment</th>
<th>Manufacturer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midspan device</td>
<td>POWERDSINE 6</td>
<td>PD-8006/AC</td>
</tr>
</tbody>
</table>

Use the Ethernet connector on the EZ-KIT Lite for PoE applications. Power-over-Ethernet does not work properly if the Ethernet connector is used on the extender board. When in PoE mode, the blinking LEDs (LED1–6) confirm successful power-up. Since PoE is intended as a simple demonstration of the power circuitry, you are not able to start a VisualDSP ++ session while in PoE mode.

Refer to “Power Select Jumper (JP1)” on page 2-4 for the extender’s PoE settings. Refer to the ADSP-BF537 EZ-KIT Lite Evaluation System Manual for the EZ-KIT Lite’s PoE settings.

**MII Interface**

The Media Independent Interface (MII) allows you to evaluate different PHY devices with the ADSP-BF537 EZ-KIT Lite. A separately purchased PHY evaluation board connects directly to the USB-LAN EZ-Extender. You need to purchase the J2 connector and solder it in order to connect the two boards. The part numbers for the SMSC evaluation boards and J2 connector are shown in Table 1-4.
Table 1-4. PHY Devices

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Manufacturer</th>
<th>Manufacturer Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>J2 20 x 2 connector</td>
<td>AMP/TYCO ELECTRONICS</td>
<td>787170-4</td>
</tr>
<tr>
<td>MII evaluation board</td>
<td>SMSC</td>
<td>EVB185</td>
</tr>
<tr>
<td>MII evaluation board</td>
<td>SMSC</td>
<td>EVB183</td>
</tr>
</tbody>
</table>
Optional ADSP-BF537 EZ-KIT Lite Interfaces
This chapter describes the hardware design of the Blackfin USB-LAN EZ-Extender.

The following topics are covered.

- **“System Architecture” on page 2-2**
  Describes the board configuration and explains how the board components interface with the processor and EZ-KIT Lite.

- **“Jumper Settings” on page 2-3**
  Describes the on-board configuration jumpers.

- **“Switch Settings” on page 2-6**
  Describes the on-board switches.
System Architecture

A block diagram of the Blackfin USB-LAN EZ-Extender is shown in Figure 2-1.

Figure 2-1. Block Diagram
Jumper Settings

Before using the Blackfin USB-LAN EZ-Extender, follow the setup procedure in “USB-LAN EZ-Extender Setup” on page 1-1.

Figure 2-2 shows the locations of all jumper headers. A two-pin jumper can be placed on the respective jumper header for different functionality. The following sections describe all possible jumper settings and associated functionality.

Figure 2-2. Jumper Locations
Power Select Jumper (JP1)

By default, the power select jumper, JP1, must have no jumpers on any of its pins. The jumpers can be used only when the extender is plugged onto an ADSP-BF537 EZ-KIT Lite (see Table 2-1).

Table 2-1. JP1 Settings

<table>
<thead>
<tr>
<th>Source of 5V Power</th>
<th>JP1 Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZ-KIT Lite power</td>
<td>No jumpers (default)</td>
</tr>
<tr>
<td>USB test mode (do not use)</td>
<td>JP1.1 and JP1.2</td>
</tr>
<tr>
<td>Power-over-Ethernet</td>
<td>JP1.2 and JP1.3</td>
</tr>
</tbody>
</table>

When using the extender with an ADSP-BF533 or an ADSP-BF561 EZ-KIT Lite, you must not place any jumpers on JP1. Placing a jumper on JP1 can damage the extender board and/or the EZ-KIT Lite. You must power the ADSP-BF533/ADSP-BF561 EZ-KIT Lite and USB-LAN EZ-Extender with the 7.5V power supply provided with the EZ-KIT Lite.

When using the extender with an ADSP-BF537 EZ-KIT Lite with the Power-over-Ethernet feature, you must place a jumper between JP1 pin 2 and JP1 pin 3. You must power both the EZ-KIT Lite and USB-LAN EZ-Extender with the CAT5E Ethernet cable, which provides power over the signal pairs. The Ethernet cable must be plugged into the Ethernet connector of the ADSP-BF537 EZ-KIT Lite, but not the USB-LAN EZ-Extender. Use the 7.5V power supply provided with the EZ-KIT Lite.

When using the extender with an ADSP-BF537 EZ-KIT Lite without the Power-over-Ethernet, you must not place any jumpers on JP1. You must power both the EZ-KIT Lite and extender with the 7.5V power supply provided with the EZ-KIT Lite.

For an overview of the Power-over-Ethernet interface, refer to “Power-Over-Ethernet” on page 1-5.
LAN Power Jumper (JP2)

The LAN power jumper, JP2, is used to power the SMSC 91C111 device with 3.3V (see Table 2-2). By default and in general, the jumper is plugged in for extra flexibility. You must make changes to JP2 only when no power is applied to the USB-LAN EZ-Extender and/or the EZ-KIT Lite.

Table 2-2. JP2 Settings

<table>
<thead>
<tr>
<th>Functionality</th>
<th>JP2 Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>No power to the LAN91C111</td>
<td>No jumper</td>
</tr>
<tr>
<td>All other cases</td>
<td>JP2.1 and JP2.2 (default)</td>
</tr>
</tbody>
</table>

Link Jumper (JP3)

The link jumper, JP3, connects directly to the link status pin of the SMSC 91C111 device (see Table 2-3). The default setting is to keep JP3 unpopulated. When JP3 is populated, it sends a logic 0 or LOW to the input port used to convey the LINK status (EPHSR bit 14). For more information about populating the link jumper, refer to the SMSC LAN91C111 data sheet.

Table 2-3. JP3 Settings

<table>
<thead>
<tr>
<th>Functionality</th>
<th>JP3 Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic low on 91C111 link status pin</td>
<td>JP3.1 and JP3.2</td>
</tr>
<tr>
<td>All other cases</td>
<td>No jumper (default)</td>
</tr>
</tbody>
</table>
Switch Settings

Before using the Blackfin USB-LAN EZ-Extender, follow the setup procedure in “USB-LAN EZ-Extender Setup” on page 1-1.

Figure 2-3 shows the locations of all switches. The following sections describe all possible switch settings and associated functionality.

Figure 2-3. Switch Locations

**ADDR Enable Switch (SW1.1)**

The address enable switch, SW1.1, is used to control output of the Blackfin address bus buffer (see Table 2-4). By default, the switch is set to ON. When SW1.1 is OFF, you cannot communicate to the USB or Ethernet processor. The address enable switch adds flexibility to the processors because you can turn the switch OFF when capacitive loading is an issue present with other peripherals on the EZ-KIT Lite.
FLAGS Enable Switch (SW1.2)

The flags enable switch, SW1.2, is used to control output of the Blackfin flags multiplexer (see Table 2-5). By default, the SW1.2 switch is set to ON. When SW1.2 is OFF, you cannot communicate to the USB or Ethernet processor. The flags enable switch adds flexibility to the extender—when the switch is OFF, the flags can be used for other peripherals on the EZ-KIT Lite.

<table>
<thead>
<tr>
<th>Functionality</th>
<th>SW1.2 Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackfin address buffer (U1) enabled</td>
<td>ON (default)</td>
</tr>
<tr>
<td>Blackfin address buffer (U1) disabled</td>
<td>OFF</td>
</tr>
</tbody>
</table>

USB IRQ Enable Switch (SW1.3)

The USB IRQ enable switch, SW1.3, is used to control a connection between the Netchip 2272 IRQ line and respective flag pin of the Blackfin processor (see Table 2-6). The switch connects the USB_IRQ line with PF10 on the ADSP-BF533/ADSP-BF561 processor and PF7 on the ADSP-BF537 processor. By default, the USB IRQ enable switch is ON. When SW1.3 is OFF, communication with the USB device cannot be established. The SW1.3 adds flexibility to the extender—when the switch is OFF, the flag can be used for other peripherals on the EZ-KIT Lite.
Switch Settings

Table 2-6. SW1.3 Settings

<table>
<thead>
<tr>
<th>Functionality</th>
<th>SW1.3 Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB IRQ enabled</td>
<td>ON (default)</td>
</tr>
<tr>
<td>USB IRQ disabled</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Test Mode Enable Switch (SW1.4)

The test mode enable switch, SW1.4, is an internal test pin and should not be used (see Table 2-7). By default SW1.4 is OFF.

Table 2-7. SW1.4 Settings

<table>
<thead>
<tr>
<th>Functionality</th>
<th>SW1.4 Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test mode enabled</td>
<td>ON</td>
</tr>
<tr>
<td>Test mode disabled</td>
<td>OFF (default)</td>
</tr>
</tbody>
</table>

Serial ROM Enable Switch (SW2.1)

The serial ROM enable switch, SW2.1, is used to control a connection between the LAN91C111 Ethernet chip and its serial ROM (U3) (see Table 2-8). When the switch is disabled, the Ethernet chip loads its Media Access Control (MAC) address from the serial ROM. By default SW2.1 is OFF. When the switch is ON, you cannot communicate with the provided Ethernet application code. The switch adds flexibility to the extender—you can modify the application code and generate another MAC address when SW2.1 is ON.

Table 2-8. SW2.1 Settings

<table>
<thead>
<tr>
<th>Functionality</th>
<th>SW2.1 Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial ROM disabled</td>
<td>ON</td>
</tr>
<tr>
<td>Serial ROM enabled</td>
<td>OFF (default)</td>
</tr>
</tbody>
</table>
IOS[2:0] Switch (SW2.2, SW2.3, SW2.4)

The IOS[2:0] bits on the Blackfin USB-LAN EZ-Extender are connected directly to the IOS[2:0] pins of the LAN91C111 Ethernet chip. By default, the switches are OFF. The IOS[2:0] pins are used in conjunction with the Serial ROM Enable Switch (SW2.1) to select between the pre-defined EEPROM configurations. For more information about the switches, refer to the SMSC LAN91C111 data sheet.
## USB-LAN EZ-Extender Bill of Materials

The bill of materials corresponds to “USB-LAN EZ-Extender Schematic” on page B-1.

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Qty.</th>
<th>Description</th>
<th>Reference Designator</th>
<th>Manufacturer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>25MHZ OSC005</td>
<td>Y1</td>
<td>EPSON</td>
<td>MA-505 25.0000 MHZ</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>SN74AHC1G00</td>
<td>U2</td>
<td>TI</td>
<td>SN74AHC1G00DBVR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOT23-5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>PI74AVC+16244</td>
<td>U1</td>
<td>PERICOM SEMI</td>
<td>PI74AVC+16244AE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TSSOP48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>93LC46B SOIC8</td>
<td>U3</td>
<td>MICROCHIP</td>
<td>93LC46B/SNG</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>LAN91C111 TQFP128</td>
<td>U7</td>
<td>SMSC</td>
<td>LAN91C111-NU</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>NET2272 TQFP64</td>
<td>U9</td>
<td>NET CHIP</td>
<td>NET2272REV1A-LF</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>PI3B16245 TSSOP48</td>
<td>U10, U16-17</td>
<td>PERICOM SEMI</td>
<td>PI3B16245AE</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>PI3B3257 TSSOP16</td>
<td>U12</td>
<td>PERICOM SEMI</td>
<td>PI3B3257LE</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>74LVC139 TSSOP16</td>
<td>U5</td>
<td>PHILIPS</td>
<td>74LVC139PW</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>30MHZ OSC010</td>
<td>Y2</td>
<td>ECLIPTEK</td>
<td>E2SAA10-30.000M</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>PA1134 ICS005</td>
<td>T1</td>
<td>PULSE</td>
<td>PA1134NL</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>PS2911-1 ICS006</td>
<td>U8</td>
<td>NEC</td>
<td>PS2911-1-F3-A</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>SI3440DV TSOP6</td>
<td>U11</td>
<td>VISHAY</td>
<td>Si3440DV-T1-E3</td>
</tr>
<tr>
<td>Ref.</td>
<td>Qty.</td>
<td>Description</td>
<td>Reference Designator</td>
<td>Manufacturer</td>
<td>Part Number</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>---------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>TLV431A SOT23-3</td>
<td>U13</td>
<td>ON-SEMI</td>
<td>TLV431ASN1T1G</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>LTC4267 SSOP16</td>
<td>U4</td>
<td>LINEAR TECH</td>
<td>LTC4267CGN#PBF</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>ADP3330ARTZ-33 SOT23-6</td>
<td>VR2</td>
<td>ANALOG DEVICES</td>
<td>ADP3330ARTZ3.3-RL7</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>ADP3330ARTZ-25 SOT23-6</td>
<td>VR1</td>
<td>ANALOG DEVICES</td>
<td>ADP3330ARTZ-2.5-R7</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>USB 4PIN CON009</td>
<td>J3</td>
<td>MILL MAX</td>
<td>897-43-004-90-000000</td>
</tr>
<tr>
<td>19</td>
<td>3</td>
<td>0.05 45x2 CON018</td>
<td>P1-3</td>
<td>SAMTEC</td>
<td>TFC-145-32-F-D</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>DIP4 SWT018</td>
<td>SW1-2</td>
<td>ITT</td>
<td>TDA04HOSB1</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>RJ45 8PIN CON_RJ45B</td>
<td>J1</td>
<td>HALO ELETRONIC</td>
<td>HFJ11-2450E-RL</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>IDC 2X1 IDC2X1</td>
<td>JP2-3</td>
<td>FCI</td>
<td>90726-402HLF</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>IDC 3X1 IDC3X1</td>
<td>JP1</td>
<td>FCI</td>
<td>90726-403HLF</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>0 1/4W 5% 1206</td>
<td>R56</td>
<td>KOA</td>
<td>0.0ECTRk7372BTTED</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>YELLOW LED001</td>
<td>LED1-2</td>
<td>PANASONIC</td>
<td>LN1461C</td>
</tr>
<tr>
<td>26</td>
<td>7</td>
<td>0.01UF 100V 10% 0805</td>
<td>C1,C3,C6,C8,</td>
<td>AVX</td>
<td>08051C103KAT2A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C11,C13,C16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>36</td>
<td>0.1UF 50V 10% 0805</td>
<td>C2,C7,C9-10,</td>
<td>AVX</td>
<td>08055C104KAT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C12,C19-27,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C30-41,C43,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C48-56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>32</td>
<td>10K 1/10W 5% 0805</td>
<td>R1-4,R8,R10-18,</td>
<td>VISHAY</td>
<td>CRCW080510K0JNEA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R36-45,R48,R57,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R60-65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>33 1/10W 5% 0805</td>
<td>R55</td>
<td>VISHAY</td>
<td>CRCW080533R0JNEA</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>4.7K 1/10W 5% 0805</td>
<td>R34</td>
<td>VISHAY</td>
<td>CRCW08054K70JNEA</td>
</tr>
</tbody>
</table>
## USB-LAN EZ-Extender Bill of Materials

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Qty.</th>
<th>Description</th>
<th>Reference Designator</th>
<th>Manufacturer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>1</td>
<td>1M 1/10W 5% 0805</td>
<td>R6</td>
<td>VISHAY</td>
<td>CRCW08051M00JNEA</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>1.5K 1/10W 5% 0805</td>
<td>R20</td>
<td>VISHAY</td>
<td>CRCW08051K50FKEA</td>
</tr>
<tr>
<td>33</td>
<td>3</td>
<td>10UF 16V 10% B</td>
<td>CT1-3</td>
<td>AVX</td>
<td>TAJB106K016R</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
<td>300MA LL4148 DL35</td>
<td>D3</td>
<td>DIODES INC</td>
<td>LL4148-13</td>
</tr>
<tr>
<td>35</td>
<td>5</td>
<td>600 100MHZ 500MA 1206</td>
<td>FER1-4,FER7</td>
<td>STEWARD</td>
<td>HZ1206B601R-10</td>
</tr>
<tr>
<td>36</td>
<td>1</td>
<td>11.0K 1/8W 1% 1206</td>
<td>R25</td>
<td>VISHAY</td>
<td>CRCW120611K0FKEA</td>
</tr>
<tr>
<td>37</td>
<td>2</td>
<td>30PF 100V 5% 1206</td>
<td>C14-15</td>
<td>AVX</td>
<td>12061A300JAT2A</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
<td>47.0K 1/10W 1% 0805</td>
<td>R7</td>
<td>VISHAY</td>
<td>CRCW080547K0FKEA</td>
</tr>
<tr>
<td>39</td>
<td>4</td>
<td>0 1/10W 5% 0805</td>
<td>R28-29,R46,R54</td>
<td>VISHAY</td>
<td>CRCW08050000Z0E</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>3.32K 1/10W 1% 0805</td>
<td>R53</td>
<td>PANASONIC</td>
<td>ERJ-6ENF3321V</td>
</tr>
<tr>
<td>41</td>
<td>2</td>
<td>42 100MHZ 4A 0805</td>
<td>FER5-6</td>
<td>DIGI-KEY</td>
<td>587-1768-2-ND</td>
</tr>
<tr>
<td>42</td>
<td>2</td>
<td>39.0 1/10W 1% 0805</td>
<td>R19,R21</td>
<td>DIGI-KEY</td>
<td>311-39.0CRTR-ND</td>
</tr>
<tr>
<td>43</td>
<td>4</td>
<td>0.47UF 16V 10% 0805</td>
<td>C4-5,C44-45</td>
<td>AVX</td>
<td>0805YC474KAT2A</td>
</tr>
<tr>
<td>44</td>
<td>3</td>
<td>1UF 10V 10% 0805</td>
<td>C17-18,C42</td>
<td>AVX</td>
<td>0805ZC105KAT2A</td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>680UF 6.3V 10% E</td>
<td>CT6</td>
<td>AVX</td>
<td>TPSE687K006R0045</td>
</tr>
<tr>
<td>46</td>
<td>1</td>
<td>100.0 1/10W 1% 0805</td>
<td>R51</td>
<td>DIGI-KEY</td>
<td>311-100CRCT-ND</td>
</tr>
<tr>
<td>47</td>
<td>2</td>
<td>10PF 50V 5% 0805</td>
<td>C46-47</td>
<td>AVX</td>
<td>08055A100JAT2A</td>
</tr>
<tr>
<td>Ref.</td>
<td>Qty.</td>
<td>Description</td>
<td>Reference Designator</td>
<td>Manufacturer</td>
<td>Part Number</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>-------------</td>
<td>----------------------</td>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>48</td>
<td>4</td>
<td>24.9 1/10W 1% 0805</td>
<td>R26-27,R30-31</td>
<td>DIGI-KEY</td>
<td>311-24.9CRTR-ND</td>
</tr>
<tr>
<td>49</td>
<td>2</td>
<td>49.9 1/10W 1% 0805</td>
<td>R32-33</td>
<td>DIGI-KEY</td>
<td>311-49.9CRCT-ND</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
<td>2.43K 1/10W 1% 0805</td>
<td>R5</td>
<td>DIGI-KEY</td>
<td>311-2.43KCRTR-ND</td>
</tr>
<tr>
<td>51</td>
<td>1</td>
<td>40A SMAJ58A DIO003</td>
<td>D1</td>
<td>DIODES INC</td>
<td>SMAJ58A-13-F</td>
</tr>
<tr>
<td>52</td>
<td>1</td>
<td>10A SBM1040 DIO004</td>
<td>D2</td>
<td>DIODES INC</td>
<td>SBM1040-13-F</td>
</tr>
<tr>
<td>53</td>
<td>1</td>
<td>0.8A HD01 MDIP4</td>
<td>D4</td>
<td>DIODES INC</td>
<td>HD01-T</td>
</tr>
<tr>
<td>54</td>
<td>1</td>
<td>68.1 1/10W 1% 0805</td>
<td>R47</td>
<td>VISHAY</td>
<td>CRCW080568R1FNEA</td>
</tr>
<tr>
<td>55</td>
<td>1</td>
<td>6.81K 1/10W 1% 0805</td>
<td>R49</td>
<td>VISHAY</td>
<td>CRCW08056K81FNEA</td>
</tr>
<tr>
<td>56</td>
<td>1</td>
<td>0.12 1/10W 1% 0603</td>
<td>R50</td>
<td>PANASONIC</td>
<td>ERJ-3RSFR12V</td>
</tr>
<tr>
<td>57</td>
<td>2</td>
<td>330 1/8W 5% 1206</td>
<td>R22-23</td>
<td>DALE</td>
<td>CRCW1206330RJNEA</td>
</tr>
<tr>
<td>58</td>
<td>1</td>
<td>10.0K 1/8W 1% 1206</td>
<td>R52</td>
<td>DALE</td>
<td>CRCW120610K0FKEA</td>
</tr>
<tr>
<td>59</td>
<td>1</td>
<td>4.7UF 10V 20% B</td>
<td>CT4</td>
<td>DIGI-KEY</td>
<td>399-3724-2-ND</td>
</tr>
<tr>
<td>60</td>
<td>1</td>
<td>1K 1/8W 5% 0805</td>
<td>R9</td>
<td>DIGI-KEY</td>
<td>311-1.0KARTR-ND</td>
</tr>
</tbody>
</table>
BLACKFIN USB-LAN EZ-EXTENDER
SCHEMATIC
POWER OVER ETHERNET CIRCUITRY
FOR USE WITH ADSP-BF537 EZ-KIT LITE ONLY

WARNING: THE EZ-KIT LITE MUST NOT BE POWERED WHEN THESE JUMPERS ARE POPULATED.

SOURCE OF 5V PWR
EZ-KIT POWER
NO JUMPER
USE TEST MODE
J21 and J22
DENOTES DEFAULT SETTING

MII INTERFACE
INDEX

A
address enable switch (SW1.1), 2-6
ADSP-BF533/37/61 processors
asynchronous memory bank, 1-3, 1-4
programmable flags, 1-3, 1-4, 2-7
architecture, of USB-LAN EZ-Extender, 2-2

B
bill of materials, A-1
block diagram, 2-2
board schematic (USB-LAN EZ-Extender), B-1

C
configuration, of USB-LAN EZ-Extender, 1-1
connectors
   J1-3 (expansion), 1-2
   J2 (PHY devices), 1-6

D
dimensions, of Blackfin USB-LAN EZ-Extender, ix

E
Ethernet
   interface, viii, 1-4
cable, 2-4
   software documentation, 1-3
   expansion interface, viii, 1-2

F
flag pins, See programmable flags (PFs)
flags enable switch (SW1.2), 2-7

I
interfaces, See Ethernet, USB, PoE, MII
IOS switch (SW2.2-2.4), 2-9
IRQ line, 1-4, 2-7

J
J2 connector, 1-6
jumpers
   map of locations, 2-3
   JP1 (power), 2-4
   JP2 (LAN power), 2-5
   JP3 (link power), 2-5

L
LAN
   devices, viii, 1-5, 2-8
   power jumper (JP2), 2-5
   link jumper (JP3), 2-5
Index

M
Media Access Control (MAC) address, 2-8
Media Independent interface (MII) (ADSP-BF537 processors), 1-6
Midpan devices, 1-5

O
optional interfaces, 1-5

P
PHY devices, 1-6
Power-over-Ethernet (PoV) interface (ADSP-BF537 processors), 1-5, 2-4
power select jumper (JP1), 2-4
product overview, viii
programmable flags (PFs)
  PF10 (ADSP-BF533/61 USB_IRQ), 1-4, 2-7
  PF11 (ADSP-BF533/61 USB devices), 1-3
  PF6 (ADSP-BF537 USB devices), 1-3
  PF7 (ADSP-BF537 USB_IRQ), 1-4, 2-7
  PF9 (ADSP-BF533/61 Ethernet IRQ), 1-4

R
reset operation, 1-4

S
schematic, of USB-LAN EZ-Extender, B-1
serial ROM enable switch (SW2.1), 2-8, 2-9
setup, of USB-LAN EZ-Extender, 1-1
SMSC 91C111 device, 2-5
supervisory reset circuit, 1-4
SW1.1 (address enable) switch, 2-6
SW1.2 (flag enable) switch, 2-7
SW1.3 (USB IRQ enable) switch, 2-7
SW1.4 (test mode enable) switch, 2-8
SW2.1 (serial ROM enable) switch, 2-8, 2-9
SW2.2-2.4 (IOS) switch, 2-9
switches
  See also SWx
diagram of locations, 2-6
system architecture, 2-2

T
technical support, xi
test mode enable switch (SW1.4), 2-8

U
USB
  interface, 1-3
devices, viii, 1-4
  IRQ enable switch (SW1.3), 2-7
  software documentation, 1-2
  USB_IRQ line, 1-4, 2-7