SHARC® EZ-Extender® Manual

Revision 3.1, August 2012

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82-000805-01

Analog Devices, Inc.
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ANALOG DEVICES

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Regulatory Compliance

The SHARC 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 SHARC 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 EZ-Extender has been appended to Analog Devices, Inc. EMC Technical File (EMC TF) referenced "**DSPTOOLS1**" dated December 21, 1997 and was declared CE compliant by an appointed Notified Body (No.0673) as listed below.

Notified Body Statement of Compliance: Z600ANA1.018

CE

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

The SHARC 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.

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PREFACE

Thank you for purchasing the SHARC® EZ-Extender®, Analog Devices (ADI) extension board to the EZ-KIT Lite® evaluation system for ADSP-21262 SHARC 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 SHARC the bandwidth for sustained high-speed computations. SHARC represents today's de facto standard for floating-point processors targeted for premium audio applications.

The SHARC EZ-Extender is 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 SHARC 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/dsp/tools.

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

Product Overview

The SHARC EZ-Extender is a separately sold assembly that plugs onto the expansion interface of the ADSP-21262 EZ-KIT Lite evaluation system.

The board extends the capabilities of the evaluation system by providing a connection between the parallel data access port (PDAP) of the ADSP-21262 processor and an Analog Devices analog-to-digital high-speed converter (ADC HSC) evaluation board. Moreover, the extender broadens the range of the EZ-KIT Lite applications by providing surface-mounted (SMT) footprints for breadboard capabilities and access to all of the pins on the EZ-KIT Lite's expansion interface.

The extender features:

- High-speed converter evaluation board interface
    - 40-pin, right angle, 0.1 in. spacing, female socket to connect to analog-to-digital converter boards
    - Switches for routing and direction selection
    - RJ-45 with serial peripheral interconnect (SPI) to configure converter registers

- SMT footprint area
    - 1206 and 805 footprints
    - SOIC24 and SOIC20 footprints
- Dimensions
    - 5 in (H) x 5 in (W)

Purpose of This Manual

The *SHARC EZ-Extender Manual* describes the operation and configuration of the components on the board. A schematic and a bill of materials are provided as a reference for future ADSP-21262 processor board designs.

Intended Audience

This manual is a user's guide and reference to the SHARC 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 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, "EZ-Extender Interfaces" on page 1-1
  Provides basic board information.
- Chapter 2, "EZ-Extender Hardware Reference" on page 2-1
  Provides information on the hardware aspects of the board.
- Appendix A, "EZ-Extender Bill of Materials" on page A-1
  Provides a list of components used to manufacture the SHARC EZ-Extender board.
- Appendix B,"EZ-Extender Schematic" on page B-1
  Provides the resources to allow modifications to the SHARC EZ-Extender or to use as a reference design. Appendix B is part of the online help.

What's New in This Manual

This is revision 3.1 of the *SHARC 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)
- 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 SHARC EZ-Extender is designed as an extension to the ADSP-21262 EZ-KIT Lite evaluation system.

Product Information

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

Analog Devices Web Site

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

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

Title	Description
ADSP-21261/ADSP-21262/ADSP-21266 SHARC Processor Data Sheet	General functional description, pinout, and timing of the processor
ADSP-2126x SHARC Processor Hardware Reference	Description of the internal processor architecture and all register functions
ADSP-21160 SHARC DSP Instruction Set Reference	Description of all allowed processor assembly instructions

If you plan to use the EZ-KIT Lite board in conjunction with a JTAG emulator, also refer to the documentation that accompanies the emulator.

1 EZ-EXTENDER INTERFACES

This chapter relates how the extender interfaces with the compatible boards. The information is presented in the following sections.

- "ADC HSC Interface" on page 1-1
- "Breadboard Area" on page 1-2

ADC HSC Interface

The SHARC EZ-Extender can connect to an analog-to-digital high-speed converter (ADC HSC) evaluation board via the ADC HSC interface. The ADC HSC interface consists of a 40-pin female header, which contains all of the control and data signals necessary to transfer data between the parallel data access port (PDAP) of the processor and the HSC evaluation board. Additionally, the extender provides a RJ-45 connector, which contains all of the serial peripheral interconnect (SPI) signals necessary to configure the control registers of capable high-speed converters. For a block diagram of the ADC HSC interface, see Figure 2-1.

Before using the SHARC EZ-Extender, familiarize yourself with the documentation and schematics of the target board and the ADSP-21262 EZ-KIT Lite. For example, on the EZ-KIT Lite, it may be necessary to disable other devices on the PDAP or disable the push buttons.

To configure the SHARC EZ-Extender to connect to an ADC HSC evaluation board, determine the source of the PDAP clock and the direction of the general-purpose signals, `DAI_P15_GP1` and `DAI_P16_GP2`. To learn about possible clock settings, refer to "Direction/Clock Source Control

Switch (SW1)" on page 2-3. The setup of the general-purpose signals DAI_P15_GP1 and DAI_P16_GP2 is dependent on the specific ADC HSC evaluation board being interfaced; therefore, the board's model must be taken into consideration.

The data bus of the EZ-Extender must be enabled before data is read. Enable the data bus by a memory read from address 0x160 0000, which the AD[15:0] pins set up as the external port. Then, the AD[15:0] pins can be set up in PDAP mode.

To learn more about Analog Devices data converters, go to www.analog.com.

Breadboard Area

SHARC EZ-Extender broadens the range of the EZ-KIT Lite applications by providing surface mounted (SMT) footprints for breadboard capabilities and access to all of the pins on the EZ-KIT Lite's expansion interface.

2 EZ-EXTENDER HARDWARE REFERENCE

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

- "System Architecture" on page 2-1
  Describes the configuration of the extender and explains how the board components interface with the processor and EZ-KIT Lite.
- "DIP Switches and Jumpers" on page 2-3
  Describes the function of the configuration DIP switches and jumpers.

System Architecture

A detailed block diagram of the SHARC EZ-Extender is shown in Figure 2-1. Note that the arrow in the bidirectional driver symbols denotes the direction of the driver when in transmit mode. The bidirectional driver is in transmit mode when the direction pin is pulled high. Use the diagram in conjunction with information in "DIP Switches and Jumpers" on page 2-3 section of this manual to configure your SHARC EZ-Extender.

Before using the SHARC EZ-Extender, familiarize yourself with the documentation and schematics of the target board and the ADSP-21262 EZ-KIT Lite. For example, on the EZ-KIT Lite, it may be necessary to disable other devices on the parallel data access port (PDAP) or disable the push buttons.

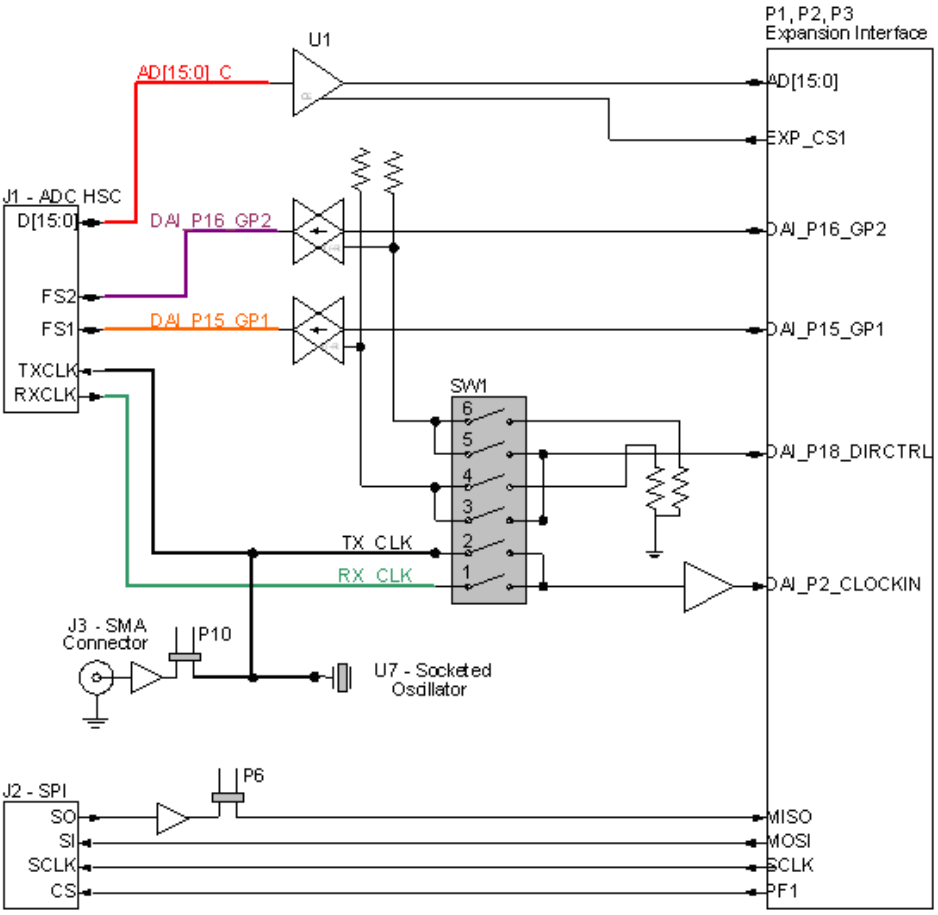


Figure 2-1. SHARC EZ-Extender Block Diagram

The block diagram in Figure 2-1 shows that each clock and general-purpose signal attached to the analog-to-digital high-speed converter (ADC HSC) interface is configured depending on how the interface operates.

The EZ-Extender has two clock signals, `TX_CLK` and `RX_CLK`. The `TX_CLK` signal is used as an output and can be generated in three ways: by applying a signal via an SMA connector, by using the `RX_CLK` signal, or by

populating a socket with an oscillator. Only one of these sources can be used at a time, the other sources must be disabled. For more information on how to disable the TX_CLK sources, see "SMA Connector Clock Disconnect Jumper (P10)" on page 2-5. The RX_CLK signal is generated by the target board. Both the TX_CLK and RX_CLK can connect to the processor's clock-in signal (DAI_P2_CLOCKIN) as an input. See "Direction/Clock Source Control Switch (SW1)" on page 2-3 for more information.

The ADC interface has two general-purpose signals, DAI_P15_GP1 and DAI_P16_GP2. The evaluation board with which the extender interfaces determines how these signals are set up. For information on how to set the direction and the source of these signals, refer to "Direction/Clock Source Control Switch (SW1)" on page 2-3.

The ADC interface connects to the PDAP of the ADSP-21262 processor. The PDAP is multiplexed with the address and data bus. To avoid bus contention with the memory devices on the EZ-KIT Lite, the driver connected to the data bus of the ADC must be enabled. For more information about enabling the data bus, see "ADC HSC Interface" on page 1-1.

DIP Switches and Jumpers

The following section describes the function of all of the jumpers and switches on the EZ-Extender. Before connecting the extender, familiarize yourself with each possible setting's effect on your application.

Direction/Clock Source Control Switch (SW1)

A designated DIP switch, SW1, provides an independent direction control for the general-purpose signals (DAI_P15_GP1 and DAI_P16_GP2), as illustrated in Figure 2-1. Each signal can be hardwired to be either transmit or receive, or can be changed in real time using the DAI_P18 processor pin. If the DAI_P18 processor pin is intended for the direction control, ensure the pin is not used for other purposes on the EZ-KIT Lite. When the SW1

switch connects a direction control signal to ground (GND), the corresponding signal (signals) is (are) controlled as input. The direction control functionality is summarized in Table 2-1.

Table 2-1. DAI_P15_GP1/DAI_P16_GP2 Direction Control Settings

SW1 Position 3 SW1 Position 5	SW1 Position 4 SW1 Position 6	DAI_P15_GP1 Direction DAI_P16_GP2 Direction
OFF	OFF	EZ-KIT Lite is transmitter
OFF	ON	DAI_P18 sets the direction: 0 = EZ-KIT Lite is receiver 1 = EZ-KIT Lite is transmitter
ON	OFF	EZ-KIT Lite is receiver
ON	ON	Do not use

The source of the PDAP clock input signal, DAI_PP2_CLOCKIN, is configured through positions 1 and 2 of the DIP switch SW1, as illustrated in Figure 2-1. The switch settings are summarized in Table 2-2.

Table 2-2. PDAP Clock-in Source Settings

SW1 Position 1 RX_CLK	SW1 Position 2 TX_CLK	DIA_P2_CLOCKIN Source
OFF	OFF	Not generated by the EZ-Extender
OFF	ON	In this configuration, the TX_CLK signal must be generated by one of the user configured clock sources.
ON	OFF	RX_CLK
ON	ON	RX_CLK; in this configuration, the RX_CLK signal is also routed to the TX_CLK to be used as an output.

MISO Disconnect Jumper (P6)

The MISO signal of the serial peripheral interconnect (SPI) connector (J2) is driven by a buffer to the processor's MISO signal, as illustrated in Figure 2-1. When the SPI connector is not in use, remove the P6 jumper to prevent the signal from interfering with other devices on the SPI bus.

SMA Connector Clock Disconnect Jumper (P10)

The SMA connector (J3) enables a clock input from a signal generator or from other clock source. The input signal is directed though a buffer, as illustrated in Figure 2-1. When the SMA connector is not in use, remove the P10 jumper to prevent the buffer from driving other signals on the net.

A EZ-EXTENDER BILL OF MATERIALS

The bill of materials corresponds to "EZ-Extender Schematic" on page B-1.

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
1	1	74LVX244M SOIC20	U6	FAIRCHILD	74LVX244M
2	1	SN74ALVTH16244 SSOP48	U1	TI	74ALVTH16244DGGE4
3	1	SN74LVC1G125 SOT23-5	U5	TI	74LVC1G125DBVRE4
4	1	74LVTH16245MEA SSOP48	U2	FAIRCHILD	74LVTH16245MEA
5	1	SN74LVC1G14DBVR SOT23-5	U3	DIGI-KEY	296-11607-1-ND
6	1	DIP8 DIP8SOC	U7	MILL-MAX	614-43-308-31-007000
7	3	0.05 45x2 CON018	P1-3	SAMTEC	TFC-145-32-F-D
8	1	DIP6 SWT017	SW1	C&K	TDA06H0SB1
9	1	IDC 20X2 IDC20X2RASOC	J1	SAMTEC	SSW-120-02-G-D-RA
10	1	RJ45 8PIN CON_RJ45	J2	TYCO	1-16609214-1
11	1	SMA XPINS CON043	J3	JOHNSON COMP	142-0701-201

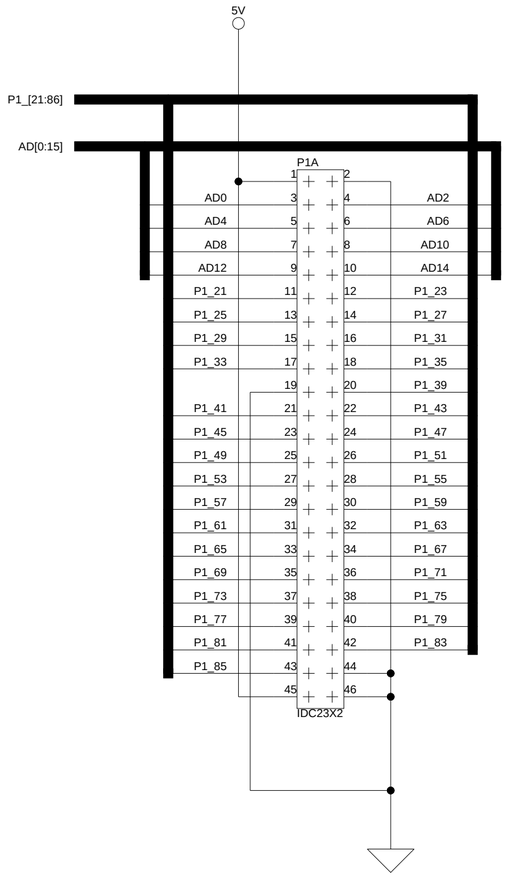
Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
12	2	IDC 2X1 IDC2X1	P6,P10	FCI	90726-402HLF
13	2	IDC 2PIN_JUMPER_ SHORT	SJ1-2	DIGI-KEY	S9001-ND
14	1	511/8W5%1206	R9	VISHAY	CRCW120651R0JKEA
15	14	0.1UF 50V 10% 0805	C3-10,C12, C14-18	AVX	08055C104KAT
16	16	10K 1/10W 5% 0805	R1-2,R5-7, R11-12,R16	VISHAY	CRCW080510K0JNEA
17	3	33 1/10W 5% 0805	R10,R13,R18	VISHAY	CRCW080533R0JNEA
18	4	10UF 25V +80-20% 1210	C1-2,C11,C13	PANASONIC	ECJ4YF1E106Z
19	2	22 1/10W 5% 0805	R3-4	VISHAY	CRCW080522R0JNEA
20	2	1.2K 1/10W 5% 0805	R15,R17	VISHAY	CRCW08051K20JNEA
21	1	10K 1/2W 10% RES002	R8	COPAL ELECT	CT9EW103

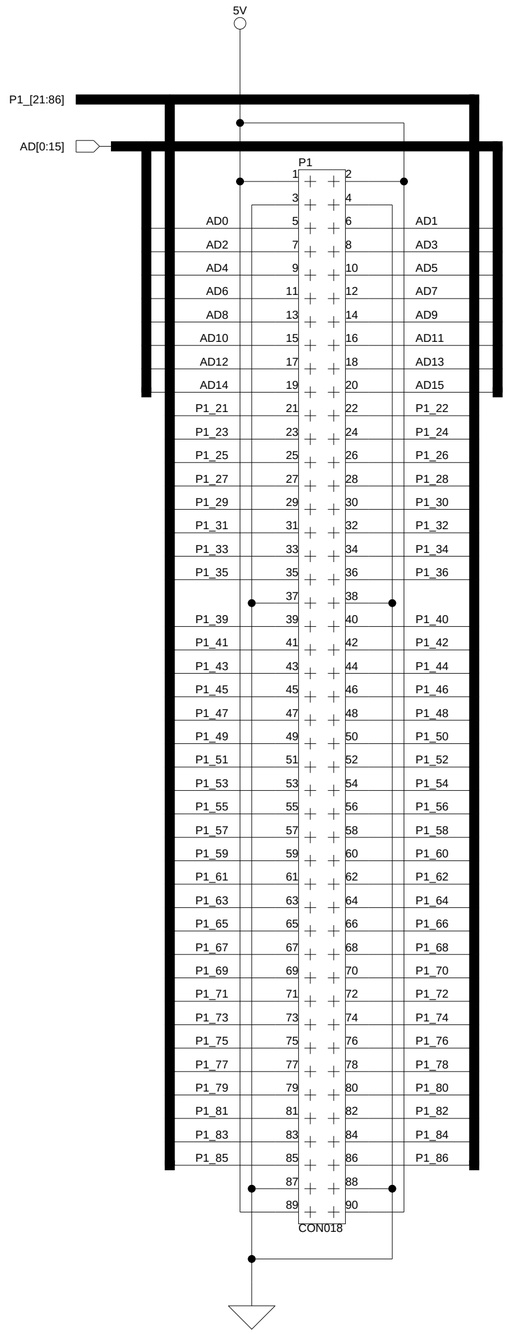
ADSP-21262 EZ-Extender 1

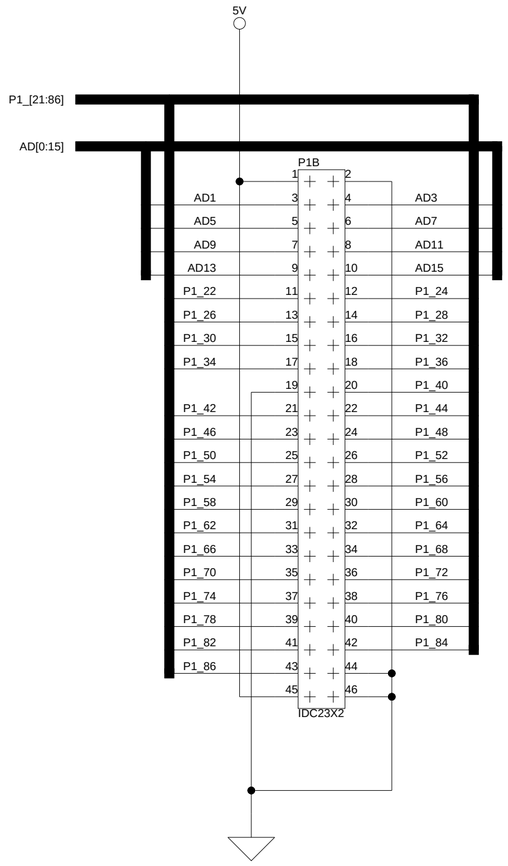
ANALOG DEVICES
20 Cotton Road
Nashua, NH 03063
PH: 1-800-ANALOGD

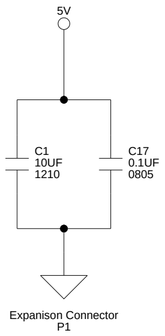
Title	ADSP21262 EX-EXTENDER 1 TITLE		
Size C	Board No. A0182-2003		Rev 2.0
Date 4-24-2006_9:28		Sheet 1 of 7	

EXPANSION INTERFACE (TYPE A)









ANALOG DEVICES	20 Cotton Road Nashua, NH 03063 PH: 1-800-ANALOGD	
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Date 4-24-2006_9:28	**Sheet** 2 **of** 7	

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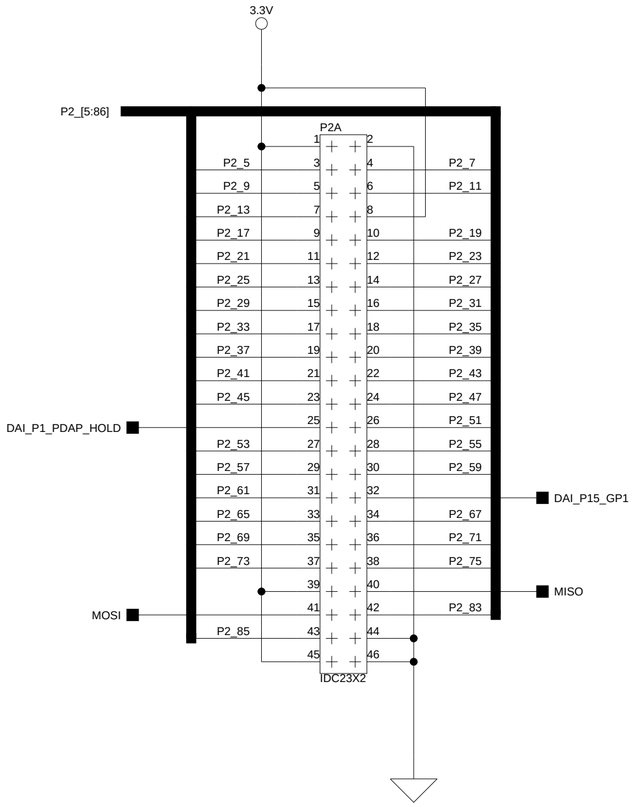

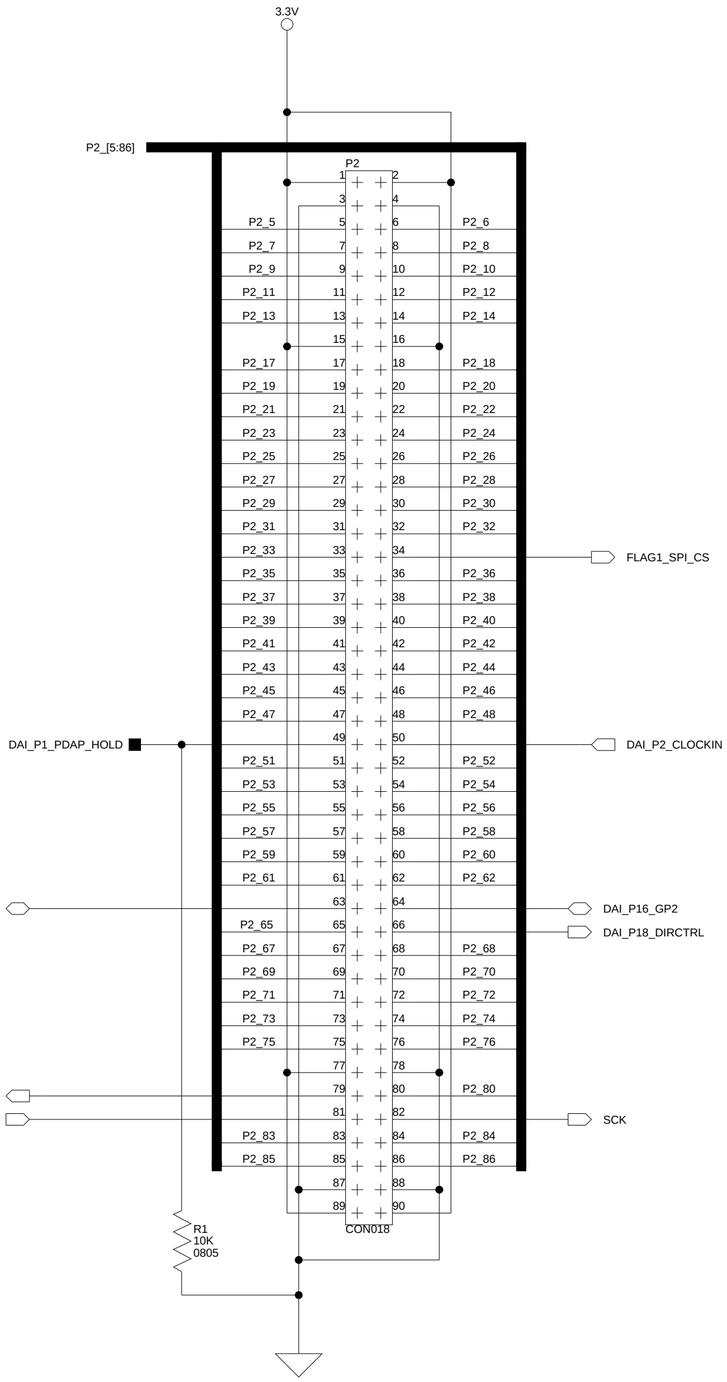

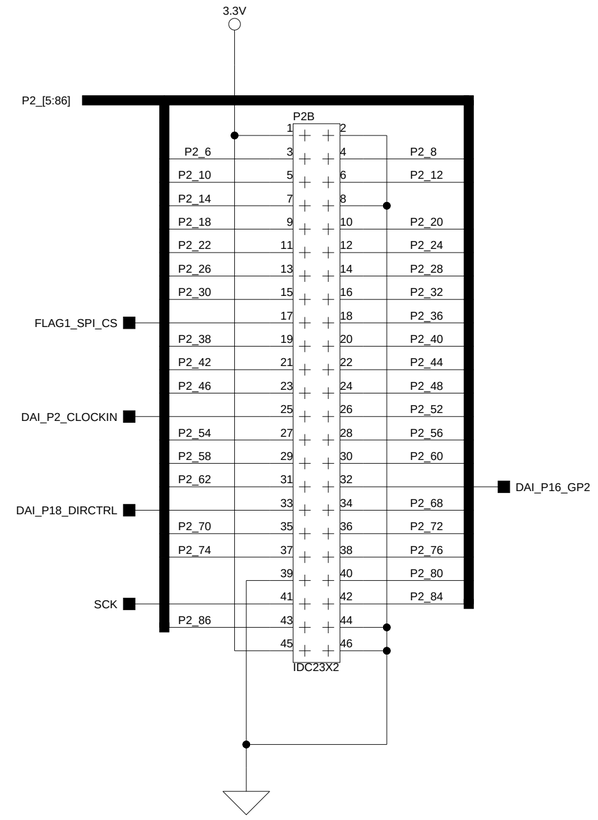

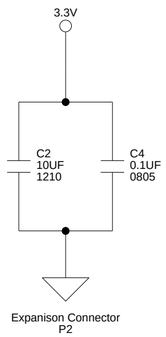

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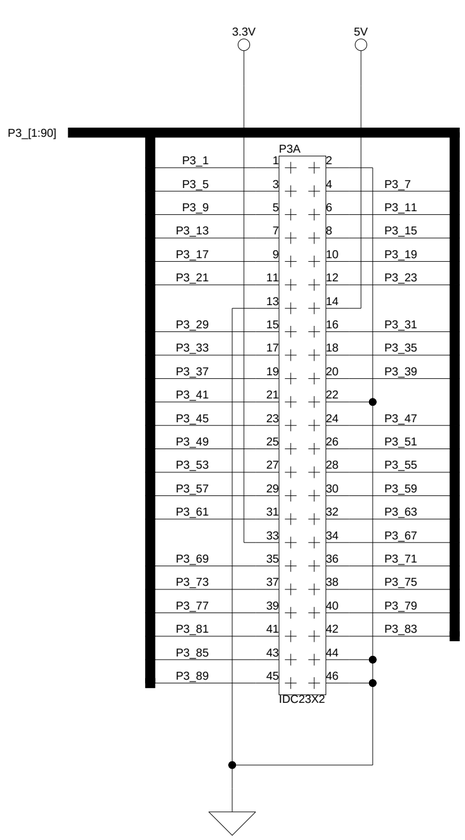
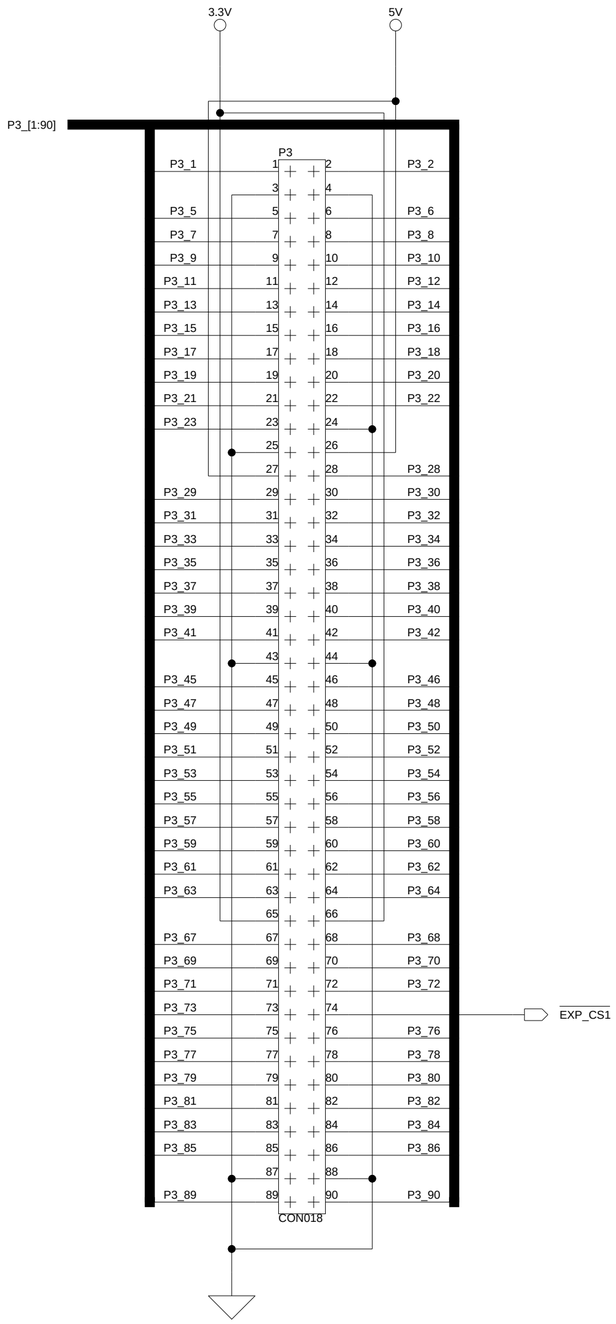
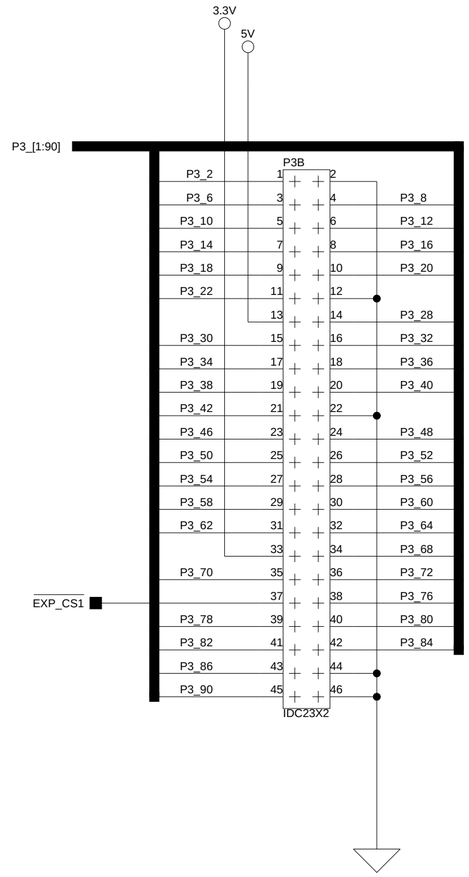
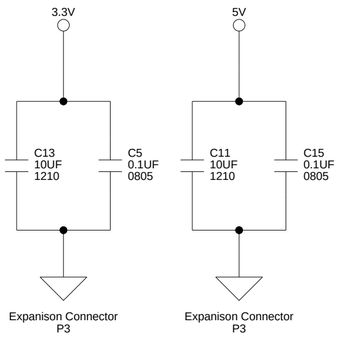
Date 4-24-2006_9:28	**Sheet** 3 **of** 7	

EXPANSION INTERFACE (TYPE A)



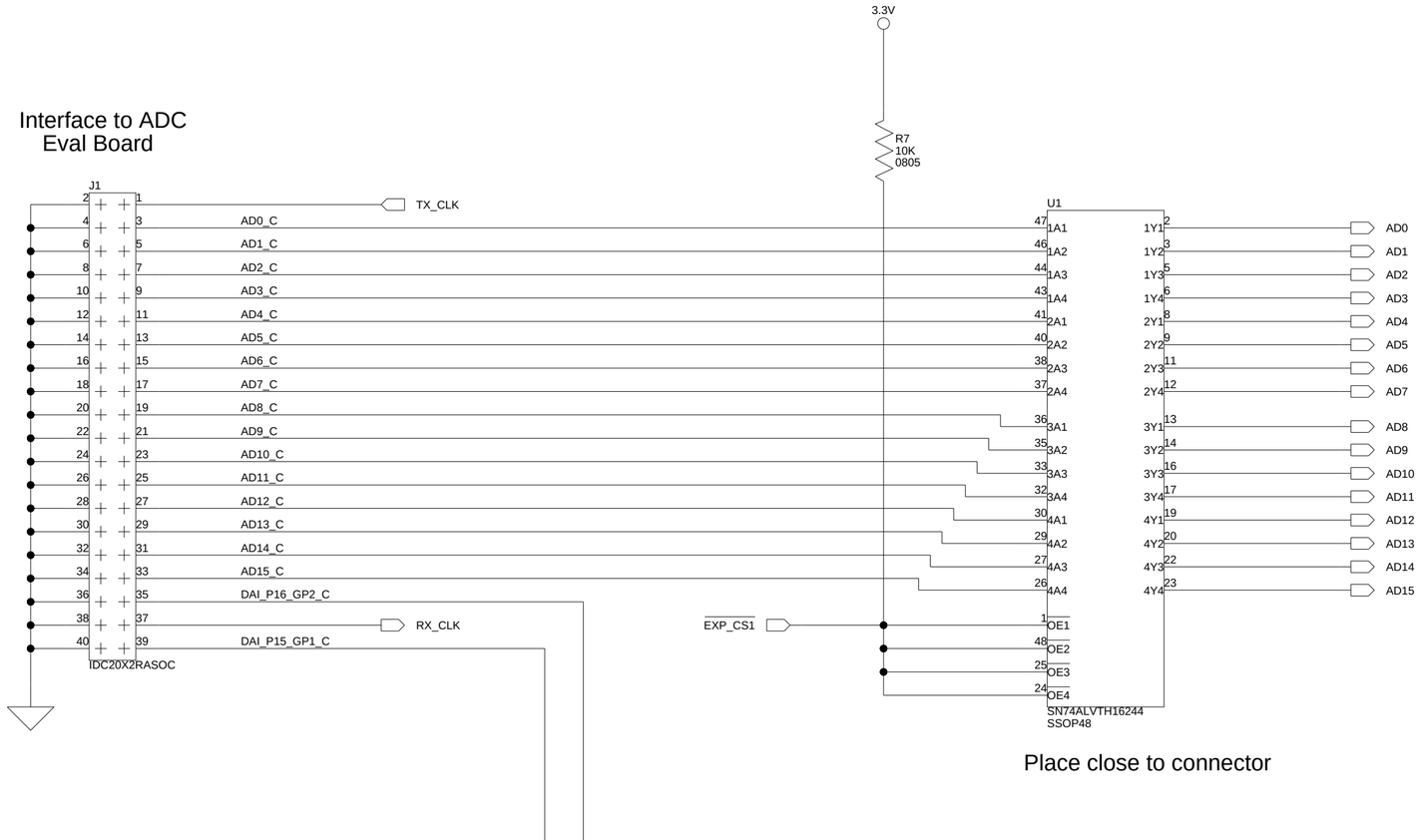




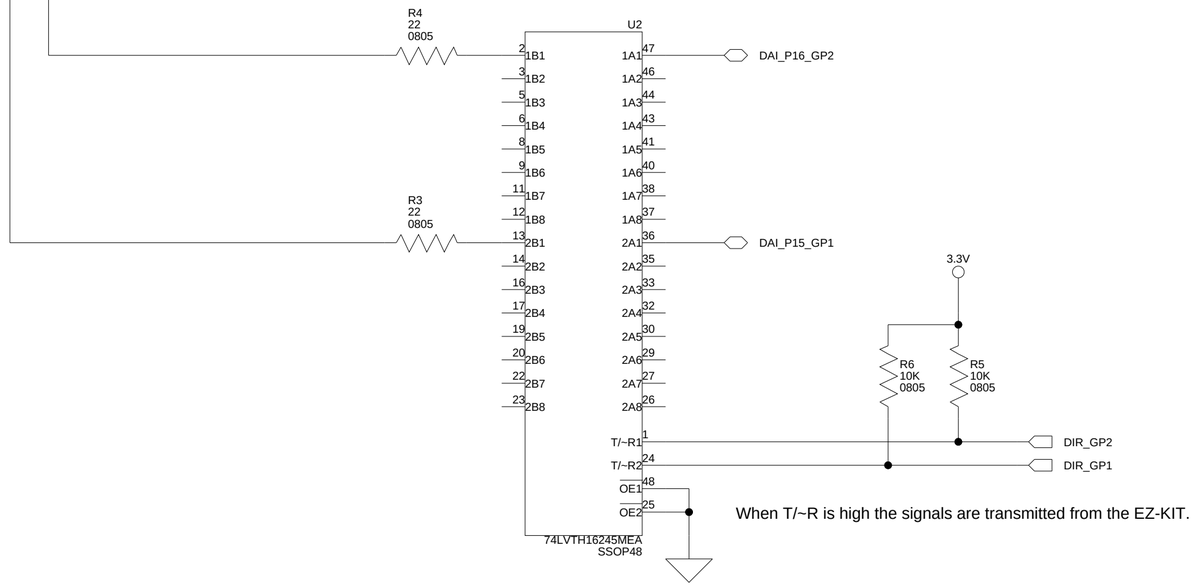


ANALOG DEVICES	20 Cotton Road Nashua, NH 03063 PH: 1-800-ANALOGD	
Title	ADSP21262 EX-EXTENDER 1 EXPANSION CONNECTOR P3	
Size C	**Board No.** A0182-2003	**Rev** 2.0
Date 4-24-2006_9:28	**Sheet** 4 **of** 7	

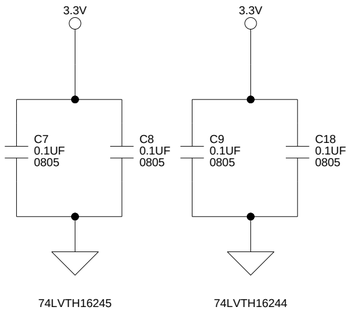
Interface to ADC Eval Board



Place close to connector



When T/~R is high the signals are transmitted from the EZ-KIT.



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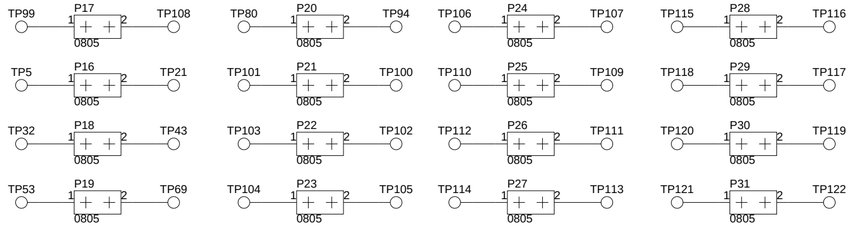
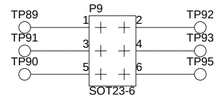
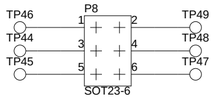
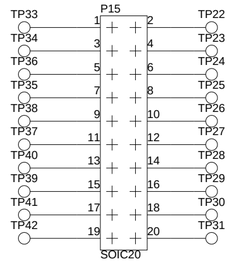
Title	ADSP21262 EX-EXTENDER 1 HSC INTERFACE	
Size C	**Board No.** A0182-2003	**Rev** 2.0
Date 4-24-2006_9:28	**Sheet** 5 **of** 7	

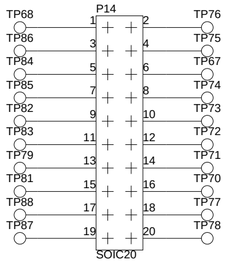
ANALOG DEVICES	20 Cotton Road Nashua, NH 03063 PH: 1-800-ANALOGD		
Title	ADSP21262 EX-EXTENDER 1 CONTROL - SPI INTERFACE		
Size C	**Board No.** A0182-2003		**Rev** 2.0
Date 4-24-2006_9:28		**Sheet** 6 **of** 7	

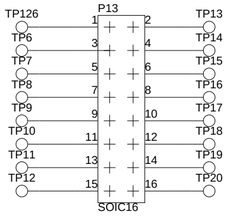


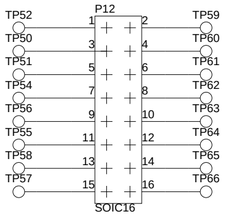


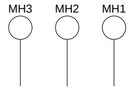


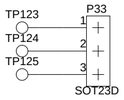


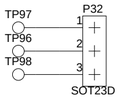












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Title	ADSP21262 EX-EXTENDER 1 BREADBOARD AREA FOOTPRINTS	
Size C	**Board No.** A0182-2003	**Rev** 2.0
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