

SHARC® USB EZ-Extender® Manual

Revision 2.0, April 2006

Part Number
82-000197-01

Analog Devices, Inc.
One Technology Way
Norwood, Mass. 02062-9106



Copyright Information

©2006 Analog Devices, Inc., ALL RIGHTS RESERVED. This document may not be reproduced in any form without prior, express written consent from Analog Devices, Inc.

Printed in the USA.

Limited Warranty

The SHARC USB EZ-Extender is warranted against defects in materials and workmanship for a period of one year from the date of purchase from Analog Devices or from an authorized dealer.

Disclaimer

Analog Devices, Inc. reserves the right to change this product without prior notice. Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use; nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under the patent rights of Analog Devices, Inc.

Trademark and Service Mark Notice

The Analog Devices logo, SHARC, VisualDSP++, EZ-KIT Lite, and EZ-Extender are registered trademarks of Analog Devices, Inc.

All other brand and product names are trademarks or service marks of their respective owners.

Regulatory Compliance

The SHARC USB EZ-Extender has been certified to comply with the essential requirements of the European EMC directive 89/336/EEC (inclusive 93/68/EEC) and, therefore, carries the “CE” mark.

The SHARC USB EZ-Extender had been appended to Analog Devices Development Tools Technical Construction File referenced “DSPTOOLS1” dated December 21, 1997 and was awarded CE Certification by an appointed European Competent Body and is on file.



The EZ-KIT Lite evaluation system 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 EZ-KIT Lite boards in the protective shipping package.



CONTENTS

PREFACE

Product Overview	viii
Purpose of This Manual	ix
Intended Audience	ix
Manual Contents	ix
What's New in This Manual	x
Technical or Customer Support	x
Supported Products	xi
Product Information	xi
Related Documents	xi
Notation Conventions	xiv

USB EZ-EXTENDER INTERFACE

USB EZ-Extender Setup	1-1
USB Software Documentation	1-2
USB 2.0 Interface	1-2

USB EZ-EXTENDER HARDWARE REFERENCE

System Architecture	2-1
Processor Select Jumper (JP1)	2-2

CONTENTS

USB EZ-EXTENDER BILL OF MATERIALS

USB EZ-EXTENDER SCHEMATIC

Title Page	B-1
Expansion Interface	B-2
Bus Switches	B-3
USB Interface	B-4

INDEX

PREFACE

Thank you for purchasing the SHARC[®] USB EZ-Extender[®], Analog Devices, Inc. extension board to the EZ-KIT Lite[®] evaluation systems for ADSP-21262, ADSP-21364, and ADSP-21369 processors.

The SHARC processors are based on a 32-bit super Harvard architecture that includes a unique memory architecture comprised of two large on-chip, dual-ported SRAM blocks coupled with a sophisticated IO processor, which gives a SHARC processor the bandwidth for sustained high-speed computations. SHARC processors represents today's de facto standard for floating-point processor targeted for premium audio applications.

The EZ-KIT Lites and SHARC USB EZ-Extender are designed to be used in conjunction with the VisualDSP++[®] development environment. VisualDSP++ offers a powerful programming tool with new flexibility that significantly decreases time required to port software code to a processor, reducing time-to-market.

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

Product Overview

The SHARC USB EZ-Extender is a separately sold extension board that plugs onto the expansion interface of the ADSP-21262, ADSP-21364, or ADSP-21369 EZ-KIT Lite evaluation system. The extension board aids the design and prototyping phases of ADSP-21262, ADSP-21364, or ADSP-21369 processor targeted applications.

The board extends the capabilities of the evaluation system by providing a connection between the parallel port or asynchronous memory bus of the SHARC processor and a USB 2.0 device.

- USB 2.0 interface
 - ✓ PLX Technology's NetChip 2272 device
 - ✓ USB driver and application code
 - ✓ USB logo certified
- No power supply required
 - ✓ Derives power from EZ-KIT Lite
- CE certified
- Dimensions
 - ✓ 3.13 in (H) x 3.6 in (W)

Before using any of the interfaces, follow the setup procedure in [“USB EZ-Extender Setup”](#) on page 1-1.

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

Purpose of This Manual

The *SHARC USB EZ-Extender Manual* describes the operation and configuration of the components on the extension board. A schematic and a bill of materials are provided as a reference for future SHARC processor board designs.

Intended Audience

This manual is a user's guide and reference to the SHARC USB EZ-Extender. Programmers who are familiar with the Analog Devices SHARC processor architecture, operation, and development tools are the primary audience for this manual.

Programmers who are unfamiliar with VisualDSP++ or EZ-KIT Lite evaluation software should refer to the *ADSP-21262*, *ADSP-21364*, or *ADSP-21369 Evaluation System Manual*, VisualDSP++ online Help, and user's or getting started guides. For the locations of these documents, refer to [“Related Documents”](#).

Manual Contents

The manual consists of:

- Chapter 1, [“USB EZ-Extender Interface”](#) on page 1-1
Provides basic board information.
- Chapter 2, [“USB EZ-Extender Hardware Reference”](#) on page 2-1
Provides information on the hardware aspects of the board.
- Appendix A, [“USB EZ-Extender Bill Of Materials”](#) on page A-1
Provides a list of components used to manufacture the EZ-Extender board.

What's New in This Manual

- Appendix B, “[USB 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 now is part of the online Help. The PDF version of the *SHARC USB EZ-Extender Manual* is located in the Docs\EZ-KIT Lite Manuals folder on the installation CD. Alternatively, the book can be found on the Analog Devices Web site: www.analog.com/processors.

What's New in This Manual

This edition of the *SHARC USB EZ-Extender Manual* has been updated for the latest revision of VisualDSP++.

Technical or Customer Support

You can reach Analog Devices, Inc. Customer Support in the following ways:

- Visit the Embedded Processing and DSP products Web site at <http://www.analog.com/processors/technicalSupport>
- E-mail tools questions to processor.tools.support@analog.com
- E-mail processor questions to processor.support@analog.com (World wide support)
processor.europe@analog.com (Europe support)
processor.china@analog.com (China support)
- Phone questions to **1-800-ANALOGD**

- Contact your Analog Devices, Inc. local sales office or authorized distributor
- Send questions by mail to:
Analog Devices, Inc.
One Technology Way
P.O. Box 9106
Norwood, MA 02062-9106
USA

Supported Products

The SHARC USB EZ-Extender is designed as an extension board to the ADSP-21262, ADSP-21364, and ADSP-21369 EZ-KIT Lite evaluation systems.

Product Information

You can obtain product information from the Analog Devices Web site, from the product CD-ROM, or from the printed publications (manuals).

Analog Devices is online at www.analog.com. Our Web site provides information about a broad range of products—analog integrated circuits, amplifiers, converters, and digital signal processors.

Related Documents

For information on product related development software, see the following publications.

All documentation is available online. Most documentation is available in printed form.

Product Information

Table 1. Related Processor Publications

Title	Description
<i>ADSP-21262 SHARC Microprocessor Datasheet</i>	General functional description, pinout, and timing of the ADSP-21262 processors
<i>ADSP-21364 SHARC Microprocessor Datasheet</i>	General functional description, pinout, and timing of the ADSP-21364 processors
<i>ADSP-21369 SHARC Processor Datasheet</i>	General functional description, pinout, and timing of the ADSP-21369 processors
<i>ADSP-2126x SHARC DSP Core Manual</i> <i>ADSP-2126x SHARC DSP Peripherals Manual</i>	ADSP-21262 processors: description of internal architecture and all register functions
<i>ADSP-2136x SHARC Processor Hardware Reference for the ADSP-21363/4/5/6 Processors</i>	ADSP-21364 processors: description of internal architecture and all register functions
<i>ADSP-2136x SHARC Processor Hardware Reference for ADSP-21367/8/9 Processors</i>	ADSP-21369 processors: description of internal architecture and all register functions
<i>ADSP-21160 SHARC DSP Instruction Set Reference</i>	ADSP-21262 processors: description of all allowed assembly instructions
<i>ADSP-2136x SHARC Processor Programming Reference</i>	ADSP-21264 and ADSP-21369 processors: description of all allowed assembly instructions

Table 2. Related VisualDSP++ Publications

Title	Description
<i>ADSP-21262 EZ-KIT Lite Evaluation System Manual</i>	Description of the ADSP-21262 EZ-KIT Lite features and usage
<i>ADSP-21364 EZ-KIT Lite Evaluation System Manual</i>	Description of the ADSP-21364 EZ-KIT Lite features and usage
<i>ADSP-21369 EZ-KIT Lite Evaluation System Manual</i>	Description of the ADSP-21369 EZ-KIT Lite features and usage
<i>VisualDSP++ User's Guide</i>	Description of VisualDSP++ features and usage
<i>VisualDSP++ Assembler and Preprocessor Manual</i>	Description of the assembler function and commands
<i>VisualDSP++ C/C++ Compiler and Library Manual for SHARC Processors</i>	Description of the compiler function and commands for SHARC processors

Table 2. Related VisualDSP++ Publications (Cont'd)




Title	Description
<i>VisualDSP++ Linker and Utilities Manual</i>	Description of the linker function and commands
<i>VisualDSP++ Loader and Utilities Manual</i>	Description of the loader function and commands


Visit the Technical Library Web site to access all processor and tools manuals and datasheets:

<http://www.analog.com/processors/resources/technicalLibrary>.

Notation Conventions

Text conventions used in this manual are identified and described as follows.

Example	Description
{this that}	Alternative required items in syntax descriptions appear within curly brackets and separated by vertical bars; read the example as <i>this</i> or <i>that</i> . One or the other is required.
[this that]	Optional items in syntax descriptions appear within brackets and separated by vertical bars; read the example as an optional <i>this</i> or <i>that</i> .
[this,...]	Optional item lists in syntax descriptions appear within brackets delimited by commas and terminated with an ellipsis; read the example as an optional comma-separated list of <i>this</i> .
.SECTION	Commands, directives, keywords, and feature names are in text with letter gothic font.
<i>filename</i>	Non-keyword placeholders appear in text with italic style format.
	Note: For correct operation, ... A Note provides supplementary information on a related topic. In the online version of this book, the word Note appears instead of this symbol.
	Caution: Incorrect device operation may result if ... Caution: Device damage may result if ... A Caution identifies conditions or inappropriate usage of the product that could lead to undesirable results or product damage. In the online version of this book, the word Caution appears instead of this symbol.
	Warning: Injury to device users may result if ... A Warning identifies conditions or inappropriate usage of the product that could lead to conditions that are potentially hazardous for the devices users. In the online version of this book, the word Warning appears instead of this symbol.

 Additional conventions, which apply only to specific chapters, may appear throughout this document.

1 USB EZ-EXTENDER INTERFACE

This chapter provides the setup procedures for both the SHARC USB EZ-Extender and EZ-KIT Lite (ADSP-21262, ADSP-21364, or ADSP-21369) and describes the USB interface the extender supports.

USB EZ-Extender Setup

It is very important to set up all of the components of the system containing the USB EZ-Extender before applying power to that system. The following procedure is recommended for the correct setup.

Power your system when these steps are completed:

1. Read the applicable design interface section in this chapter—the text provides an overview of the capabilities of the interface.
2. Read [“System Architecture” on page 2-1](#) to understand the physical connections of the extension board. For detailed information, refer to [“USB EZ-Extender Schematic” on page B-1](#).
3. Remove any rubber feet that may be attached to the EZ-KIT Lite. In place of these rubber feet, install the four nylon feet and screws provided with the USB EZ-Extender. Install the nylon 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.

USB 2.0 Interface

4. Set the jumper on the USB EZ-Extender board. Use the block diagram in [Figure 2-1 on page 2-1](#) in conjunction with “[Processor Select Jumper \(JP1\)](#)” on page 2-2.
5. Set the switches on the EZ-KIT Lite board. If not already, familiarize yourself with the documentation and schematics of the EZ-KIT Lite (see “[Related Documents](#)”). Compare the expansion interface signals of the USB EZ-Extender board with the signals of the EZ-KIT Lite board 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 EZ-Extender on the EZ-KIT Lite via the three-connector expansion interface.

USB Software Documentation

For information on the USB software (host-side and device-side), refer to the `USB Software Readme.txt` file located in the `...\212xx\Examples\USB EZ-EXTENDER` or `...\213xx\Examples\USB EZ-EXTENDER` subdirectory of the VisualDSP++ installation directory.

USB 2.0 Interface

The USB EZ-Extender allows you to connect a USB 2.0 chip to a SHARC processor without any other programmable logic. PLX Technology’s NetChip 2272 device ties directly to the parallel port or asynchronous memory bank of the SHARC processor. You can read from and write to the USB 2.0 controller by directly addressing the named memory bank.

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

- FLAG2 on the ADSP-21262 and ADSP-21364 processors
- FLAG0 on the ADSP-21369 processor

The USB interrupt request pin (IRQ) line of the extender connects to FLAG1 on the ADSP-21262, ADSP-21364, and ADSP-21369 processors. This flag pin may be used for push buttons or LEDs on the respective EZ-KIT Lites; consequently, the user must make the proper changes to that EZ-KIT Lite.

When writing to and reading from the USB device using the EZ-KIT Lites, use memory addresses listed in [Table 1-1](#).

Table 1-1. USB Device Memory

EZ-KIT Lite	Starting Address	Ending Address
ADSP-21262	0x0100 6C00	0x0100 6FE0
ADSP-21364	0x0100 6C00	0x0100 6FE0
ADSP-21369	0x0C00 0000	0x0C00 03E0

USB 2.0 Interface

2 USB EZ-EXTENDER HARDWARE REFERENCE

This chapter describes the hardware design of the USB EZ-Extender. The following topics are covered.

- “System Architecture” on page 2-1
Describes the extension board’s configuration.
- “Processor Select Jumper (JP1)” on page 2-2
Describes the configuration jumper’s functionality.

System Architecture

A block diagram of the SHARC USB EZ-Extender is shown in [Figure 2-1](#).

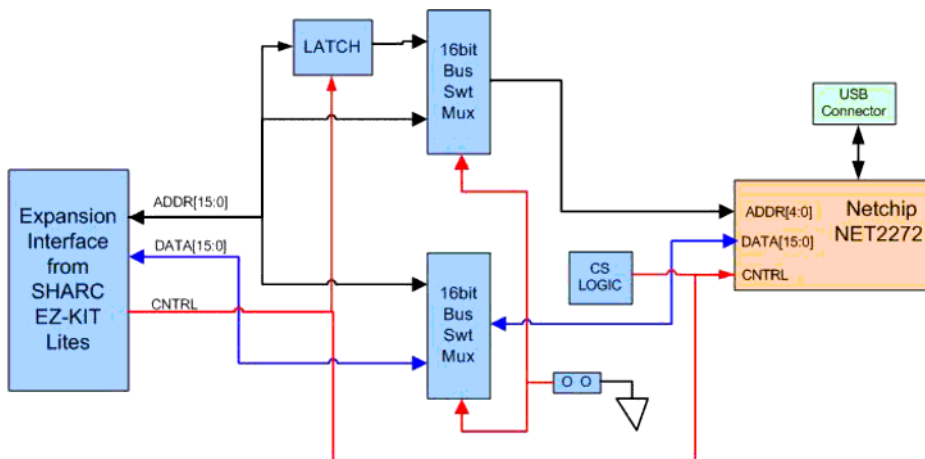


Figure 2-1. Block Diagram

Processor Select Jumper (JP1)

Processor Select Jumper (JP1)

Before using the SHARC USB EZ-Extender, follow the steps in “[USB EZ-Extender Setup](#)” on page 1-1.

Figure 2-2 shows the location of the processor select jumper JP1. A two-pin jumper can be placed on the respective jumper header for different functionality.

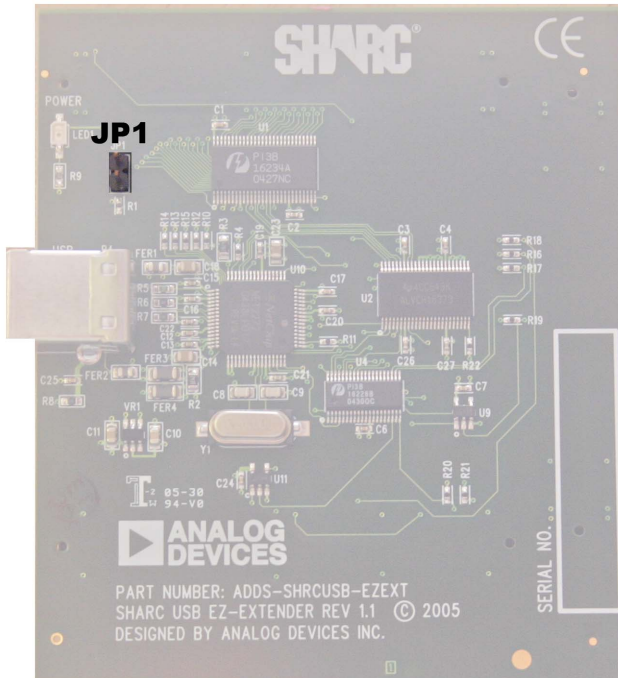


Figure 2-2. JP1 Jumper Settings

Table 2-1 describes the jumper settings and functionality. The jumper, by default, must have no jumpers on any of its pins.

Table 2-1. JP1 Settings

EZ-KIT Lite	JP1 Setting
ADSP-21262/ADSP-21364	No jumpers (default)
ADSP-21369	Installed



When using the extender with an ADSP-21262 or ADSP-21364 EZ-KIT Lite, you must not place any jumpers on JP1. Placing a jumper on JP1 can damage the extender card and/or the EZ-KIT Lite. When using the extender with an ADSP-21369 EZ-KIT Lite, you must place the jumper on JP1.

Processor Select Jumper (JP1)

A USB EZ-EXTENDER BILL OF MATERIALS

The bill of materials corresponds to “[USB EZ-Extender Schematic](#)” on [page B-1](#). Please check the latest schematic on the Analog Devices Web site:

<http://www.analog.com/Processors/Processors/DevelopmentTools/technicalLibrary/manuals/DevToolsIndex.html#Evaluation%20Kit%20Manuals>.

Ref.	Qty.	Description	Reference Designators	Manufacturer	Part Number
1	1	SN74LVC1G32 SOT23-5	U9	TI	SN74LVC1G32DBVRE4
2	1	SN74LVC1G08 SOT23-5	U11	TI	SN74LVC1G08DBVR
3	1	NET2272 TQFP64	U10	NET CHIP	NET2272REV1A-LF
4	1	PI3B16234 TSSOP56	U1	PERICOM SEMI	PI3B16234AE
5	1	30MHZOSC010	Y1	ECLIPTEK	E2SAA10-30.000M
6	1	PI3B16226 BQSOP40	U4	PERICOM SEMI	PI3B16226BE
7	1	SN74ALVCH163 73 TSSOP48	U2	TI	SN74ALVCH16373DGGR G4
8	1	ADP3330ARTZ-2 5 SOT23-6	VR1	ANALOG DEVICES	ADP3330ARTZ-2.5-R7
9	1	USB 4PIN CON009	P4	MILL MAX	897-43-004-90-000 000

Ref.	Qty.	Description	Reference Designators	Manufacturer	Part Number
10	3	0.05 45x2 CON018	P1-3	SAMTEC	TFC-145-32-F-D
11	1	IDC2X1IDC2X1	JP1	FCI	90726-402HLF
12	2	600 100MHZ 500MA 1206	FER3-4	STEWART	HZ1206B601R-10
13	1	47.0K 1/10W 1% 0805	R3	VISHAY	CRCW080547K0FKEA
14	2	42 100MHZ 4A 0805	FER1-2	TAIYO YUDEN	FBMJ2125HS420-T
15	2	0.47UF 16V 10% 0805	C10-11	AVX	0805YC474KAT2A
16	3	10UF 6.3V 10% 0805	C14,C18,C23	AVX	080560106KAT2A
17	19	0.01UF 16V 10% 0402	C1-4,C6-7, C12-13,C15-17, C19-22,C24-27	AVX	0402YC103KAT2A
18	15	10K 1/16W 5% 0402	R1,R4,R10-22	VISHAY	CRCW040210K0FKED
19	2	10PF 50V 5% 0805	C8-9	AVX	08055A100JAT2A
20	1	1.5K 1/10W 5% 0603	R5	PANASONIC	ERAV15J152V
21	2	39.0 1/10W 1% 0603	R6-7	VISHAY	CRCW-060339R0FKEA
22	1	2.43K 1/10W 1% 0805	R2	DIGI KEY	311-2.43KCRTR-ND
23	1	330 1/10W 5% 0603	R9	VISHAY	CRCW0603330RJNEA

USB EZ-Extender Bill Of Materials

Ref.	Qty.	Description	Reference Designators	Manufacturer	Part Number
24	1	1M 1/10W 5% 0603	R8	VISHAY	CRCW06031M00FNEA
25	1	GREEN-SMT LED001	LED1	PANASONIC	LN1361CTR

A

B

C

D

1

1

2

2

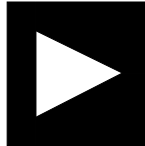
3

3

4

4

SHARC USB EZ-EXTENDER Schematic

		ANALOG DEVICES	20 Cotton Road Nashua, NH 03063 PH: 1-800-ANALOGD
Title		SHARC USB EZ-EXTENDER TITLE	
Size C	Board No.	A0197-2005	Rev 1.1B
Date	4-24-2006_10:01	Sheet	1 of 4

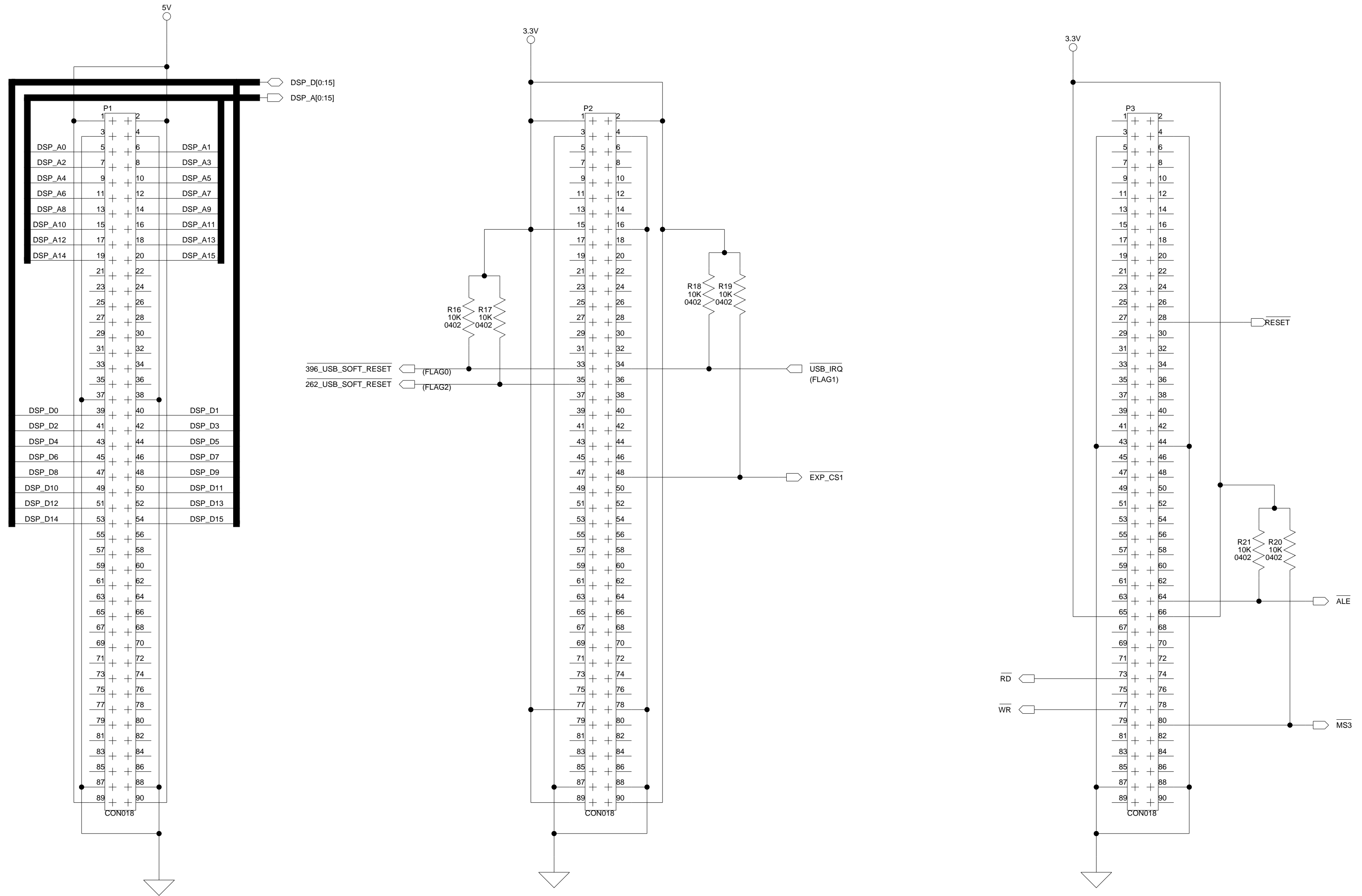
A

B

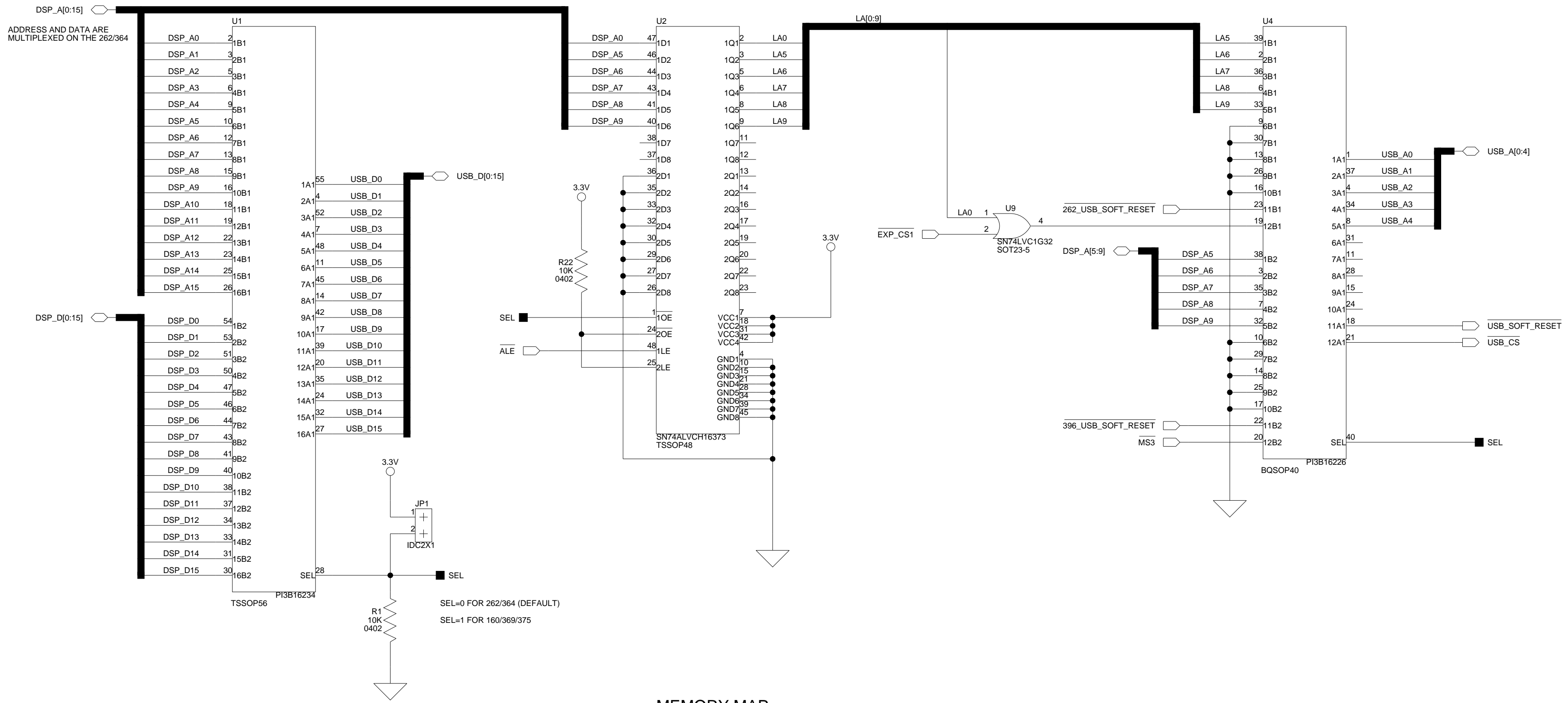
C

D

EXPANSION INTERFACE (TYPE A)

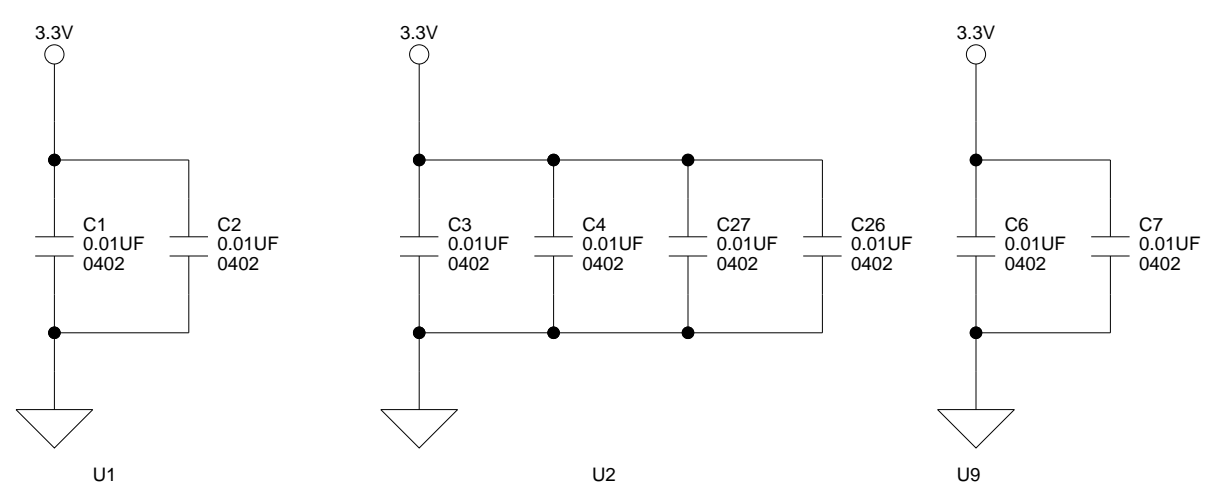


 ANALOG DEVICES		20 Cotton Road Nashua, NH 03063 PH: 1-800-ANALOGD	
		Title SHARC USB EZ-EXTENDER EXPANSION INTERFACE	
Size C	Board No. A0197-2005	Rev 1.1B	
Date 4-24-2006_10:01	Sheet 2 of 4		Rev 1.1B



MEMORY MAP

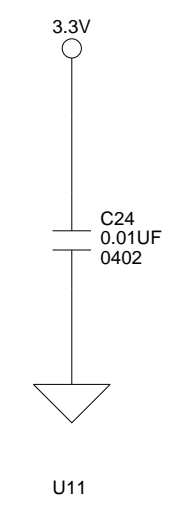
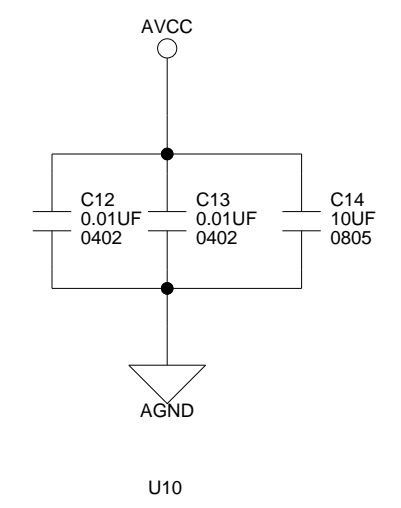
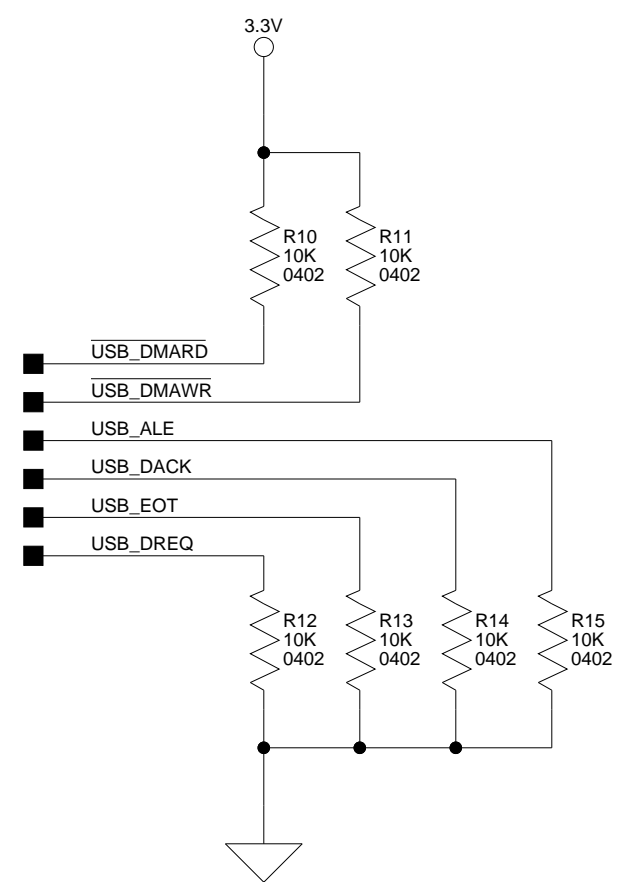
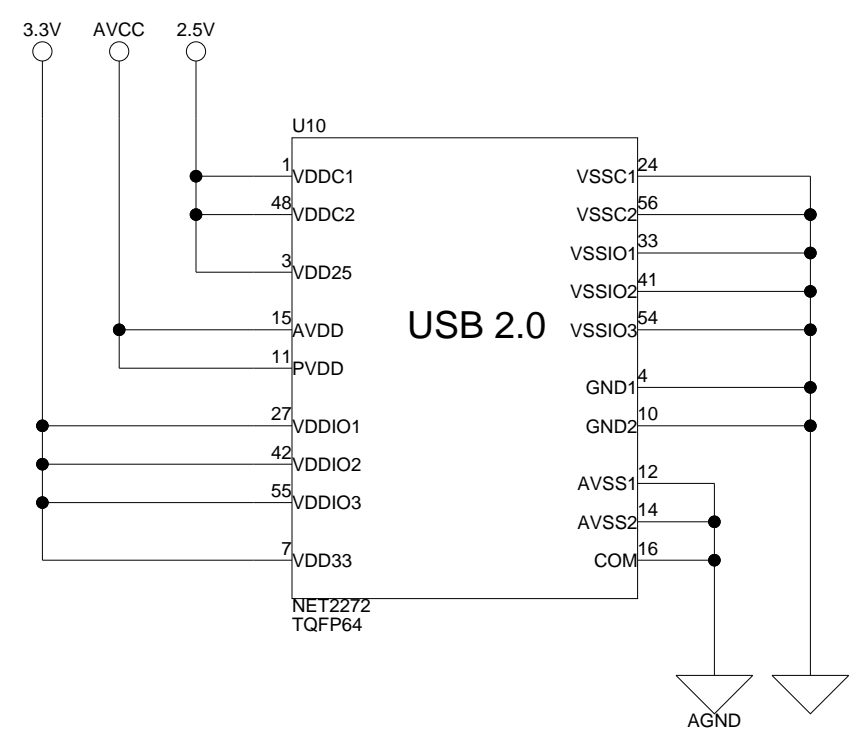
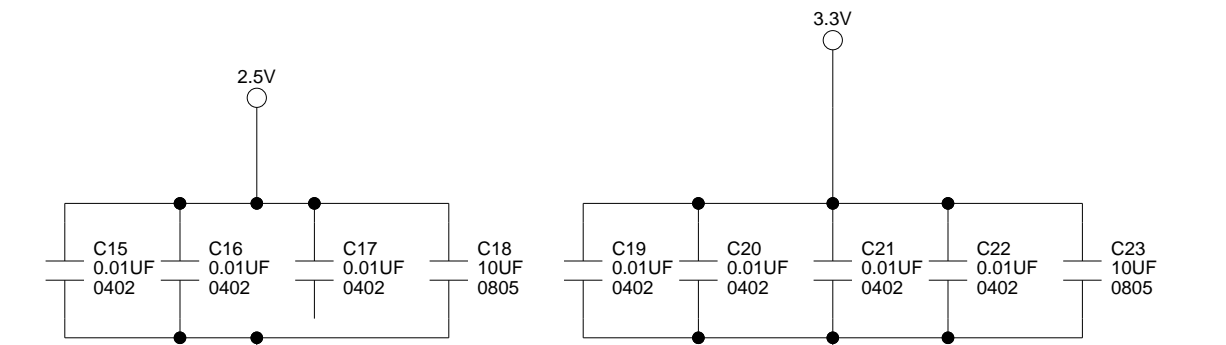
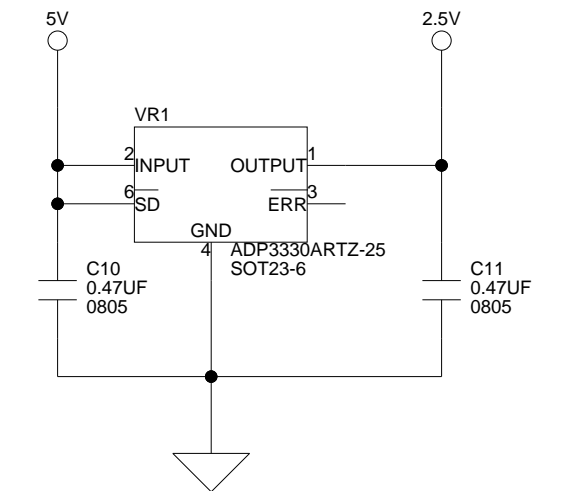
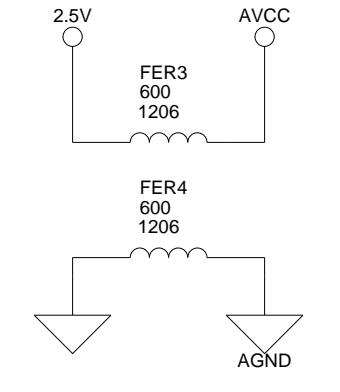
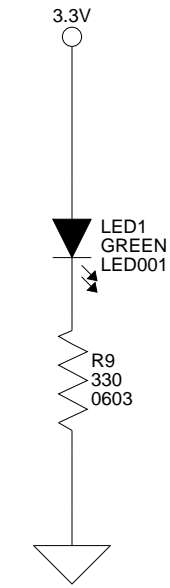
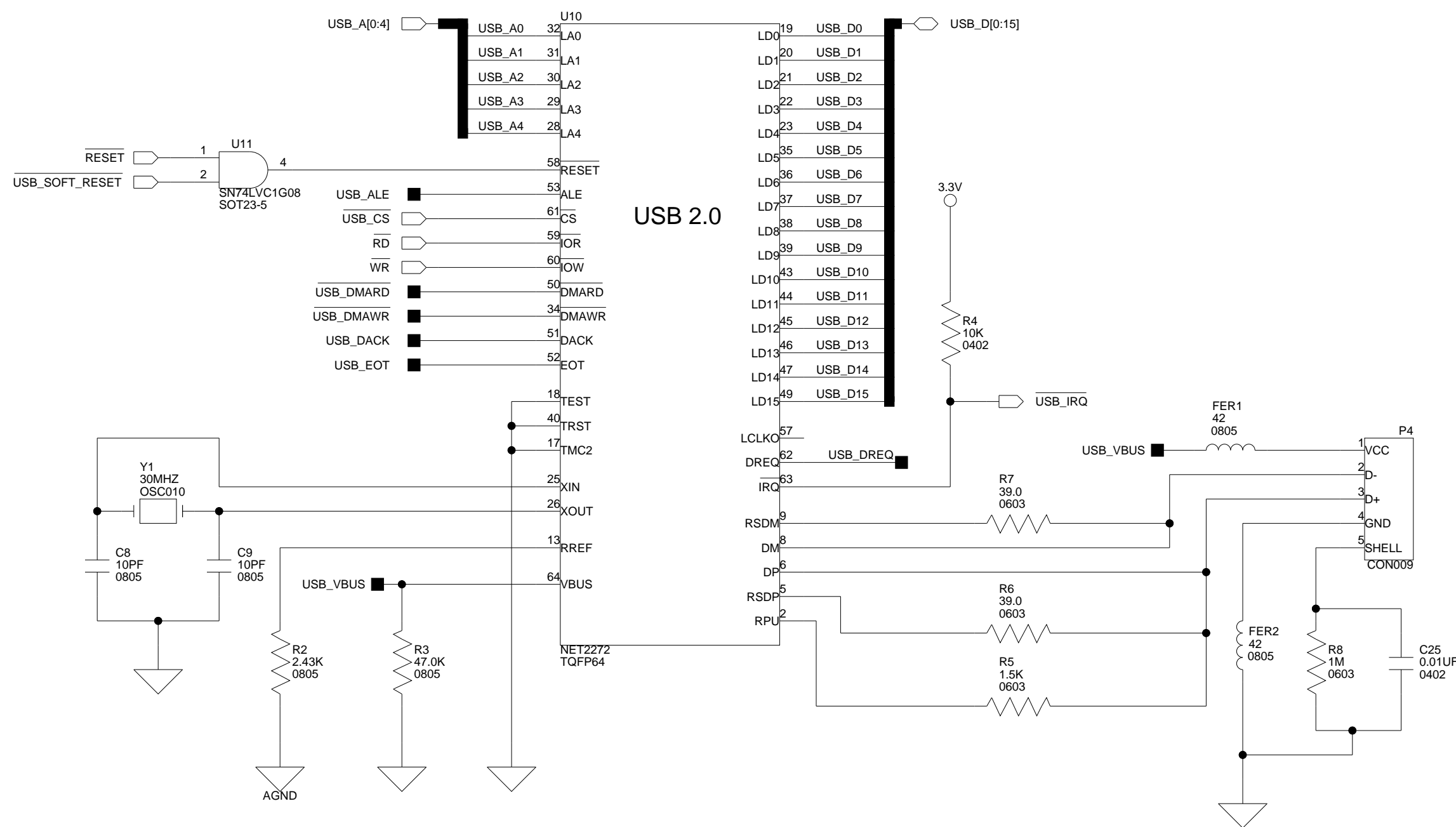
PROCESSOR	MODE	ADDRESS RANGE	OFFSET	DEVICE
262/364	16-bit	0x0100 6C00 - 0x0100 6FE0	0x0020	NETCHIP
369/375	16-bit	0x0C00 0000 - 0x0C00 03E0	0x0020	NETCHIP

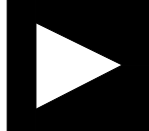


ANALOG DEVICES

20 Cotton Road
Nashua, NH 03063
PH: 1-800-ANALOGD

Title			SHARC USB EZ-EXTENDER BUS SWITCHES		
Size C	Board No.	A0197-2005		Rev	1.1B
Date	4-24-2006_10:01	Sheet	3	of	4



 ANALOG DEVICES		20 Cotton Road Nashua, NH 03063 PH: 1-800-ANALOGD	
		Title SHARC USB EZ-EXTENDER USB INTERFACE	
Size C	Board No. A0197-2005	Rev 1.1B	
Date 4-24-2006_10:01	Sheet 4 of 4		

I INDEX

A

architecture, of this EZ-Extender, [2-1](#)

B

bill of materials, [A-1](#)
board schematic, [B-1](#)

C

connectors, J1-3 (expansion), [1-1](#)
customer support, [-x](#)

D

dimensions, of this EZ-Extender, [-viii](#)

E

expansion interface, [1-1](#), [1-2](#)

F

FLAG0 (USB reset) pin, ADSP-21369
processors, [1-3](#)
FLAG1 (USB IRQ) pin, ADSP-21262/364/369
processors, [1-3](#)
FLAG2 (USB reset) pin, ADSP-21262/364
processors, [1-3](#)

I

interrupt request line (IRQ), [1-3](#)

J

JP1 (processor select) jumper, [1-2](#), [2-2](#)

N

notation conventions, [-xiv](#)

P

parallel port, ADSP-21262/364/369 processors,
[1-2](#)
printed circuit boards (PCBs), [1-1](#)
processor select jumper (JP1), [1-2](#), [2-2](#)
product overview, [-viii](#)

S

schematic, of this EZ-Extender [B-1](#)
setup procedure, of this EZ-Extender, [1-1](#)
system architecture, [2-1](#)

U

USB
controller, [1-2](#)
device memory map, [1-3](#)
documentation, [1-2](#)
IRQ line, [1-3](#)
reset, [1-3](#)

INDEX