ADSP-TS101S EZ-KIT Lite®
Evaluation System Manual

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

ANALOG DEVICES

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Printed in the USA.

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The ADSP-TS101S EZ-KIT Lite evaluation system 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 ADSP-TS101S EZ-KIT Lite evaluation system had been appended to the Technical Construction File referenced "**DSPTOOLS1**" dated December 21, 1997 and was awarded CE Certification by an appointed European Competent Body as listed below.

Technical Certificate No: Z600ANA1.008

Issued by: Technology International (Europe) Limited
41 Shrivenham Hundred Business Park
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CE

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.

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PREFACE

Thank you for purchasing the ADSP-TS101S EZ-KIT Lite®, Analog Devices (ADI) evaluation system for TigerSHARC® floating-point embedded processors.

The TigerSHARC processor is a Static Super Scalar (SSS) architecture targeted at software-defined radio applications. In these wireless infrastructure applications, the TigerSHARC processor is replacing field-programmable gate arrays (FPGAs) in the Chip Rate processing applications for third generation cellular. The performance, flexibility, multiprocessing and IO capabilities of the TigerSHARC processor makes it superior to FPGA implementations.

The evaluation board is designed to be used in conjunction with the VisualDSP++® development environment to test the capabilities of the ADSP-TS101S TigerSHARC processor. The VisualDSP++ development environment gives you the ability to perform advanced application code development and debug, such as:

- Create, compile, assemble, and link application programs written in C++, C, and ADSP-TS101S assembly
- Load, run, step-in, step-out, step-over, halt, and set breakpoints in application program
- Profile programs
- Read and write data and program memory

- Read and write core and peripheral registers
- Plot memory

Access to the ADSP-TS101S processor from a personal computer (PC) is achieved through a USB port or an optional JTAG emulator. The USB interface gives unrestricted access to the ADSP-TS101S processor and the evaluation board peripherals. Analog Devices JTAG emulators offer faster communication between the host PC and target hardware. Analog Devices carries a wide range of in-circuit emulation products. To learn more about Analog Devices emulators and processor development tools, go to `http://www.analog.com/processors/tools/`.

ADSP-TS101S EZ-KIT Lite provides example programs to demonstrate the capabilities of the evaluation board.

The VisualDSP++ license provided with this EZ-KIT Lite evaluation system limits the size of a user program to 96K words.

The board features:

- Two Analog Devices ADSP-TS101S processors
  - 250 MHz Core Clock Speed
  - Configurable Core Clock Mode
- USB Debugging Interface
- Analog Devices AD1871 96 kHz Analog-to-Digital Converter
  - Line-In 3.5 mm Stereo Jack
- Analog Devices AD1854 96 kHz Digital-to-Analog Converter
  - Line-Out 3.5 mm Stereo Jack
- SDRAM Memory
  - 32 MB (4 Meg x 64) DIMM

- Flash Memory (544K x 8)
  - 512K Main Flash Memory
  - 32K Secondary Flash Memory
- Interface Connectors
  - 14-Pin Emulator Connector for JTAG Interface
  - Link Port 0 and Link Port 1 for each processor
  - Expansion Interface Connectors (not populated)
- General-Purpose IO
  - 4 Push Button FLAGS (2 for each processor)
  - 2 Push Button Interrupts (1 for each processor)
  - 4 LED FLAG Outputs (2 for each processor)
- Analog Devices ADP3338, ADP3339, ADM660, and ADP3170 for Voltage Regulation

The EZ-KIT Lite board has two external memories: Flash memory and SDRAM. The Flash memory can be used to store user-specific boot code. By configuring the boot mode switch (SW7) and programming the Flash memory, the board can run as a stand-alone unit. For more information, see "Memory Map" on page 2-2.

The EZ-KIT Lite board also contains an audio interface, facilitating creation of audio signal processing applications.

Additionally, the EZ-KIT Lite board provides expansion connectors, allowing you to connect to the processor's external port (EP).

Purpose of This Manual

The *ADSP-TS101S EZ-KIT Lite Evaluation System Manual* provides instructions for using the hardware and installing the software on your PC. The manual provides guidelines for running your own code on the ADSP-TS101S EZ-KIT Lite. This manual also describes the operation and configuration of the components on the evaluation board. Finally, a schematic and a bill of materials are provided as a reference for future ADSP-TS101S board designs.

Intended Audience

This manual is a user's guide and reference to the ADSP-TS101S EZ-KIT Lite evaluation system. Programmers who are familiar with the Analog Devices TigerSHARC processor architecture, operation, and programming are the primary audience for this manual.

Programmers who are unfamiliar with Analog Devices TigerSHARC processors can use this manual in conjunction with the *ADSP-TS101 TigerSHARC Processor Hardware Reference* and the *ADSP-TS101 TigerSHARC Processor Programming Reference*, which describe the processor architecture and instruction set. Programmers who are unfamiliar with VisualDSP++ should refer to the VisualDSP++ online Help and the VisualDSP++ user's or getting started guides. For the locations of these documents, refer to "Related Documents".

Manual Contents

The manual consists of:

- Chapter 1, "Getting Started" on page 1-1
  Provides software and hardware installation procedures, PC system requirements, and basic board information.
- Chapter 2, "Using EZ-KIT Lite" on page 2-1
  Provides information on the EZ-KIT Lite from a programmer's perspective and outlines the processor's memory map.
- Chapter 3, "EZ-KIT Lite Hardware Reference" on page 3-1
  Provides information on the hardware aspects of the evaluation system.
- Appendix A, "Bill Of Materials" on page A-1
  Provides a list of components used to manufacture the EZ-KIT Lite board.
- Appendix B, "Schematics" on page B-1
  Provides the resources to allow EZ-KIT Lite board-level debugging or to use as a reference design.
  This appendix is not part of the online Help. The online Help viewers should go the PDF version of the *ADSP-TS101S EZ-KIT Lite Evaluation System Manual* located in the `Docs\EZ-KIT Lite Manuals` folder on the installation CD to see the schematics.

What's New in This Manual

This is the second edition of the *ADSP-TS101S EZ-KIT Lite Evaluation System Manual*. The manual documents the updated driver installation procedures for the ADSP-TS101S EZ-KIT Lite.

Technical or Customer Support

You can reach DSP Tools Support in the following ways.

- Visit the DSP Development Tools website at

  `www.analog.com/technology/dsp/developmentTools/index.html`

- Email questions to

  `dsptools.support@analog.com`

- Phone questions to **1-800-ANALOGD**
- Contact your ADI local sales office or authorized distributor
- Send questions by mail to

  ```
  Analog Devices, Inc.
  DSP Division
  One Technology Way
  P.O. Box 9106
  Norwood, MA 02062-9106
  USA
  ```

Supported Processors

The ADSP-TS101S EZ-KIT Lite evaluation system supports ADSP-TS101S TigerSHARC Analog Devices embedded processors.

Product Information

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

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

MyAnalog.com

MyAnalog.com is a free feature of the Analog Devices website that allows customization of a webpage to display only the latest information on products you are interested in. You can also choose to receive weekly email notification containing updates to the webpages that meet your interests. MyAnalog.com provides access to books, application notes, data sheets, code examples, and more.

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Visit www.myanalog.com to sign up. Click **Register** to use MyAnalog.com. Registration takes about five minutes and serves as means for you to select the information you want to receive.

If you are already a registered user, just log on. Your user name is your email address.

Embedded Processor Product Information

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You may also obtain additional information about Analog Devices and its products in any of the following ways.

- Email questions or requests for information to `dsp.support@analog.com`
- Fax questions or requests for information to **1-781-461-3010** (North America) or **+49 (0) 89 76903-157** (Europe)

Related Documents

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

Table 1. Related Processor Publications

Title	Description
ADSP-TS101S Embedded Processor Datasheet	General functional description, pinout, and timing.
ADSP-TS101 TigerSHARC Processor Hardware Reference	Description of internal processor architecture and all register functions.
ADSP-TS101 TigerSHARC Processor Programming Reference	Description of all allowed processor assembly instructions.

Table 2. Related VisualDSP++ Publications

Title	Description
VisualDSP++ 3.5 User's Guide for 32-Bit Processors	Detailed description of the VisualDSP++ 3.5 for 32-bit processors features and usage.
VisualDSP++ 3.5 Assembler and Preprocessor Manual for 32-Bit Processors	Description of the assembler function and commands for TigerSHARC family of processors.
VisualDSP++ 3.5 C/C++ Complier and Library Manual for TigerSHARC Processors	Description of the complier function and commands for TigerSHARC processors.

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

Title	Description
VisualDSP++ 3.5 Linker and Utilities Manual for 32-Bit Processors	Description of the linker function and commands for 32-bit processors.
VisualDSP++ 3.5 Loader Manual for 32-Bit Processors	Description of the loader function and commands for 32-bit processors.

The listed documents can be found through online Help or in the `Docs` folder of your VisualDSP++ installation. Most documents are available in printed form.

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

Online Documentation

Your software installation kit includes online Help as part of the Windows® interface. These help files provide information about VisualDSP++ and the ADSP-TS101S EZ-KIT Lite evaluation system.

To view VisualDSP++ Help, click on the **Help** menu item or go to the Windows task bar and select **Start –>Programs –>Analog Devices –> VisualDSP++ 3.5 for 32-bit Processors –> VisualDSP++ Documentation**.

To view ADSP-TS101S EZ-KIT Lite Help, which now is a part of the VisualDSP++ Help system, go the **Contents** tab of the Help window and select **Manuals –> ADSP-TS101S EZ-KIT Lite**.

For more documentation, please go to `http://www.analog.com/technology/dsp/library.html`.

Printed Manuals

For general questions regarding literature ordering, call the Literature Center at **1-800-ANALOGD** (**1-800-262-5643**) and follow the prompts.

VisualDSP++ Documentation Set

Printed copies of VisualDSP++ manuals may be purchased through Analog Devices Customer Service at **1-781-329-4700**; ask for a Customer Service representative. The manuals can be purchased only as a kit. For additional information, call **1-603-883-2430**.

If you do not have an account with Analog Devices, you will be referred to Analog Devices distributors. To get information on our distributors, log onto `www.analog.com/salesdir/continent.asp`.

Hardware Manuals

Printed copies of hardware reference and instruction set reference manuals can be ordered through the Literature Center or downloaded from the Analog Devices website. The phone number is **1-800-ANALOGD** (**1-800-262-5643**). The manuals can be ordered by a title or by product number located on the back cover of each manual.

Data Sheets

All data sheets can be downloaded from the Analog Devices website. As a general rule, printed copies of data sheets with a letter suffix (L, M, N, S) can be obtained from the Literature Center at **1-800-ANALOGD** (**1-800-262-5643**) or downloaded from the website. Data sheets without the suffix can be downloaded from the website only—no hard copies are available. You can ask for the data sheet by part name or by product number.

If you want to have a data sheet faxed to you, the phone number for that service is **1-800-446-6212**. Follow the prompts and a list of data sheet code numbers will be faxed to you. Call the Literature Center first to find out if requested data sheets are available.

Contacting DSP Publications

Please send your comments and recommendations on how to improve our manuals and online Help. You can contact us at `dsp.techpubs@analog.com`.

Notation Conventions

The following table identifies and describes text conventions used in this manual.

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

Example	Description
Close command (**File** menu) or **OK**	Text in **bold** style indicates the location of an item within the VisualDSP++ environment's and boards' menu system and user interface items.
`{this | that}`	Alternative required items in syntax descriptions appear within curly brackets separated by vertical bars; read the example as `this` or `that`.
`[this | that]`	Optional items in syntax descriptions appear within brackets and separated by vertical bars; read the example as an optional `this` or `that`.
`[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 `this`.
`PF9-0`	Registers, connectors, pins, commands, directives, keywords, code examples, and feature names are in text with `letter gothic` font.
`filename`	Non-keyword placeholders appear in text with *italic* style format.

Example	Description
	A note providing information of special interest or identifying a related topic. In the online version of this book, the word **Note** appears instead of the symbol.
	A caution providing information about critical design or programming issues that influence operation of a product. In the online version of this book, the word **Caution** appears instead of the symbol.

1 GETTING STARTED

This chapter provides information you need to begin using ADSP-TS101S EZ-KIT Lite evaluation system. For correct operation, install the software and hardware in the order presented in "Installation Tasks" on page 1-3.

The chapter includes the following sections.

- "Contents of EZ-KIT Lite Package" on page 1-1
  Provides a list of components shipped with the EZ-KIT Lite evaluation system.
- "PC Configuration" on page 1-3
  Describes the minimum requirements for the PC to work with the EZ-KIT Lite evaluation system.
- "Installation Tasks" on page 1-3
  Provides the step-by-step procedures for setting up the hardware and software.

Contents of EZ-KIT Lite Package

Your ADSP-TS101S EZ-KIT Lite evaluation system package contains the following items.

- ADSP-TS101S EZ-KIT Lite board
- *EZ-KIT Lite Quick Start Guide*
- *VisualDSP++ 3.5 Installation Quick Reference* card

- CD containing:
  - VisualDSP++ 3.5 for 32-Bit Processors with a limited license
  - ADSP-TS101S EZ-KIT Lite debug software
  - USB driver files
  - Example programs
  - *ADSP-TS101S EZ-KIT Lite Evaluation System Manual* (this document)
- Universal 7.5V DC power supply
- USB 2.0 type cable
- Registration card (please fill out and return)

If any item is missing, contact the vendor where you purchased your EZ-KIT Lite or contact Analog Devices, Inc.

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.

PC Configuration

For correct operation of the VisualDSP++ software and the EZ-KIT Lite, your computer must have the minimum configuration:

Windows 98, Windows 2000, Windows XP
Intel (or comparable) 166 MHz processor
VGA Monitor and color video card
2-button mouse
50 MB free on hard drive
32 MB RAM
Full-speed USB port
CD-ROM Drive

EZ-KIT Lite does not run under Windows 95 or Windows NT unless using a JTAG emulator.

Installation Tasks

The following task list is provided for the safe and effective installation of the ADSP-TS101S EZ-KIT Lite. Follow these instructions in the presented order to ensure correct operation of your software and hardware.

1. VisualDSP++ and EZ-KIT Lite software installation
2. Software license installation and registration
3. EZ-KIT Lite hardware setup
4. EZ-KIT Lite USB driver installation

5. USB driver installation verification
6. VisualDSP++ startup

Installing VisualDSP++ and EZ-KIT Lite Software

This EZ-KIT Lite comes with the latest version of VisualDSP++ 3.5 for 32-bit processors. VisualDSP++ installation includes EZ-KIT Lite installations.

To install VisualDSP++ and EZ-KIT Lite software:

1. Insert the VisualDSP++ installation CD into the CD-ROM drive.
2. If Autoplay is enabled on your PC, you see the **Install Shield Wizard Welcome** screen. Otherwise, choose **Run** from the **Start** menu, and enter `D:\ADI_Setup.exe` in the **Open** field, where `D` is the name of your local CD-ROM drive.
3. Follow the on-screen instructions to continue installing the software.
4. At the **Custom Setup** screen, select your EZ-KIT Lite from the list of available systems and choose the installation directory. Click an icon in the **Feature Description** field to see the selected system's description. When you have finished, click **Next**.
5. At the **Ready to Install** screen, click **Back** to change your install options, click **Install** to install the software, or click **Cancel** to exit the install.
6. When the EZ-KIT Lite installs, the **Wizard Completed** screen appears. Click **Finish**.

Installing and Registering Software License

VisualDSP++ and EZ-KIT Lites are licensed products. You may run only one copy of the software for each license purchased. Once a new copy of the VisualDSP++ or EZ-KIT Lite software is installed on your PC, you must install, register, and validate your licence.

The *VisualDSP++ 3.5 Installation Quick Reference Card* included in your package will guide you through the licence installation and registration process (refer to Tasks 1, 2, and 3).

Software registration requires a serial number, which appears on your CD sleeve or registration form.

Setting Up EZ-KIT Lite Hardware

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.

The ADSP-TS101S EZ-KIT Lite board is designed to run outside your personal computer as a stand-alone unit. You do not have to open your computer case.

To connect the EZ-KIT Lite board:

1. Remove the EZ-KIT Lite board from the package.

Be careful when handling the boards to avoid the discharge of static electricity, which may damage some components.

Figure 1-1 shows the default jumper settings, DIP switch, connector locations, and LEDs used in installation.

2. Confirm that your board is set up in the default configuration (Figure 1-1) before going to step 3.

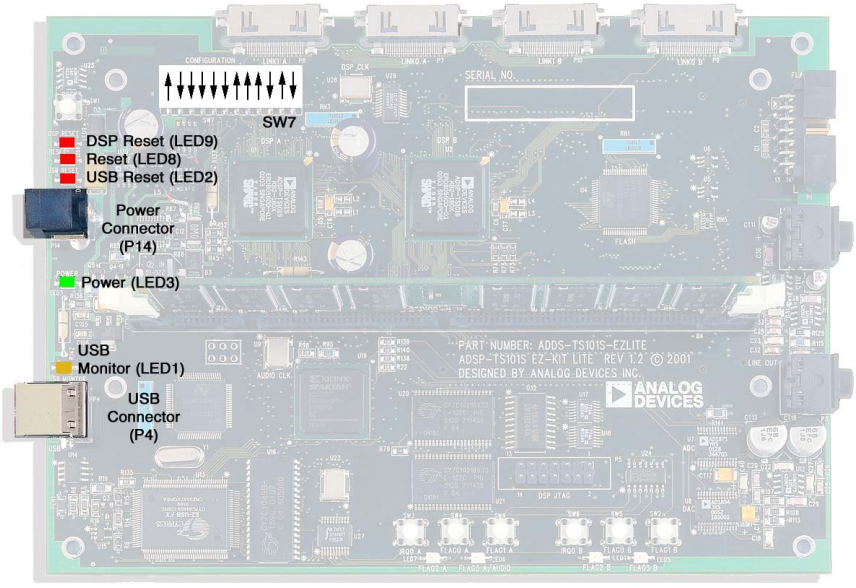

Figure 1-1. EZ-KIT Lite Hardware Setup

3. Plug the provided power supply into P14 on the EZ-KIT Lite board. Verify that the green power LED (LED3) is on. Also verify that the RESET (LED8) and USB RESET (LED2) LEDs go on for a moment and then go off.

4. While the board is booting, the DSP RESET LED (LED9) stays lit. Once the LED turns off, connect the USB cable to an available full-speed USB port and to P4 on the ADSP-TS101S EZ-KIT Lite board.
5. Follow the USB driver installation instructions in "Installing EZ-KIT Lite USB Driver".

Installing EZ-KIT Lite USB Driver

The EZ-KIT Lite evaluation system requires one full-speed USB port. The USB driver can be installed on the following platforms.

- Windows 98, as described on page 1-8.
- Windows 2000, as described on page 1-12.
- Windows XP, as described on page 1-13.

The USB driver used by the debug agent is not Microsoft certified because it is intended for a development or laboratory environment, not a commercial environment.

Windows 98 USB Driver

Before using the ADSP-TS101S EZ-KIT Lite for the first time, the Windows 98 USB driver must be installed.

To install the USB driver:

1. Insert the CD into the CD-ROM drive.
   The connection of the ADSP-TS101S EZ-KIT Lite evaluation board to the USB port activates the Windows 98 **Add New Hardware Wizard** shown in Figure 1-2.

Figure 1-2. Windows 98 – Add New Hardware Wizard

2. Click **Next**.

3. Select **Search for the best driver for your device**, as shown in Figure 1-3.

Figure 1-3. Windows 98 – Searching for Driver

4. Click **Next**.
5. Select **CD-ROM drive**, as shown in Figure 1-4.

Figure 1-4. Windows 98 – Searching for CD-ROM

6. Click **Next**.
   Windows 98 locates the `WmUSBEz.inf` file on the installation CD, as shown in Figure 1-5.

Figure 1-5. Windows 98 – Locating Driver

7. Click **Next**.
   The **Coping Files** dialog box appears (Figure 1-6).

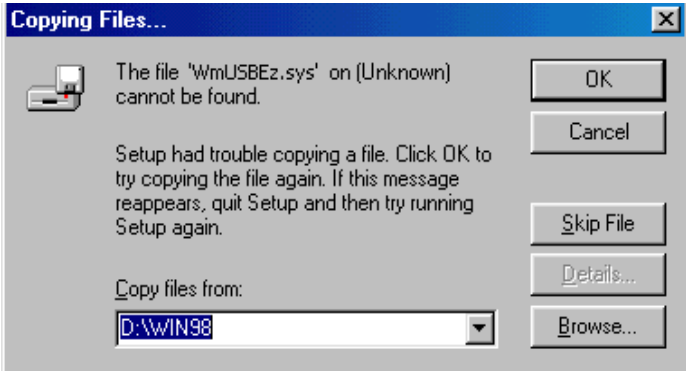

Figure 1-6. Windows 98 – Searching for .SYS File

8. Click **Browse**.
   The **Open** dialog box, shown in Figure 1-7, appears on the screen.

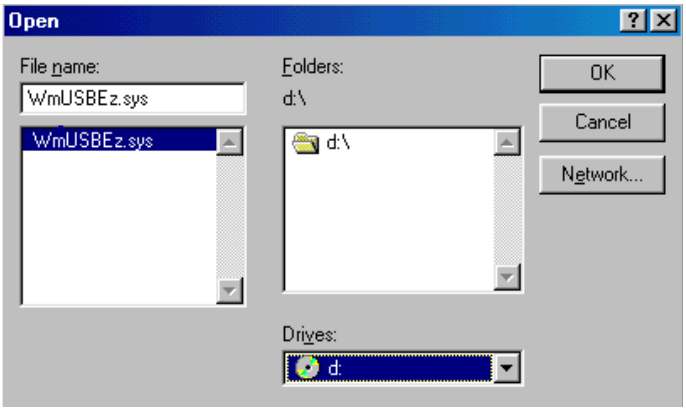

Figure 1-7. Windows 98 – Opening .SYS File

9. In **Drives**, select your CD-ROM drive.
10. Click **OK**. The **Copying Files** dialog box (Figure 1-8) appears.

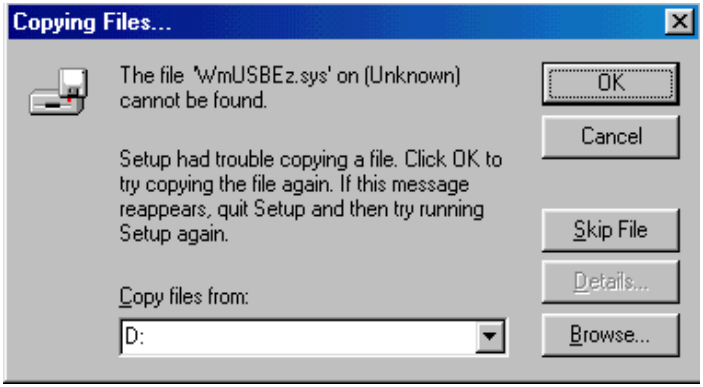

Figure 1-8. Windows 98 – Copying .SYS File

11. Click **OK**.
    The driver installation is now complete, as shown in Figure 1-9.

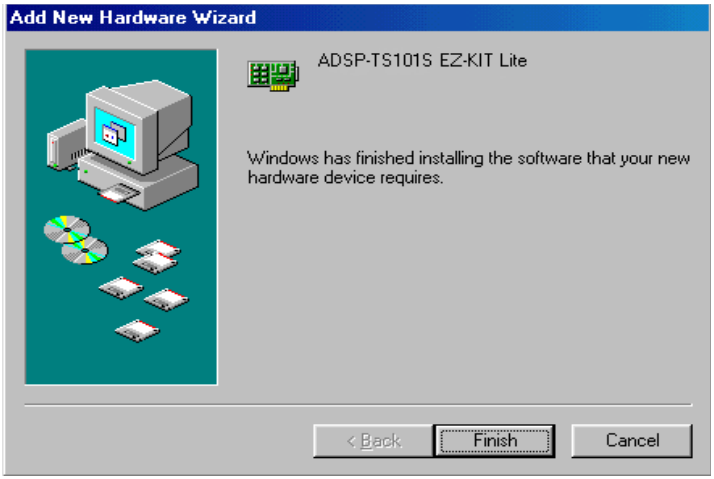

Figure 1-9. Windows 98 – Completing Software Installation

12. Click **Finish** to exit the wizard.

Verify the installation by following the instructions in "Verifying Driver Installation" on page 1-15.

Windows 2000 USB Driver

VisualDSP++ 3.5 installation software pre-installs the necessary drivers for the selected EZ-KIT Lite. The install also upgrades an older driver if such is detected in the system.

Prior to running the VisualDSP++ 3.5 installer, ensure there are no other Hardware Wizard windows running in the background. If there are any wizard windows running, close them before starting the installer.

To install the USB driver:

1. If VisualDSP++ 3.5 is already installed on your system, go to step 2. Otherwise, run VisualDSP++ 3.5 installation. Refer to the *VisualDSP++ 3.5 Installation Quick Reference Card* for a detailed installation description.
   When installing VisualDSP++ 3.5 on Windows 2000, make sure the appropriate EZ-KIT Lite component is selected for the installation.
2. Connect the EZ-KIT Lite device to your PC's USB port. Windows 2000 automatically detects an EZ-KIT device and automatically installs the appropriate driver for the selected device (see step 1).
3. Verify the installation by following the instructions in "Verifying Driver Installation" on page 1-15.

Windows XP USB Driver

VisualDSP++ 3.5 installation software pre-installs the necessary drivers for the selected EZ-KIT Lite. The install also upgrades an older driver if such is detected in the system.

Prior to running the VisualDSP++ 3.5 installer, ensure there are no other Hardware Wizard windows running in the background. If there are any wizard windows running, close them before starting the installer.

To install the USB driver:

1. If VisualDSP++ 3.5 is already installed on your system, go to step 2. Otherwise, run VisualDSP++ 3.5 installation. Refer to the *VisualDSP++ 3.5 Installation Quick Reference Card* for a detailed installation description.
   When installing VisualDSP++ 3.5 on Windows XP, make sure the appropriate EZ-KIT Lite component is selected for the installation.

2. Connect the EZ-KIT Lite device to your PC's USB port.
   By connecting the device to the USB port you activate the Windows XP **Found New Hardware Wizard**, shown in Figure 1-10.

Figure 1-10. Windows XP – Found New Hardware Wizard

3. Select **Install the software automatically (Recommended)** and click **Next**.

When Windows XP completes the driver installation for the selected device (see step 1), a window shown in Figure 1-11 appears on the screen.

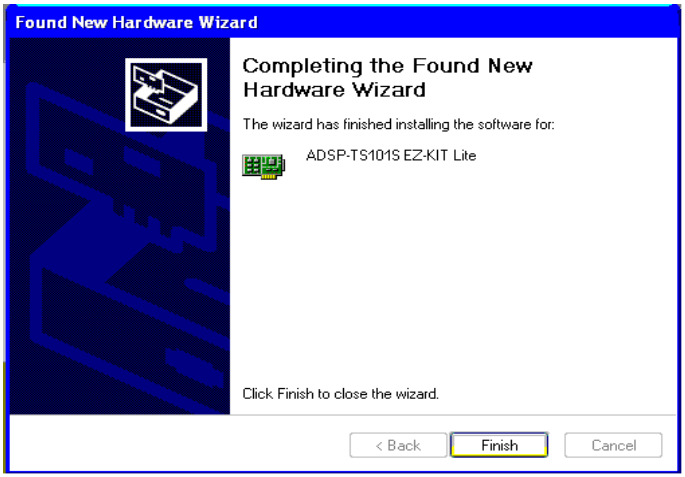

Figure 1-11. Windows XP – Completing Driver Installation

4. Verify the installation by following the instructions in "Verifying Driver Installation"

Verifying Driver Installation

Before you use the EZ-KIT Lite evaluation system, verify that the USB driver software is installed properly:

1. Remove power and unplug the USB cable, then apply power to the evaluation board.
2. Verify that the DSP RESET LED (LED9) stays lit for a few seconds and then turns off.
3. Connect the USB cable to the evaluation board.

4. After the RESET and DSP RESET (LED8 and LED9) go out, verify that the yellow USB monitor LED (LED1) is lit. This signifies that the board is communicating properly with the host PC and is ready to run VisualDSP++.

5. Open Windows **Device Manager** and verify that **ADSP-TS101S EZ-KIT Lite** shows under **ADI Development Tools** with no exclamation point, as in Figure 1-12.

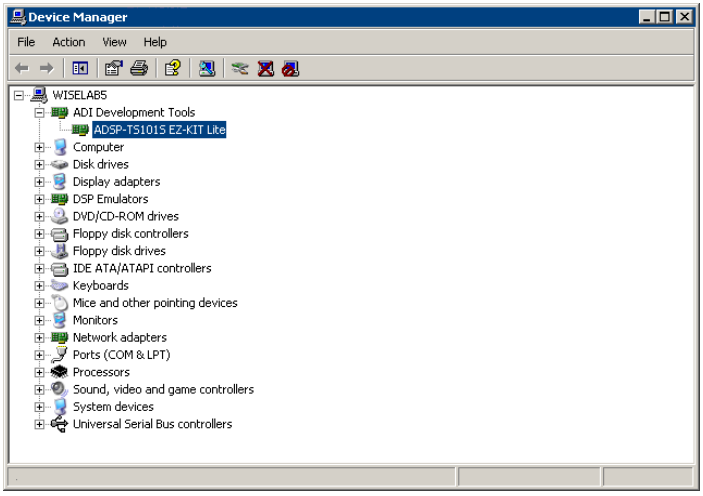

Figure 1-12. Device Manager Window

If using an EZ-KIT Lite on Windows 98, disconnect the USB cable from the board before booting the PC. When Windows 98 is booted and you are logged on, re-connect the USB cable to the board. The operation should continue normally from this point.

Starting VisualDSP++

To set up a session in VisualDSP++:

1. Verify that the yellow USB monitor LED (LED1, located near the USB connector) is lit. This signifies that the board is communicating properly with the host PC and is ready to run VisualDSP++.
2. Press and hold down the keyboard **Control** (CTRL) key.
3. Select the **Start** button on the Windows taskbar, then choose **Programs–>Analog Devices –>VisualDSP++ 3.5 for 32-bit Processors–>VisualDSP++ Environment**. If you are running VisualDSP++ for the first time, go to step 5.
   If you already have existing sessions, the **Session List** dialog box appears on the screen.
4. Click **New Session**.
5. The **New Session** dialog box, shown in Figure 1-13, appears on the screen.

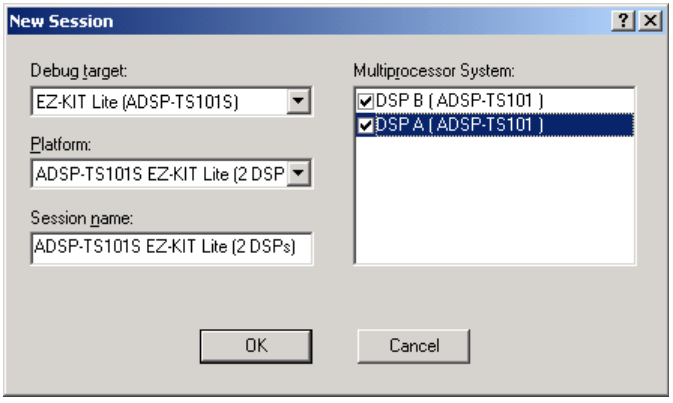

Figure 1-13. New Session Dialog Box

6. In **Debug Target**, choose **EZ-KIT Lite (ADSP-TS101S)**.

7. Type a new target name in **Session Name** or accept the default name.
8. Click **OK** to return to the **Session List** dialog box.
9. Highlight the new session and click **Activate**.

2 USING EZ-KIT LITE

This chapter provides specific information to assist you with developing programs for the ADSP-TS101S EZ-KIT Lite evaluation board. The information appears in the following sections.

- "EZ-KIT Lite License Restrictions" on page 2-2
  Describes the restrictions of the VisualDSP++ license shipped with the EZ-KIT Lite.
- "Memory Map" on page 2-3
  Describes the ADSP-TS101S EZ-KIT Lite board's memory map.
- "Using SDRAM Interface" on page 2-4
  Defines the register values needed to configure the external memory for SDRAM access.
- "Using Programmable FLAG Pins" on page 2-5
  Describes the function and use of the programmable FLAG pins on the EZ-KIT Lite evaluation system.
- "Using Interrupt Pins" on page 2-6
  Describes the function and use of the interrupt pins on the EZ-KIT Lite evaluation system.
- "Using Flash Memory" on page 2-6
  Describes how to program and use the Flash memory.
- "Using Audio Interface" on page 2-7
  Describes how to use and configure the audio interface.

- "Example Programs" on page 2-8
  Provides information about the example programs included in the ADSP-TS101S EZ-KIT Lite evaluation system.
- "Using Flash Programmer Utility" on page 2-8
  Provides information on the Flash Programmer utility included with VisualDSP++.

For detailed information about programming the ADSP-TS101S TigerSHARC processor, see the documents referred to as "Related Documents".

EZ-KIT Lite License Restrictions

The license shipped with the EZ-KIT Lite imposes the following restrictions.

- The size of a user program's code is limited to 96K words (1/4) of the ADSP-TS101S processor's program memory (PM) space.
- No connections to simulator or emulator sessions are allowed.
- The EZ-KIT Lite hardware must be connected and powered up in order to use VisualDSP++ with a kit license.

Memory Map

The ADSP-TS101S processor has 6 Mbits of internal memory that can be used for program storage or data storage. The configuration of internal memory is detailed in the *ADSP-TS101 TigerSHARC Processor Hardware Reference*.

The ADSP-TS101S EZ-KIT Lite board contains 544K x 8-bits of external Flash memory. The memory is separated into two sections. One section contains 512K bytes of main Flash memory, and the other section contains 32K bytes of secondary Flash memory. This memory is connected to the processor's ~BMS pin. The Flash memory can be accessed in boot memory space.

The board also contains one 4M x 64-bit SDRAM DIMM. This memory is connected to the processor's SDRAM interface.

Table 2-1. EZ-KIT Lite Evaluation Board Memory Map

	Start Address	End Address	Content
Internal Memory	0x0000 0000	0x0000 FFFF	Internal Memory 0
	0x0008 0000	0x0008 FFFF	Internal Memory 1
	0x0010 0000	0x0010 FFFF	Internal Memory 2
	0x0018 0000	0x0018 07FF	Internal Registers
	0x01C0 0000	0x01C0 FFFF	Broadcast
	0x0200 0000	0x0230 FFFF	Processor ID 0
	0x0240 0000	0x0070 7FFF	Processor ID 1
External Memory	0x0400 0000	0x047F FFFF	External Memory Space (SDRAM)

Using SDRAM Interface

The DIMM shipped with the EZ-KIT Lite evaluation board is a 32 MB module. You can upgrade to a 64 MB or 128 MB module. The module must be a 168-pin DIMM PC100 module. Modules may be purchased from vendors, such as Viking, Infineon, or Crucial.

Rev. 1.2 boards are shipped with 128 MB modules, but only 32 MB of the 128 MB can be accessed, and they cannot be upgraded with more memory. The issue will be resolved in Rev. 1.3.

To properly access SDRAM, the `SYSCON` and `SDRCON` registers must be configured properly. For the supplied DIMM, the `SDRCON` register should be configured as follows: SDRAM enable, CAS latency of two cycles, pipe depth of zero, page boundary of 256 words (1K words on Rev. 1.2), refresh rate of every 1200 cycles (every 600 cycles on Rev. 1.2), precharge to RAS of three cycles, RAS to precharge of four cycles, and init sequence is MRS cycle follows refresh.

The SDRAM registers can be configured automatically through the debugger. To enables the auto configuration, check the **Autoconfigure SDRAM** option on the **Target Options** dialog box, which is accessible through the **Settings** pull-down menu. If necessary, modify the auto configuration values by changing the values in the dialog box. The default values used by the debugger are:

- `SYSCON = 0x001A79E7` and `SDRCON = 0x00005223` (Rev. 1.2)
- `SDRCON = 0x00005303` (Rev. 1.3 and greater)

The `SYSCON` and `SDRCON` registers define bus control configuration. They can be written once only after reset and cannot be changed during system operation.

Using Programmable FLAG Pins

Each ADSP-TS101S processor has four programmable FLAG pins. Two FLAG pins from each processor (FLAG0 and FLAG1) allow you to interact with the running program through the use of a switch (SW4, SW9, SW5, and SW2). The FLAG2 and FLAG3 pins are connected to LEDs (LED7, LED6, LED4, and LED5).

After the processor is reset, the programmable FLAGs are configured as inputs. The direction of each programmable FLAG is configured in the SQCTL register. If the FLAG is configured for an output, the value is set in the SQCTL register. If the FLAG is configured for an input, the value on the FLAG pin is read from the SQSTAT register. Programmable FLAGs are summarized in Table 2-2. For more information on configuring the programmable FLAG pins, see the *ADSP-TS101 TigerSHARC Processor Hardware Reference*.

Table 2-2. Programmable FLAG Pin Summary

FLAG	Connected To	Use
FLAG0_A	SW4	The FLAG0 and FLAG1 pins are connected to the push buttons to supply feedback for program execution. For instance, you can write your code to trigger a routine when the push button is pressed.
FLAG1_A	SW9	
FLAG0_B	SW5	
FLAG1_B	SW2	
FLAG2_A	LED7	The FLAG2 and FLAG3 pins are connected to the LEDs to supply feedback during program execution.
FLAG3_A	LED6	
FLAG2_B	LED4	
FLAG3_B	LED5	

Using Interrupt Pins

The ADSP-TS101S processor has four interrupt pins (IRQ3-0) that allow you to interact with the running program. One external interrupt from each processor is directly accessible through push button switches SW3 and SW6 on the EZ-KIT Lite board. Interrupts are summarized in Table 2-3. For more information on configuring the interrupt pins, see the *ADSP-TS101 TigerSHARC Processor Programming Reference*.

Table 2-3. Interrupt Pin Summary

Interrupt	Connected To	Use
IRQ0_A	SW3	The IRQ0 interrupt is connected to push buttons to supply feedback for program execution. For instance, you can write your code to perform a different function when an interrupt is detected.
IRQ0_B	SW6	

Using Flash Memory

The DSM2150 flash/PLD chip provides a total of 544K x 8-bits of external Flash memory, arranged into two independent Flash arrays (main and secondary). The chip also has a series of configuration registers to control IO and PLD. The memory chip is initially configured with the memory sectors mapped to the processor, as shown in Figure 2-1 on page 2-3.

Use PSDsoft Express™ to modify the DSM project. The project files can be found in the EZ-KIT Lite installation directory: \…\VisualDSP 3.5 32-Bit\TS\EZ-KITs\ADSP-TS101\PSDConfigFiles. Analog Devices does not provide support for setting up the DSM2150 with PSDsoft Express or programming it using FlashLINK™. E-mail ST Microelectronics at apps.psd@st.com for technical assistance.

To program the Flash memory with your boot code, you must first create a loader file from your processor code. You set up the loader in VisualDSP++ depending on how you plan to boot the Flash memory. For information on creating a loader file, refer to the VisualDSP++ online help and *VisualDSP++ 3.5 Loader Manual for 32-Bit Processors*.

Next, the loader file must be programmed into the Flash memory. This can be done using the VisualDSP++ Flash Programmer Utility (see "Using Flash Programmer Utility" on page 2-8) or using the FlashLINK JTAG programmer. The original file that ships with the board is located in `\…\VisualDSP 3.5 32-Bit\TS\EZ-KITs\ADSP-TS101\Examples\Loader File Example\blinkTS101.ldr`.

The DSM2150 can be re-programmed using the FlashLINK JTAG programming cable available from STMicroelectronics (`www.st.com/psd`). FlashLINK plugs into any PC parallel port. The software development tool, PSDsoft Express, is required to modify the DSM2150 configuration and operate the FlashLINK cable. PSDsoft Express can be downloaded at no charge from the same Web site.

Using Audio Interface

The audio interface on the EZ-KIT Lite board allows you to interface to the board's analog-to-digital converter (ADC) and digital-to-analog converter (DAC). See "Audio (P1, P2)" on page 3-21 for more information about the connectors. The audio interface consists of two main ICs: AD1871 and AD1854.

The AD1871 is a stereo audio ADC intended for digital audio applications requiring high-performance analog-to-digital conversion. The AD1871 provides 97 dB THD+N and 107 dB dynamic range.

The AD1854 is a high-performance, single-chip stereo, audio DAC delivering 113 dB dynamic range and 112 dB SNR at a 48 kHz sample rate.

Because the ADSP-TS101S processor does not have any SPORTs, a Xilinx field-programmable gate array (FPGA) generates the audio interface control signals between the processor and the audio circuit. Setting the FLAG3 signal of DSP_A "high" enables the audio interface inside of the (FPGA). Once the audio interface has been enabled, the audio data can be transferred to and from the processor by generating a DMAR0 cycle. The audio data interfaces with the processor via the lowest 24 bits of the data bus (D23-0). Refer to the audio example program included in the EZ-KIT Lite installation directory for more information on how to use the interface.

Example Programs

Example programs are provided with the ADSP-TS101S EZ-KIT Lite to demonstrate various capabilities of the evaluation board. These programs are installed with the EZ-KIT Lite software and can be found in \…\VisualDSP 3.5 32-Bit\TS\EZ-KITs\ADSP-TS101\Examples. Please refer to the readme file provided with each example program for more information.

Using Flash Programmer Utility

The ADSP-TS101S EZ-KIT Lite evaluation system includes a Flash Programmer utility. The utility allows you to program the Flash memory on the EZ-KIT Lite. The Flash Programmer is installed with VisualDSP++. Once the utility is installed, it is accessible from the **Tools** pull-down menu.

For more information on the Flash Programmer utility, select **Start** and choose **Programs –>Analog Devices –>VisualDSP–>VisualDSP++ 3.5 for 32-bit Processors –>VisualDSP++ Documentation**.

3 EZ-KIT LITE HARDWARE REFERENCE

This chapter describes the hardware design of the ADSP-TS101S EZ-KIT Lite board. The following topics are covered.

- "System Architecture" on page 3-2
  Describes the configuration of the ADSP-TS101S EZ-KIT Lite evaluation board and explains how the board components interface with the processor.
- "Switch Settings" on page 3-4
  Shows the location and describes the function of the configuration DIP switch.
- "LEDs and Push Buttons" on page 3-8
  Shows the location and describes the function of the LEDs and push buttons.
- "Connectors" on page 3-11
  Shows the location of and gives the part number for all of the connectors on the board. In addition, provides the manufacturer and part number information for the mating parts.
- "Power Supply Specifications" on page 3-14
  Describes the power connector.

System Architecture

This section describes the processor's configuration on the EZ-KIT Lite board.

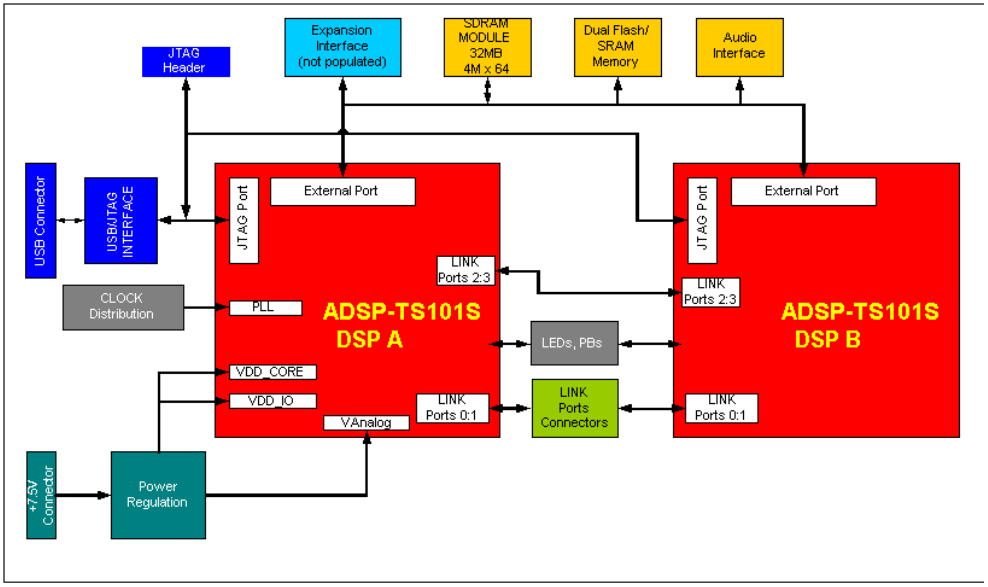

Figure 3-1. System Architecture

The EZ-KIT Lite has been designed to demonstrate the capabilities of the ADSP-TS101S TigerSHARC processor. The processor core voltage is 1.25V. The external interface operates at 3.3V.

An 83.33 MHz SMT oscillator supplies the input clock to the processor. The speed at which the core operates is determined by the settings of the processor switch `SW7`. For more information, see "Clock Mode Settings" on page 3-7. By default, the processor core runs at 250 MHz (83.3 MHz x 3).

External Port

The external port is connected to a 544K x 8-bit Flash memory. The Flash memory connects to the boot memory select pin (~BMS), allowing the memory to be used to boot the processor as well as to store information during normal operation. Refer to "Memory Map" on page 2-2 for information about the location of the Flash memory on the processor's memory map.

The external port is also connected to a 4M x 64-bit SDRAM DIMM. Refer to "Using SDRAM Interface" on page 2-4 for information on how to configure the SDRAM registers.

Expansion Interface

The expansion interface consists of three connectors (P1-3). The following table shows the interfaces each connector provides. For the exact pinout of these connectors, refer to Appendix B, "Schematics".

Table 3-1. Connector Interfaces

Connector	Interfaces
P11	5V, GND, Address, Data
P12	3.3V, GND, SDRAM control signals, FLAGS, IRQS, TIMERS
P13	GND, Reset, DMA, Memory Control, CLKOUT, PSD IO signals

When you use the expansion interface, limits to the current and to the interface speed must be taken into consideration. The maximum current limit depends on the capabilities of the used regulator. Additional circuitry can also add extra loading to signals, decreasing their maximum effective speed.

Analog Devices does not support and is not responsible for the effects of additional circuitry.

JTAG Emulation Port

The JTAG emulation port allows an emulator to access the processor's internal and external memory, as well as the special function registers through a 14-pin header. See "JTAG (P5)" on page 3-12 for more information about the JTAG connector. To learn more about available emulators, contact Analog Devices as described in "Embedded Processor Product Information" on page -xv.

Switch Settings

This section describes the function of the DIP switch, `SW7`. A location of the switch is shown in Figure 3-2.

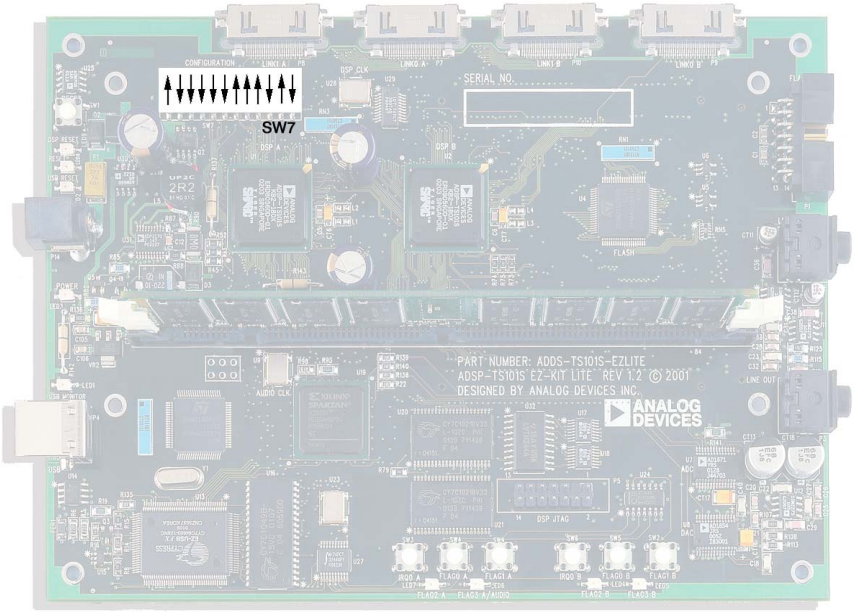

Figure 3-2. Switch Location

Control Impedance Selection

Positions 3 through 1 (CONTROLIMP$_{2-0}$) of SW7 determine the impedance for the ADC (Address/Data/Controls) and LINK (all link port outputs). Refer to the ADSP-TS101S TigerSHARC processor datasheet at http://www.analog.com/Uploaded-Files/Data_Sheets/56471537362067545483987 11ADSP-TS101S_a.pdf for more information.

Table 3-2. Control Impedance Selection

Position 3	Position 2	Position 1	ADC		Link	
			dig_ctrl	pulse	dig_ctrl	pulse
ON	ON	ON	0	X	0	X
ON	ON	OFF	0	X	0	X
ON		ON	0	X	1	0
ON		OFF	0	X	1	1
OFF	ON	ON	1	0	0	X
OFF	ON	OFF	1	1	0	X
OFF[1]	**OFF**	**ON**	**1**	**0**	**1**	**0**
OFF	OFF	OFF	1	1	1	1

1 Default settings

Drive Strength Selection

Positions 6 through 4 (DS$_{2-0}$) of SW7 determine the digital drive strength. Refer to the ADSP-TS101S TigerSHARC processor datasheet at http://www.analog.com/Uploaded-Files/Data_Sheets/56471537362067545483987 11ADSP-TS101S_a.pdf for more information.

Table 3-3. Drive Strength Selection

Position 6	Position 5	Position 4	Drive Strength
ON	ON	ON	11%
ON	ON	OFF	29%
ON	OFF	ON	37%
ON	OFF	OFF	49%
OFF	ON	ON	62%
OFF	ON	OFF	75%
OFF	OFF	ON	88%
OFF[1]	**OFF**	**OFF**	**100%**

1 Default settings

Boot Mode Settings

Position 7 of SW7 determines how the processor boots. Table 3-4 shows the setting for the boot modes. Refer to the ADSP-TS101S TigerSHARC processor datasheet for more information.

Table 3-4. Boot Mode Settings

Position 7	Boot Mode
ON[1]	**EPROM BOOT**
OFF	External Boot

1 Default settings

Interrupt Enable Settings

Position 8 of SW2 determines how the processor handles interrupts. Table 3-5 shows the setting for the interrupt modes. Refer to the ADSP-TS101S TigerSHARC processor datasheet for more information.

Table 3-5. Interrupt Enable Settings

Position 8	Interrupt Enable Mode
ON[1]	**Level-sensitive mode**
OFF	Edge-sensitive mode

1 Default settings

Clock Mode Settings

Positions 9 through 11 (LCLKRAT$_{2-0}$) of SW7 determine the ADSP-TS101S processor's core speed. The frequency supplied to CLKIN of the processor may be changed by replacing the 83.33 MHz oscillator (U28) shipped with the board with a different oscillator. Ensure that the selected clock mode and frequency do not exceed the minimum and maximum specifications of the ADSP-TS101S processor.

Table 3-6 shows the jumper settings for the clock modes. For more information on the clock modes, see the ADSP-TS101S processor datasheet.

Table 3-6. Clock Mode Settings

Position 11	Position 10	Position 9	Ratio
ON	ON	ON	2
ON	ON	OFF	2.5
ON[1]	**OFF**	**ON**	**3**
ON	OFF	OFF	3.5
OFF	ON	ON	4
OFF	ON	OFF	5
OFF	OFF	ON	6
OFF	OFF	OFF	RSVD

1 Default settings

LEDs and Push Buttons

This section describes the function of the LEDs and push buttons. Figure 3-3 shows the location of the LEDs and push buttons.

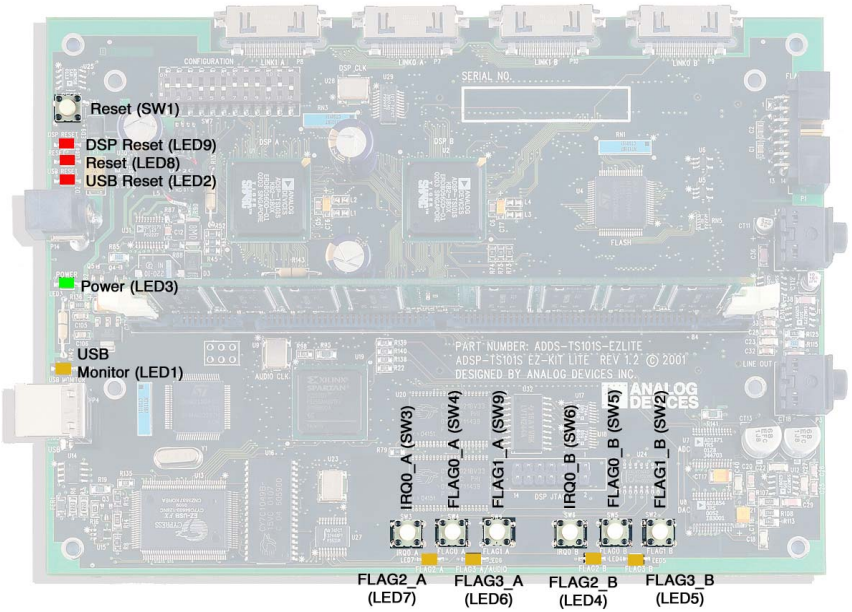

Figure 3-3. LEDs and Push Button Locations

USB Monitor LED (LED1)

The USB Monitor LED, `LED1`, indicates that USB communication has been initialized successfully, allowing you to connect to the processor using VisualDSP++. If the LED is not lit, try resetting the board and/or reinstalling the USB driver (see "Installing EZ-KIT Lite USB Driver" on page 1-7).

Reset LEDs (LED2, LED8, and LED9)

When LED2 is lit, the USB interface is being reset. This interface is only reset when it is not configured. Once it has been configured, you must remove power to reset the USB interface.

When LED8 is lit, it indicates that the master reset of all the major ICs is active.

When LED9 is lit, the two ADSP-TS101S processors (U1 and U2) are being reset. The USB interface resets the ADSP-TS101S processor during USB communication initialization.

Power LED (LED3)

The green LED, LED3, indicates that power is being properly supplied to the board.

FLAG LEDs (LED4–7)

The FLAG LEDs connect to the processor's FLAG pins (FLAG2 and FLAG3). These LEDs are active high and are lit by an output of "1" from the processor. Refer to "Using SDRAM Interface" on page 2-4 for more information on how to utilize the FLAGS when programming the processor. Table 3-7 shows the FLAG signals and the corresponding LEDs.

Table 3-7. FLAG LEDs

FLAG Pin	LED Reference Designator
FLAG2_A	LED7
FLAG3_A	LED6
FLAG2_B	LED4
FLAG3_B	LED5

Reset Push Button (SW1)

The RESET push button, SW1, resets all the ICs on the board, except the USB interface after it has been configured.

Programmable FLAG Push Buttons (SW2, SW–5, and SW9)

Four push buttons are provided for general-purpose user input. The SW2, SW4, SW5, and SW9 push buttons connect to the processor's programmable FLAG pins. The push buttons are active high and when pressed, send a high (1) to the processor. Refer to "Using SDRAM Interface" on page 2-4 for more information on how to use the FLAGS when programming the processor. Table 3-8 shows the FLAG signals and the corresponding switches.

Table 3-8. FLAG Switches

FLAG Pin	Push Button Reference Designator
FLAG0_A	SW4
FLAG1_A	SW9
FLAG0_B	SW5
FLAG1_B	SW2

Interrupt Push Buttons (SW3 and SW6)

Two push buttons, SW3 and SW6, are provided for user input. The push buttons connect to the processor's interrupt pins. The push buttons are active low and, when pressed, send a low (0) to the processor. Refer to "Using SDRAM Interface" on page 2-4 for more information on how to use the push buttons when programming the processor. Table 3-9 shows the interrupt signals and the corresponding switches.

Table 3-9. Interrupt Switches

FLAG Pin	Push Button Reference Designator	FLAG Pin	Push Button Reference Designator
IRQ0_A	SW3	IRQ0_B	SW6

Connectors

This section describes the connector functionality and provides information about mating connectors. The locations of the connectors are shown in Figure 3-4 on page 3-11.

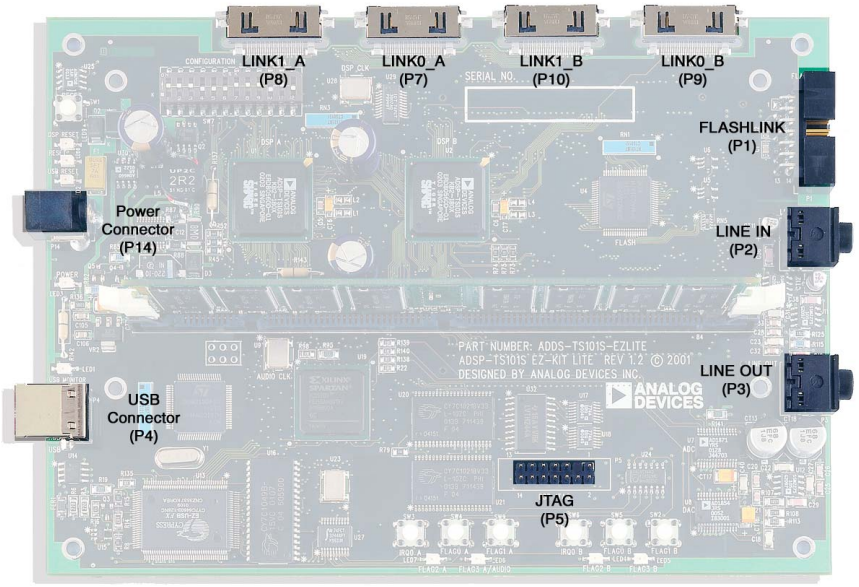

Figure 3-4. Connector Locations

Audio (P2–3)

There are two 3.5 mm stereo audio jacks.

Part Description	Manufacturer	Part Number
3.5 mm stereo jack	Shogyo	SJ-0359AM-5
Mating Connector		
3.5 mm stereo plug to 3.5 mm stereo cable	Radio Shack	L12-2397A

USB (P4)

The USB connector is a standard Type B USB receptacle.

Part Description	Manufacturer	Part Number
Type B USB receptacle	Mill-Max	897-30-004-90-000
	Digi-Key	ED90003-ND
Mating Connector		
USB cable (provided with the kit)	Assman	AK672-5
	Digi-Key	AK672-5ND

JTAG (P5)

The JTAG header is the connecting point for a JTAG in-circuit emulator pod.

Pin 3 is missing to provide keying. Pin 3 in the mating connector should have a plug. When an emulator is connected to the JTAG header, the USB debug interface is disabled.

When using an emulator with the EZ-KIT Lite board, follow the connection instructions provided with the emulator.

Expansion Interface (P11–13)

Three board-to-board connector footprints provide signals for most of the processor's peripheral interfaces. The connectors are located at the bottom of the board. For more information about the expansion interface, see "Expansion Interface" on page 3-3. For availability and pricing of the P11, P12, and P13 connectors, contact Samtec.

Part Description	Manufacturer	Part Number
90 Position 0.05" Spacing	Samtec	SFM-145-02-S-D
Mating Connector		
90 Position 0.05" Spacing (Through Hole)	Samtec	TFM-145-x1 Series
90 Position 0.05" Spacing (Surface Mount)	Samtec	TFM-145-x2 Series
90 Position 0.05" Spacing (Low Cost)	Samtec	TFC-145 Series

Link Ports (P7–10)

Two link ports from each processor are connected to a 26-pin connector. Refer to EE-106 at http://www.analog.com/UploadedFiles/Application_Notes/24075233ee_106.pdf for more information about the link port connectors. EE-106 discusses the link port assignments for ADSP-211xx processor applications.

In a TigerSHARC processor application, the link port cable connectors require pins 12 and 13 to be populated. The correct TigerSHARC link port cable assembly can be obtained from TransTech DSP (TTC44-30). The associated Gore Coaxial cable (DXN2132) should also be revised for the proper number of strands to include connector pins 12 and 13.

Part Description	Manufacturer	Part Number
26-position connector	TransTech DSP	TTC44-30
Mating Connectors		
Cable connector	Honda	RMCA-E26F1S-A
Shroud	Honda	RMCA-E26L1A
Coaxial cable	Gore	DXN2132

Power Connector (P14)

The power connector provides all the power necessary to operate the EZ-KIT Lite board.

Part Description	Manufacturer	Part Number
2.5 mm Power Jack (P14)	SWITCHCRAFT	RAPC712
	Digi-key	SC1152-ND
Mating Power Supply (shipped with the EZ-KIT Lite)		
7.5V Power Supply	GlobTek	TR9CC2000LCP-Y

Power Supply Specifications

This section provides the requirements for powering the board.

The power connector supplies DC power to the EZ-KIT Lite board. Table 3-10 shows the power connector pinout.

Table 3-10. Power Connectors

Terminal	Connection
Center pin	+7.5 VDC@2amps
Outer Ring	GND

A BILL OF MATERIALS

Reference	Quantity	Description	Reference Design	Manufacturer	Part Number
1	3	0.00 1/4W 5%	R137, R142–143	YAGEO	0.0QBK-ND
2	1	3.3V-OCTAL-BUFFER	U32	TI	SN74LVT244BDW
3	1	HEX-INVER-SCHMITT-TRIGGER	U24	TI	74LVC14AD
4	1	3.3V-OCTAL-BUFFER	U27	IDT	IDT74FCT3244APY
5	1	3.3V 1-10 CLOCK DRIVER	U29	IDT	IDT74FCT3807AQ
6	1	USB-TX/RX MICROCONTROLLER	U13	CYPRESS	CY7C64603-128NC
7	1	NPN TRANSISTOR 200MA	Q3	FAIRCHILD	MMBT4401
8	1	128K X 8 SRAM	U16	CYPRESS	CY7C1019BV33-12VC
9	1	12.0MHZ CRYSTAL	Y1	DIG01	300-6027-ND
10	1	XILINX-SPARTAN2-FPGA	U19	XILINX	XC2S200-6FG256C
11	8	SINGLE-2-INPUT-NAND	U5–6, U15, U26, U35–U38	TI	SN74AHC1G00DBVR
12	1	N-CHANNEL-MOSFET	Q2	FAIRCHILD	FDS6982

Reference	Quantity	Description	Reference Design	Manufacturer	Part Number
13	1	POWER MOSFET	Q1	IR	IRFR024
14	1	12.288MHZ OSCILLATOR	U9	DIG01	SG-8002CA-PCC-ND
15	1	2N7002	Q5	FAIRCHILD	2N7002
16	1	MMBT3904	Q4	FAIR CHILD	MMBT3904
17	2	256Kx16 SRAM	U20, U21	GSI TECHNOLOGY	GS74116TP-10
18	1	FLASH MEMORY	U4	STMICRO	DSM2150F5V
19	1	32K EEPROM	U14	MICROCHIP	24LC32A-I/SN
20	1	83.33MHZ OSCILLATOR	U28	DIG01	SG-8002CA-PCC-ND
21	1	FLASH MEMORY	U22	ST MICRO	DSM2150F5V
22	38	0.01uF 100V 10% CERM	C46–47, C52–53, C58–59, C64–65, C74–81, C94–97, C121–128, C136–142, C156–157, C161	AVX	12061C103KAT050M
23	2	1000pF 50V 5% CERM	C84–85	AVX	12065A102JAT2A
24	1	150pF 50V 5% CERM	C13	AVX	12065A151JAT2A
25	2	2200pF 50V 5% NPO	C19, C41	AVX	12065A222JAT2A
26	1	0.1uF 50V 20% CERM	C16	AVX	12065E104MAT2A

Reference	Quantity	Description	Reference Design	Manufacturer	Part Number
27	1	VOLTAGE-SUPERVISOR	U25	ANALOG DEVICES	ADM708SAR
28	1	2.5V-1.0AMP REGULATOR	VR1	ANALOG DEVICES	ADP3338AKC-2.5
29	1	5V-1.5A REGULATOR	VR2	ANALOG DEVICES	ADP3339AKC-5-REEL
30	3	DUAL AUDIO OP AMP	U10–12	ANALOG DEVICES	SSM2275S
31	2	ADSP-TS101SKB2180	U1–2	ANALOG DEVICES	ADSP-TS101SKB2180
32	1	STERO-DAC	U8	ANALOG DEVICES	AD1854JRS
33	1	STERO-ADC	U7	ANALOG DEVICES	AD1871YRS
34	1	SWITCHED-VOLT-CONVERTER	U30	ANALOG DEVICES	ADM660AR
35	1	SINGLE-PHASE-CORE-CONTROL	U31	ANALOG DEVICES	ADP3170
36	1	4.7uF 25V 10% TANT	CT10	AVX	TAJC475K025R
37	1	PWR 2.5MM_JACK	P14	SWITCHCRAFT	SC1152-ND12
38	1	USB 4PIN	P4	MILL-MAX	897-30-004-90-000000
39	4	LNKPRT 12X2	P7–10	HONDA (TSUSHINK)	RMCA-EA26LMY-0M03-A
40	7	SPST-MOMENTARY 6MM	SW1–6, SW9	PANASONIC	EVQ-PAD04M

Reference	Quantity	Description	Reference Design	Manufacturer	Part Number
41	1	DIP12	SW7	DIGI-KEY	CKN3063-ND
42	1	IDC 7X2	P1	MOLEX	70247-1401
43	1	168PIN DIMM	U3	MOLEX	71251-0012
44	1	7A FAST-ACTING	F1	DIG01	283-2438-2-ND
45	13	0.00 1/8W 5%	R19, R23, R34, R49–51, R54–55, R131, R133–134, R141	YAGEO	0.0ECT-ND
46	1	220uF 10V 20% ELEC	CT14	SPRAGUE	293D227X9010E2T
47	5	AMBER-SMT GULL-WING	LED1, LED4–7	PANASONIC	LN1461C-TR
48	2	330pF 50V 5% NPO	C20, C26	AVX	08055A331JAT
49	4	0.01uF 100V 10% CERM	C10, C165, C167, C168	AVX	08051C103KAT2A
50	86	0.1uF 50V 10% CERM	C1, C9, C17, C42–45, C48–51, C54–57, C60–63, C66–73, C82–83, C86–93, C98–120, C129–135, C143–155, C158–160, 162, C172, C173	AVX	08055C104KAT

Reference	Quantity	Description	Reference Design	Manufacturer	Part Number
51	9	0.001uF 50V 5% NPO	C4–6, C12, C28, C30, C32–33, C164	AVX	08055A102JAT2A
52	3	10uF 16V 10% TANT	CT9, CT24–25	SPRAGUE	293D106X9025C2T
53	35	10K 100MW 5%	R8–10, R13, R15, R30, R32, R36, R45–47, R52, R53, R56, R58–59, R61, R63, R64, R67, R73–81, R83, R93, R97, R99, R151, R152	AVX	CR21-103J-T
54	12	33 100MW 5%	R22, R66, R68–71, R98, R130, R135, R138–140	AVX	CR21-330JTR
55	5	4.7K 100MW 5%	R28–29, R31, R35, R20	AVX	CR21-4701F-T
56	1	1M 100MW 5%	R7	AVX	CR21-1004F-T
57	1	1.5K 100MW 5%	R16	AVX	CR21-1501F-T
58	1	22uF 16V 10% TANT	CT26	DIG01	PCT3226CT-ND
59	1	2.00K 1/8W 1%	R2	DALE	CRCW1206-2001FRT1

Reference	Quantity	Description	Reference Design	Manufacturer	Part Number
60	2	49.9K 1/8W 1%	R102, R128	AVX	CR32-4992F-T
61	2	2.21K 1/8W 1%	R4–5	AVX	CR32-2211F-T
62	11	100pF 100V 5% NPO	C11, C18, C22–23, C27, C31, C34–35, C40, C166, C169	AVX	12061A101JAT2A
63	3	10uF 16V 10% TANT	CT15–17	AVX	TAJB106K016R
64	6	100 100MW 5%	R33, R44, R57, R60, R62, R65	AVX	CR21-101J-T
65	2	220pf 50V 10% NPO	C24, C29	AVX	12061A221JAT2A
66	4	1000 100MHZ 1.5A 0.06 CHOKE	L1–L4	MURATA	PLM250S40T1
67	3	SILICON RECTIFIER	D1–D3	GENER-ALSEMI	S2A
68	3	600 100MHZ 500MA 0.70 BEAD	FER1–3	DIGIKEY	240-1019-1-ND
69	4	237 1/8W 1%	R114, R116, R118, R121	KOA	P11.0FCT-ND
70	2	750K 1/8W 1%	R115, R117	KOA	RK73H2BT7503F
71	8	5.76K 1/8W 1%	R103, R119–120, R122–126	DALE	CRCW12065761FRT1
72	2	3.01K 1/8W 1%	R82, R85	KOA	RK73H2BT3011F

Reference	Quantity	Description	Reference Design	Manufacturer	Part Number
73	2	11.0K 1/8W 1%	R101, R129	DALE	CRCW12061102FTR1
74	4	120PF 50V 5%	C36–39	PHILLIPS	1206CG121J9B200
75	4	1UF 16V 10%	C2–3, C15, C163	MURATA	GRM40X7R105K016AL
76	1	1.0K 1/8W 1%	R89	AVX	CR32-1001F-T
77	2	30PF 100V 5%	C7–8	AVX	12061A300JAT2A
78	4	10 100MW 5%	R25, R72, R149, R150	DALE	CRCW0805-10R0FRT1
79	2	680PF 50V 1% NPO	C21, C25	AVX	08055A681FAT2A
80	2	2.74K 1/8W 1%	R108, R113	PANASONIC	ERJ-8ENF2741V
81	4	5.49K 1/8W 1%	R104–105, R109–110	PANASONIC	ERJ-8ENF5491V
82	2	3.32K 1/8W 1%	R106, R111	PANASONIC	ERJ-8ENF3321V
83	3	1.65K 1/8W 1%	R1, R107, R112	PANASONIC	ERJ-8ENF1651V
84	2	10UF 16V 20% ELEC	CT11–12	DIG01	PCE3062TR-ND
85	2	68UF 25V 20% ELEC	CT13, CT18	PANASONIC	EEV-FC1E680P
86	1	1800UF 10V 20%	CT19	RUBYCON	10MBZ1800M
87	1	2.2UH X 20%	L5	COOPER ELE TEHC	UP2C-2R2
88	2	1800UF 6.3V 20%	CT20–21	RUBYCON	6.3MBZ1800M
89	4	10K 31MW 5%	RN2, RN4, RN5, RN7	CTS	746X101103J
90	1	3.9NF 50V 5%	C14	PANASONIC	ECH-U1C392JB5

Reference	Quantity	Description	Reference Design	Manufacturer	Part Number
91	1	3.6K 1/8W 1%	R86	PHYCOMP	311-3.60KFTR-ND
92	1	26.7K 1/8W 1%	R92	PHYCOMP	311-26.7KFTR-ND
93	1	.008 1W 5%	R90	PANASONIC	P8.0TTR-ND
94	1	12.1K 1/8W 1%	R91	PHYCOMP	311-12.1KFTR-ND
95	3	10K 50MW 5%	RN1, RN3, RN6	CTS	RT130B7
96	4	0.00 100MW 5%	R144, R147, R148, R153	PAN	ERJ-6GE10R00V
97	4	10UH X 10%	L1–L4	PANASONIC	ELJ-FC100KF
98	2	3.32K 100MW 1%	R11, R12	DIG01	P3.32KCCTR-ND
99	3	1K 1/8W 5%	R14, R21, R24	AVX	CR32-102J-T
100	1	10K 1/8W 5%	R17	DALE	CRCW1206-1002FRT1
101	3	100K 1/8W 5%	R94, R96, R136	AVX	CR1206-1003FTR1
102	1	20.0K 1/8W 1%	R84	DALE	CRCW1206-2002FRT1
103	2	220 1/8W 5%	R87–88	AVX	CR32-221J-T
104	2	22 1/8W 5%	R3, R6	AVX	CR32-220J-T
105	8	270 1/8W 5%	R18, R37–40, R42–43, R48	AVX	CR32-271J-T
106	1	680 1/8W 5%	R41	AVX	CR32-681J-T
107	3	RED-SMT GULL-WING	LED2, LED8, LED9	PANASONIC	LN1261C

Reference	Quantity	Description	Reference Design	Manufacturer	Part Number
108	1	GREEN-SMT GULL-WING	LED3	PANASONIC	LN1361C
109	2	604 1/8W 1%	R100, R127	PANASONIC	ERJ-8ENF6040V
110	10	1uF 25V 20%	CT1–8, CT22–23	PANASONIC	ECS-T1EY105R
111	2	QUICKSWITCH-257	U17–18	ANALOG DEV.	ADG774ABRQ
112	1	IDC 7X2	P5	BERG	54102-T08-07
113	2	3.5MM STEREO_JACK	P2–3	Shogyo	SJ-0359AM-5
114	1	32MB SDRAM	U3	Viking	PE464U4-CL2

ADSP-TS101 EZ-KIT LITE

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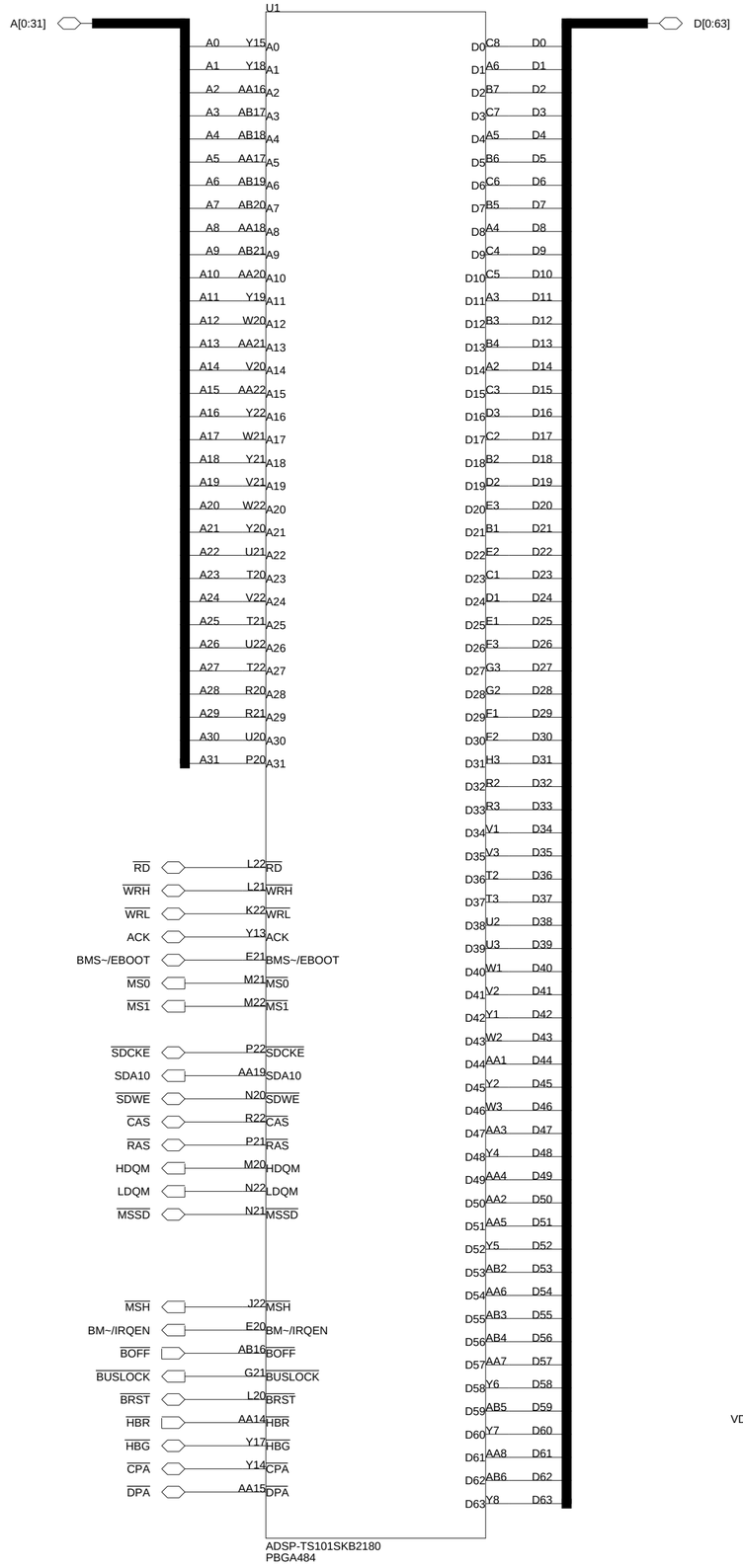
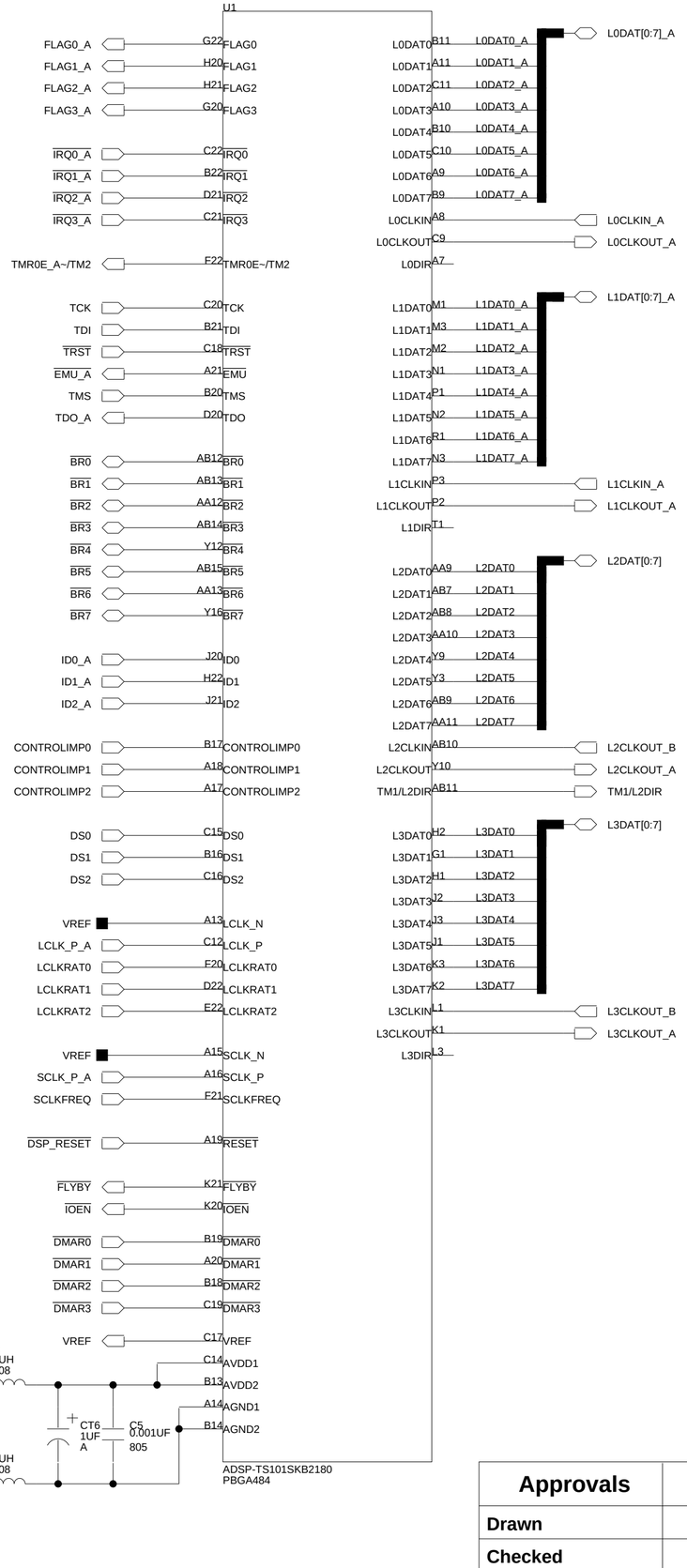
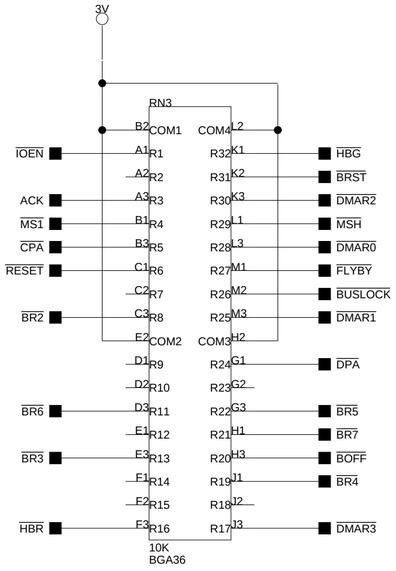
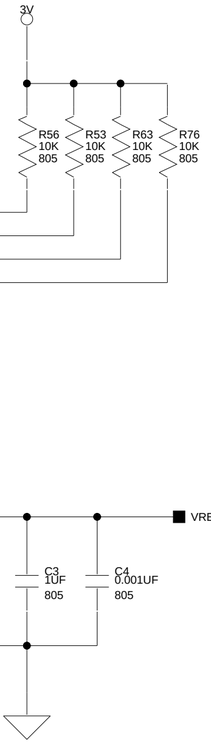
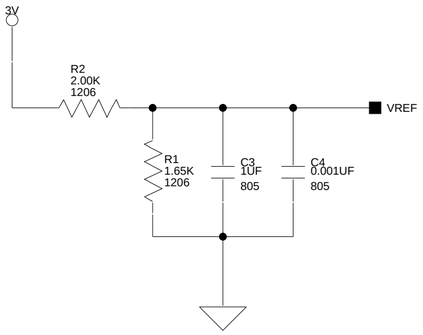
Title	ADSP-TS101 EZ-KIT LITE		
Size C	Board No. A0163-2001		Rev 1.3
Date 7-15-2002_16:25		Sheet 1 of 13	











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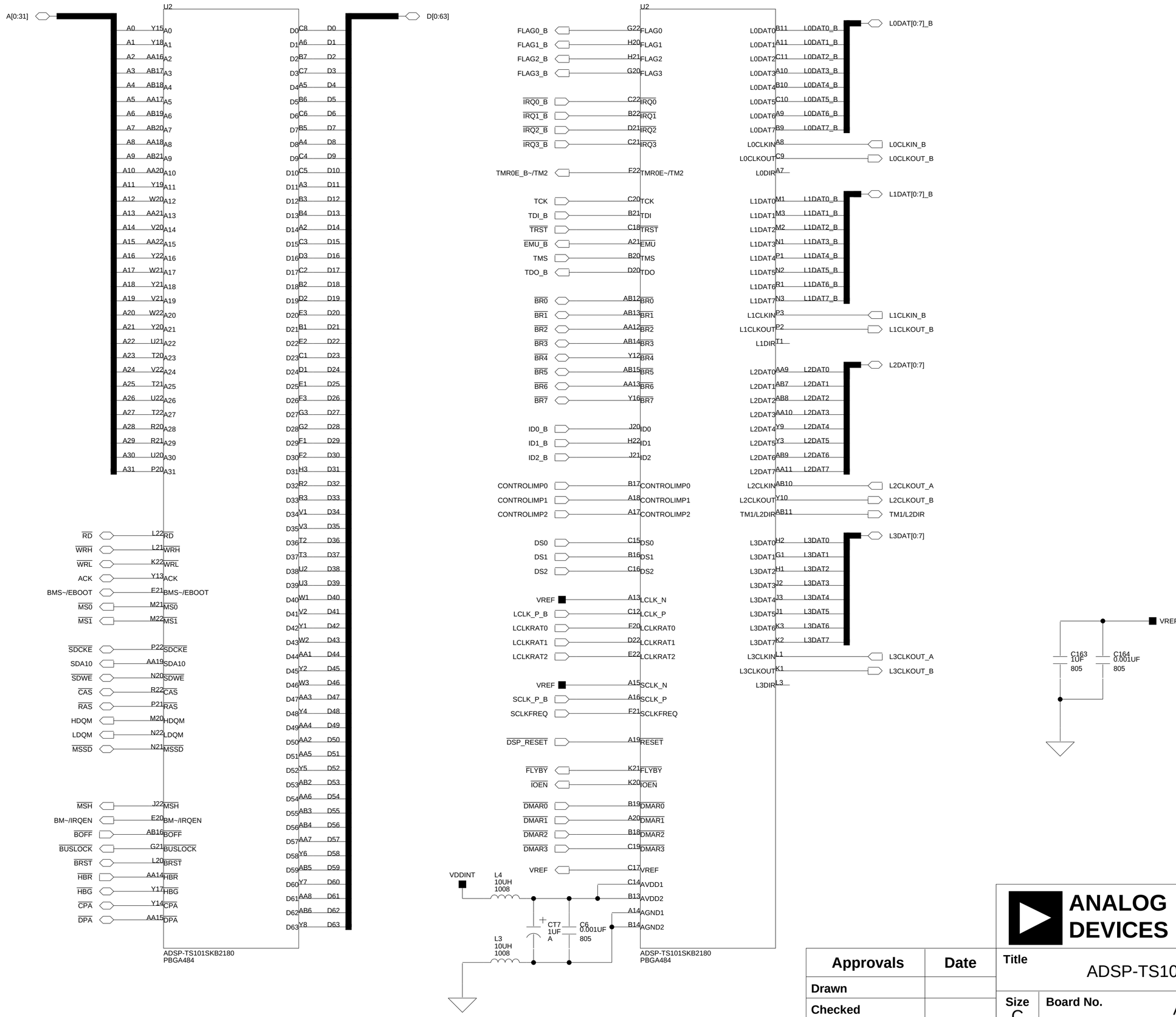
Title ADSP-TS101 EZ-KIT LITE - DSP A

Size	Board No.	Rev
C	A0163-2001	1.3

Date 7-15-2002_16:24 **Sheet** 2 **of** 17



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Title ADSP-TS101 EZ-KIT LITE - DSP B

Size	Board No.	Rev
C	A0163-2001	1.3

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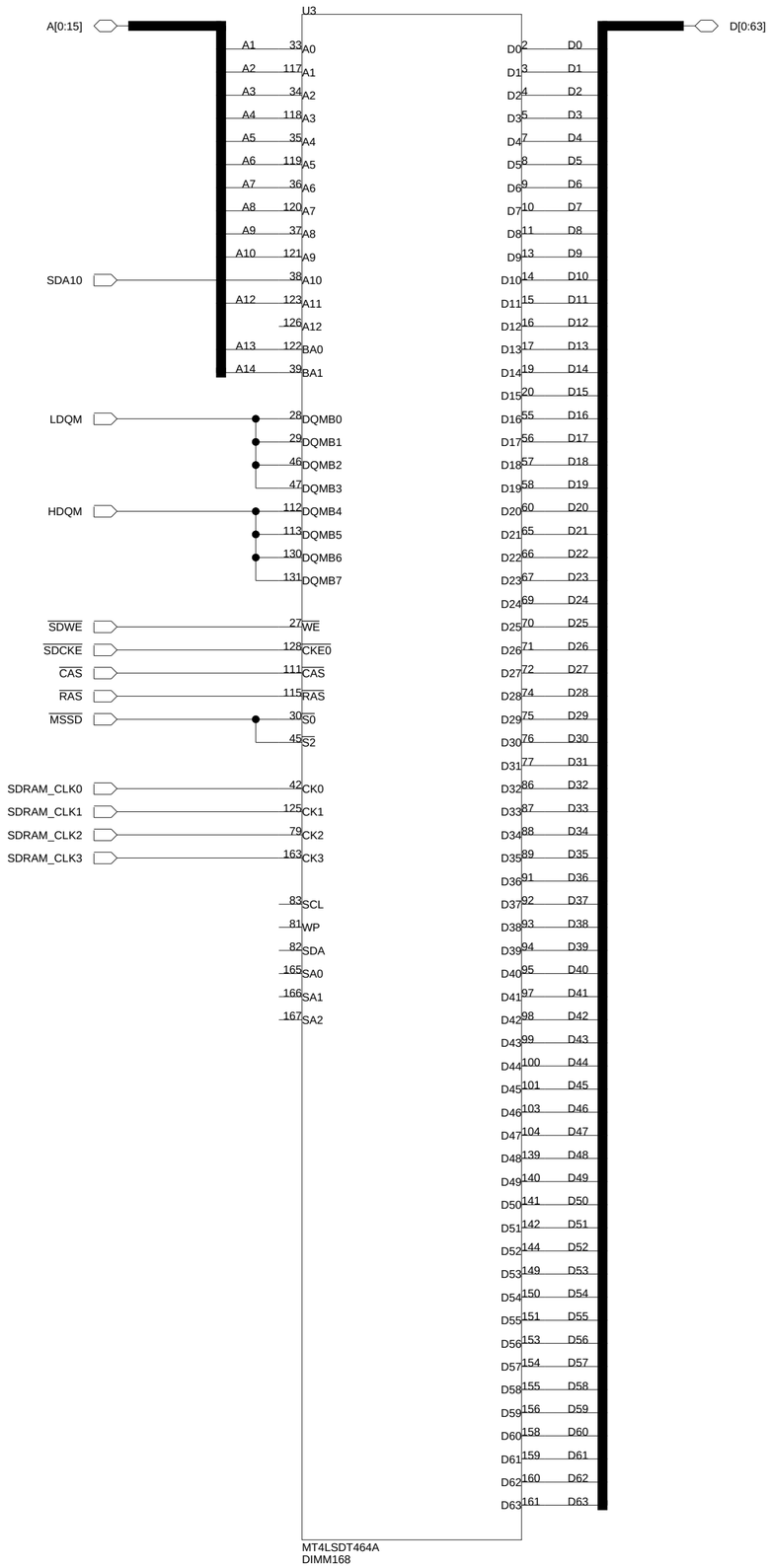
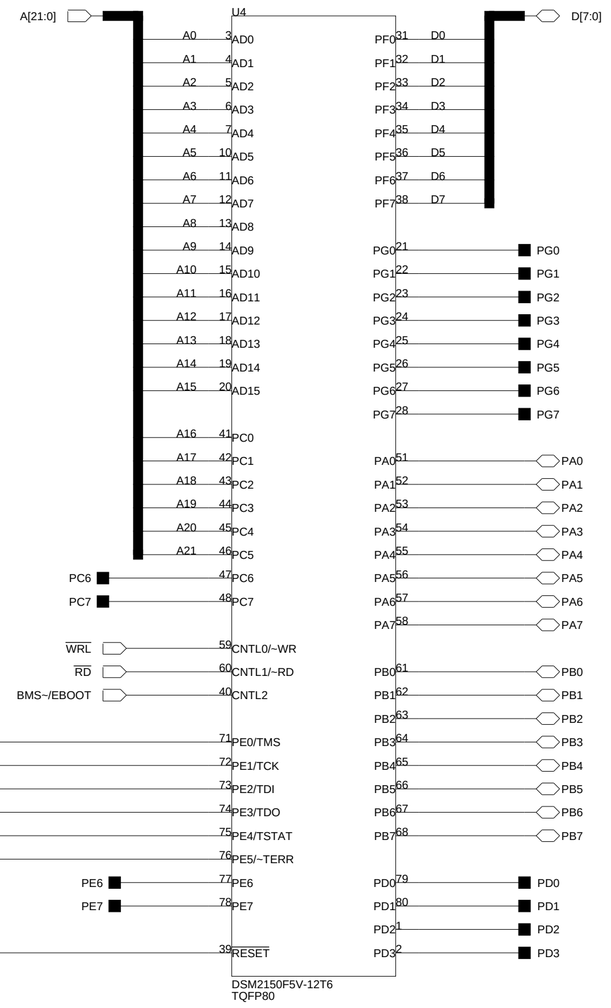
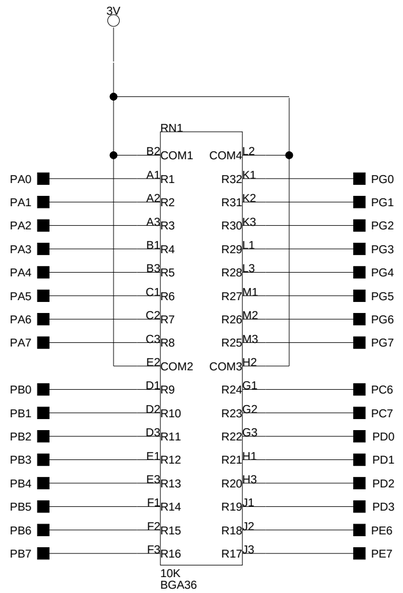
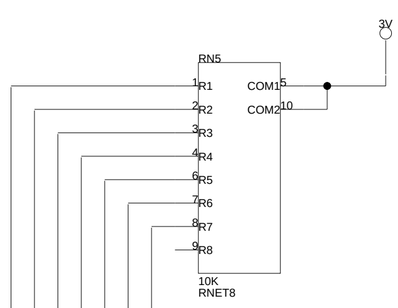
4M x 64 SDRAM

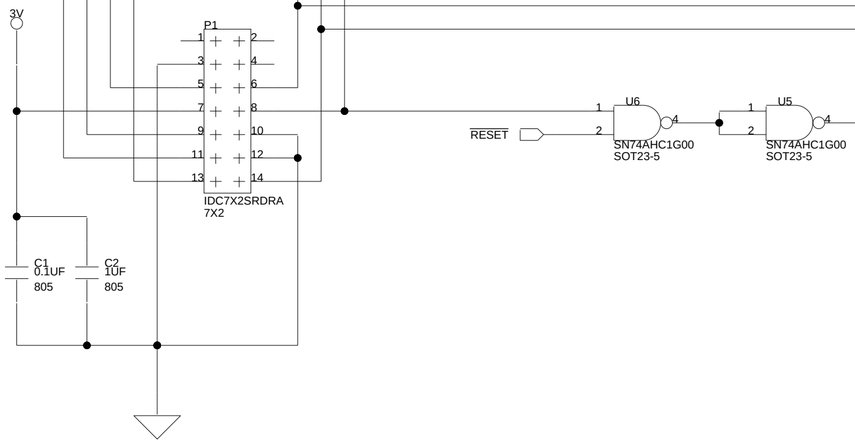


512 KB MAIN FLASH
32KB SECONDARY FLASH









DSM JTAG HEADER

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Title ADSP-TS101 EZ-KIT LITE - SDRAM & FLASH

Size	Board No.	Rev
C	A0163-2001	1.3

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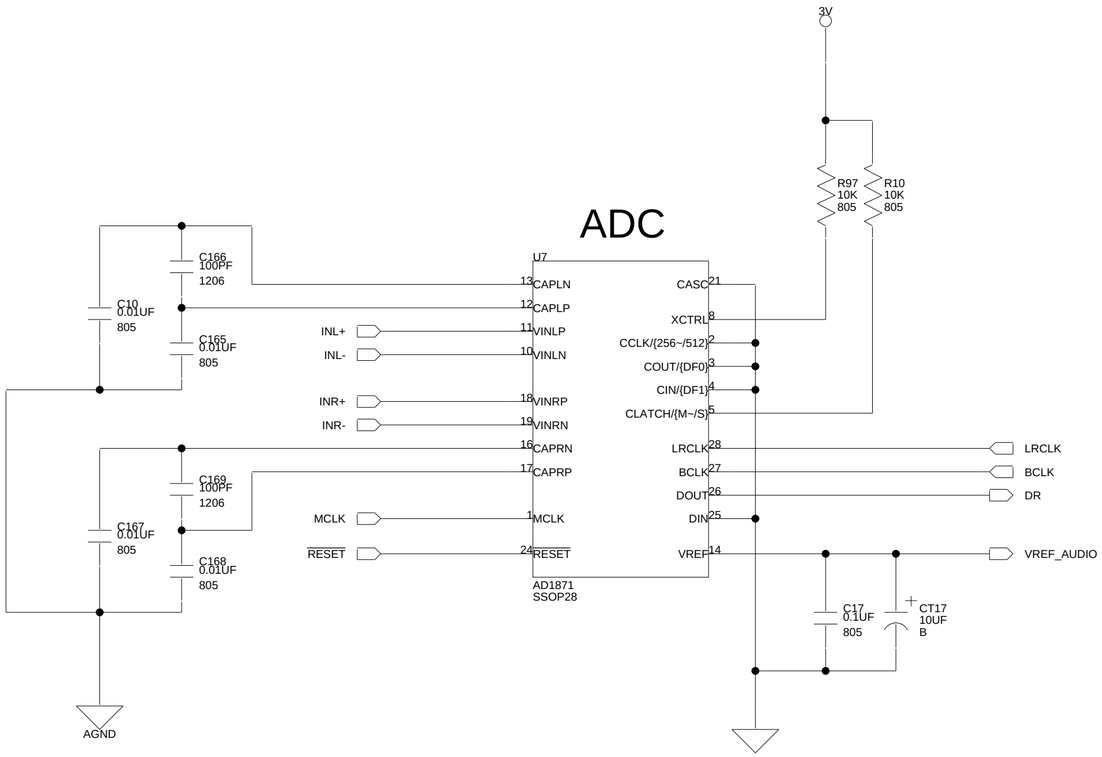

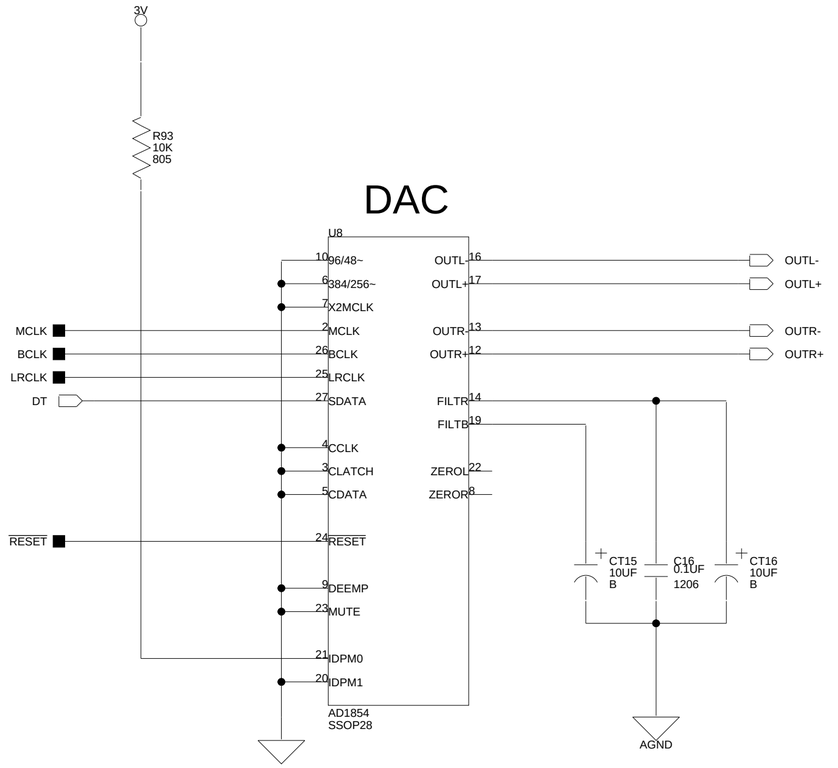

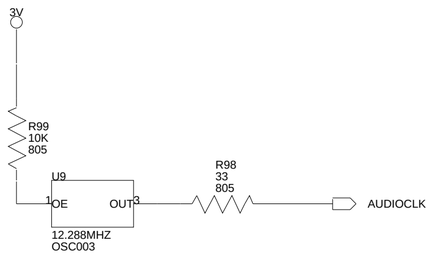

SLAVE MODE
MCLK IS 256 x Fs
48 kHZ SAMPLE RATE
I^2S I/F MODE

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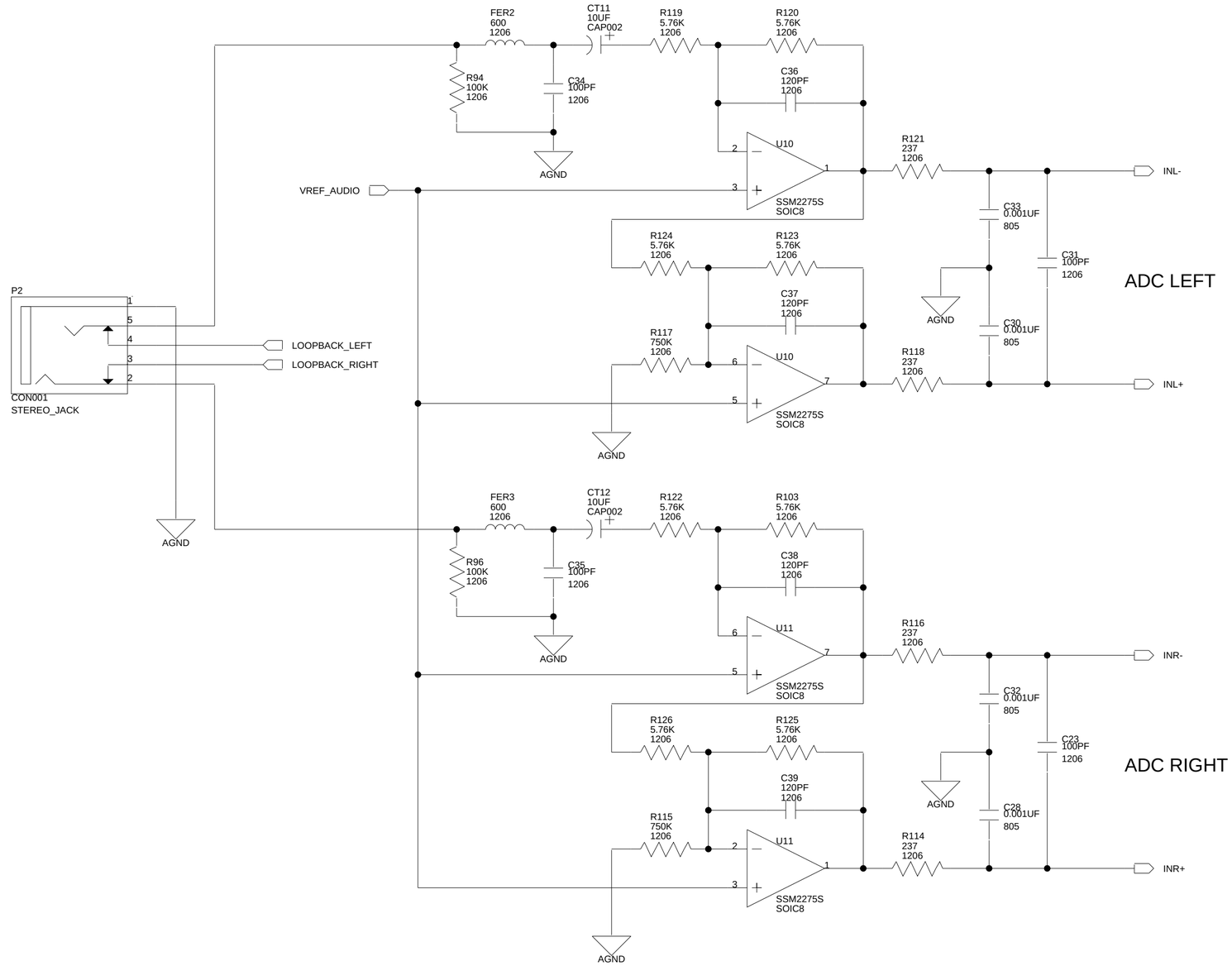
Title: ADSP-TS101 EZ-KIT LITE - AUDIO INTERFACE

Size	Board No.	Rev
C	A0163-2001	1.3

Date: 7-15-2002_16:24 Sheet 5 of 17



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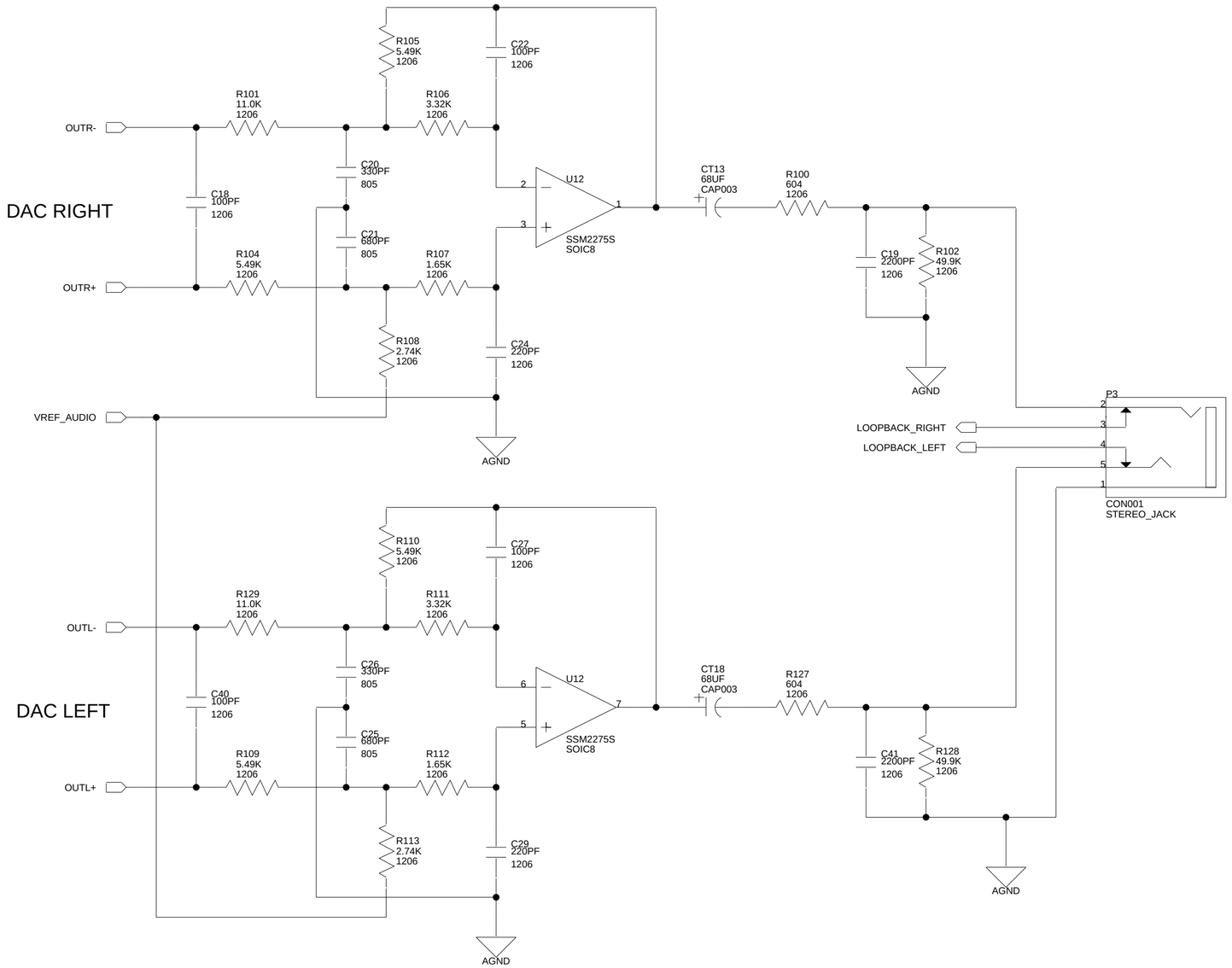
Title ADSP-TS101 EZ-KIT LITE - AUDIO IN AMPLIFIERS

Size	Board No.	Rev
C	A0163-2001	1.3

Date 7-15-2002_16:24 **Sheet** 6 **of** 17



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Title: ADSP-TS101 EZ-KIT LITE - AUDIO OUT AMPLIFIERS

Size	Board No.	Rev
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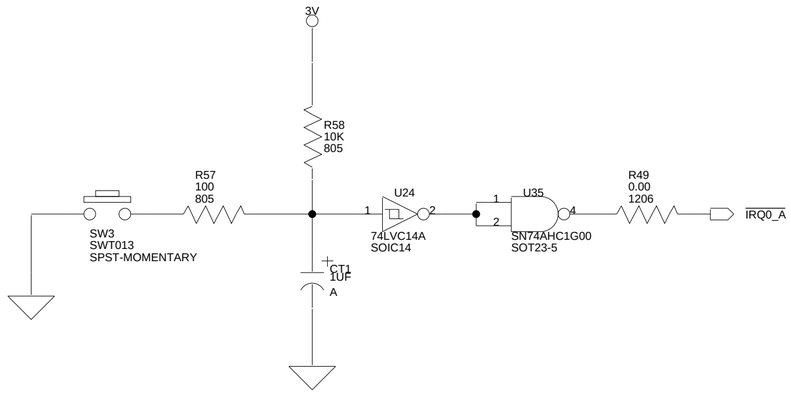

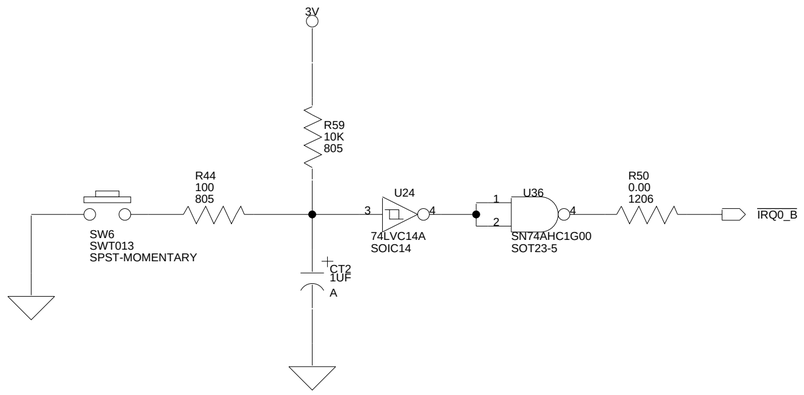

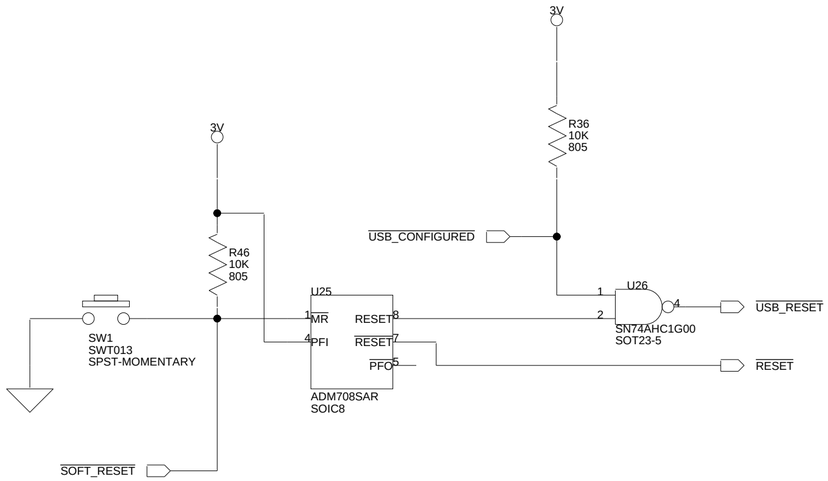

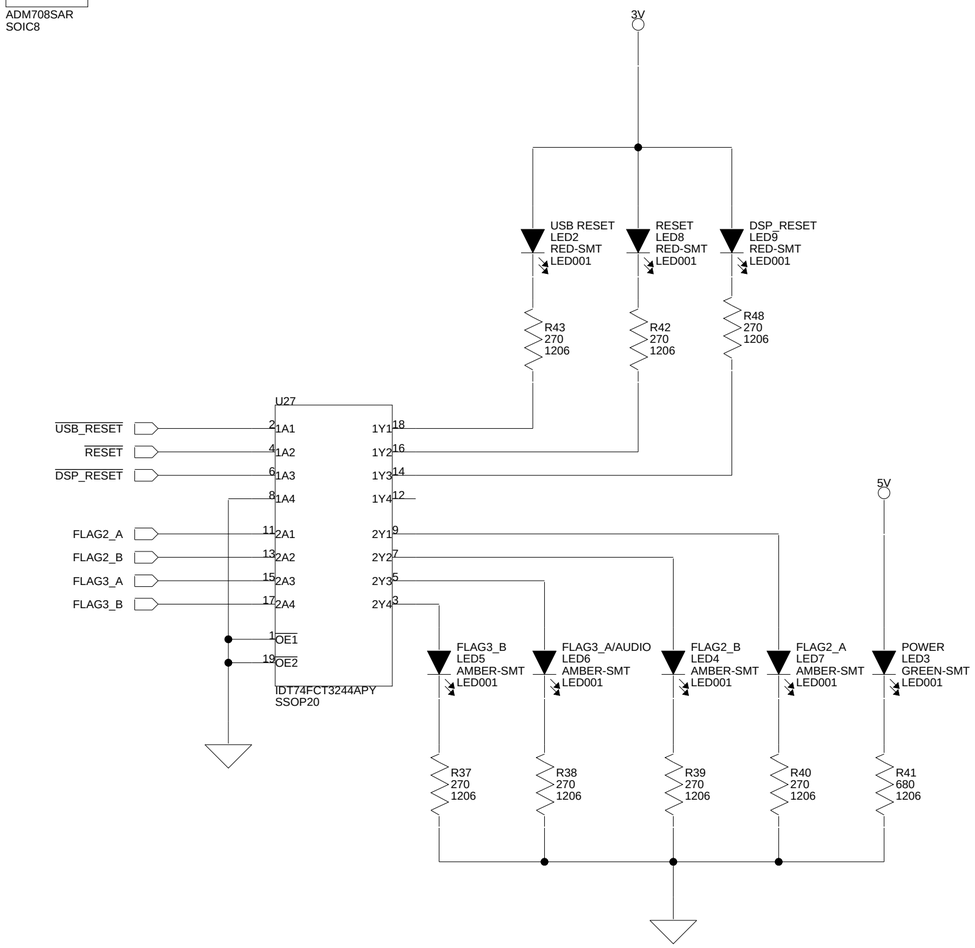

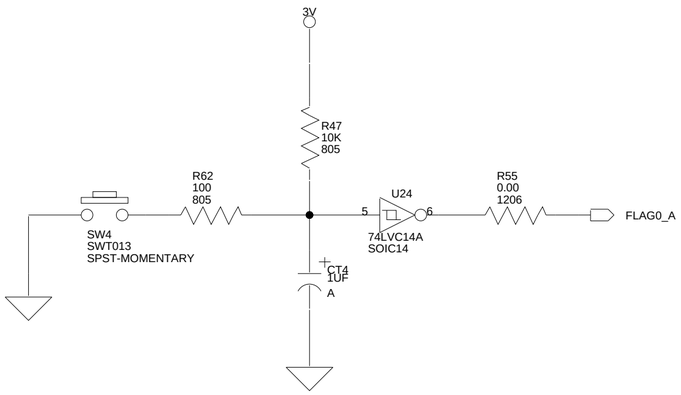

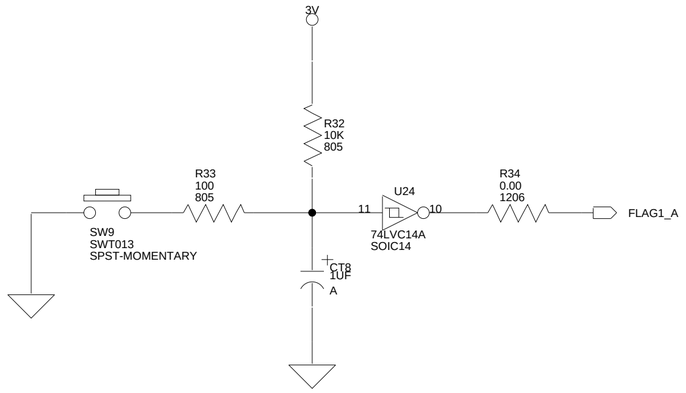

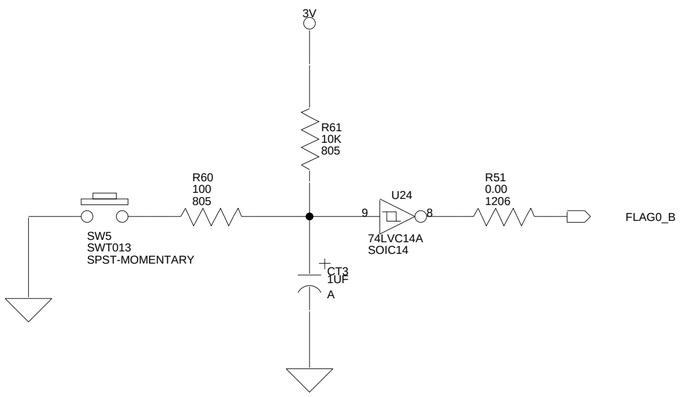

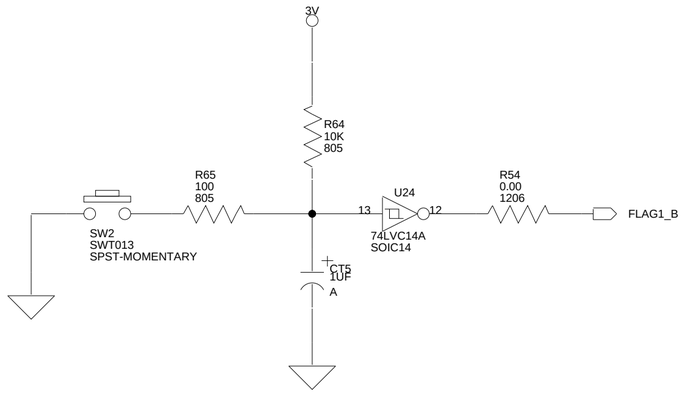

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Title: ADSP-TS101 EZ-KIT LITE - PUSH BUTTONS & LEDS

Size	Board No.	Rev
C	A0163-2001	1.3

Date: 7-15-2002_16:24 Sheet 8 of 17

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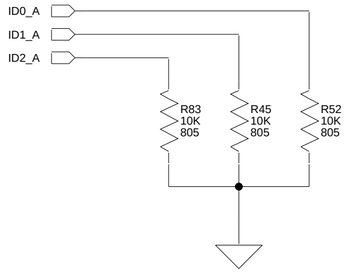

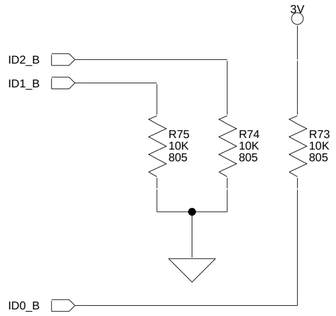

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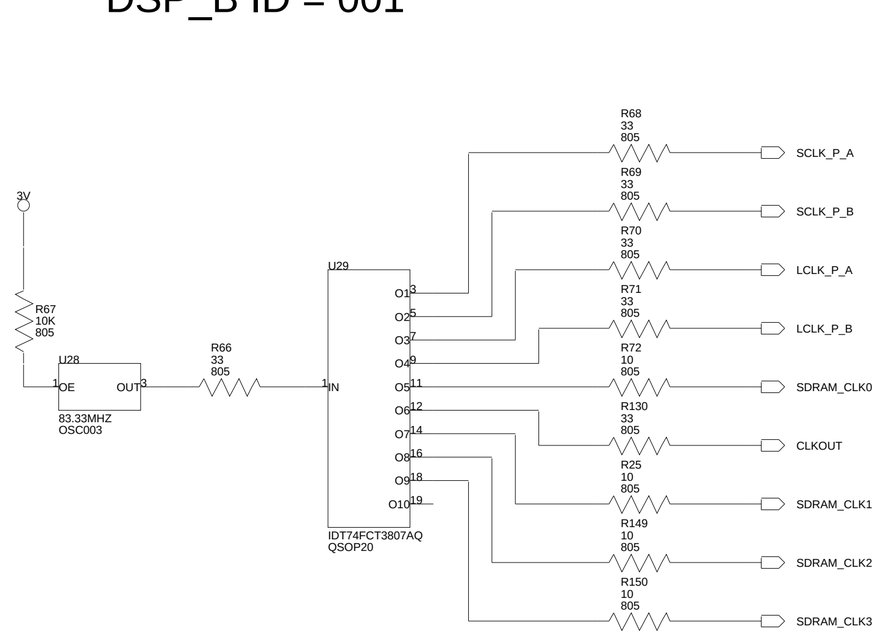

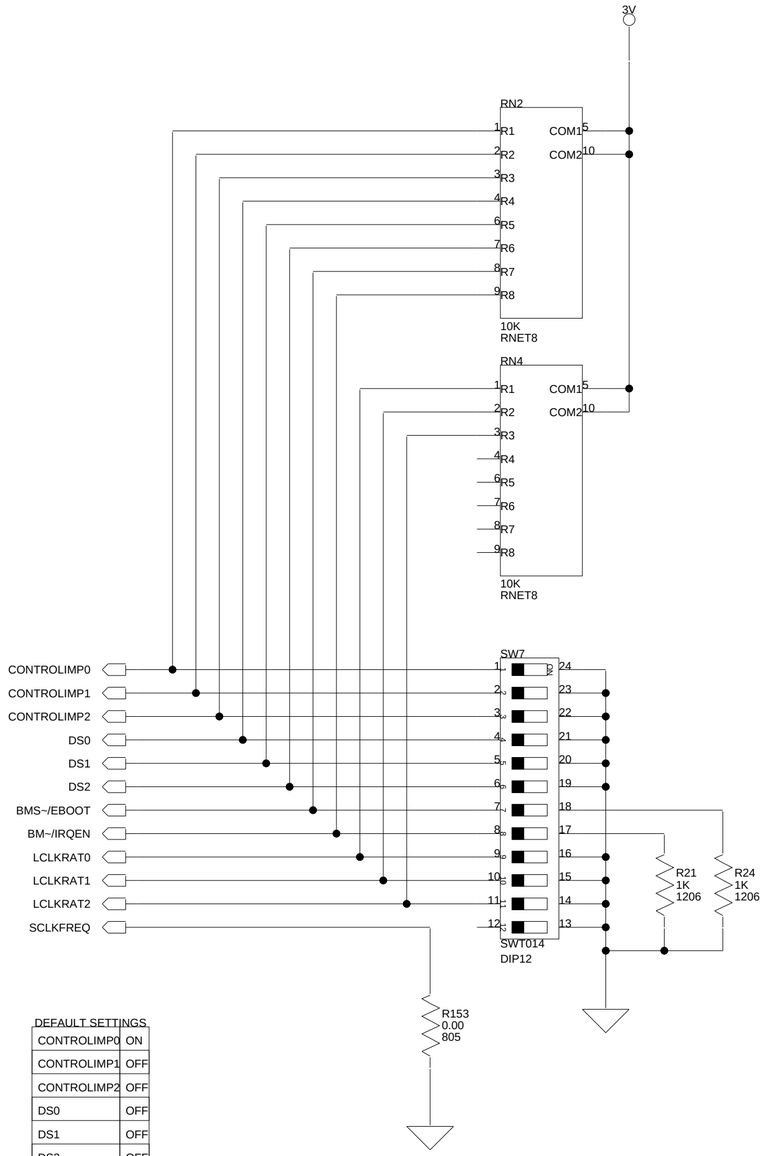

DEFAULT SETTINGS

CONTROLIMP0	ON
CONTROLIMP1	OFF
CONTROLIMP2	OFF
DS0	OFF
DS1	OFF
DS2	OFF
BMS~	ON
BM~	ON
LCLKRAT0	ON
LCLKRAT1	OFF
LCLKRAT2	ON

ANALOG DEVICES
20 Cotton Road
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Title: ADSP-TS101 EZ-KIT LITE - CONFIGURATION

Size	Board No.	Rev
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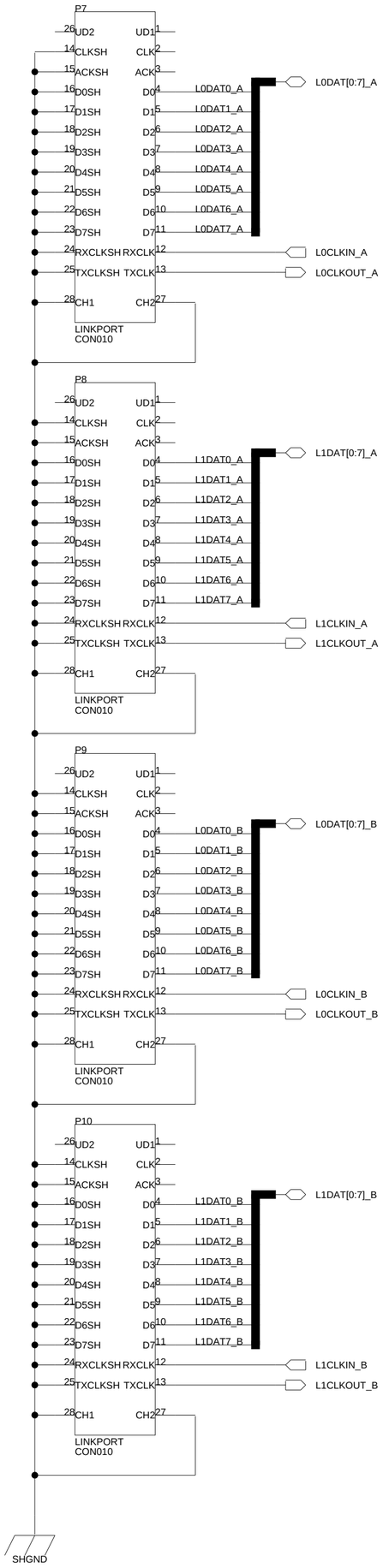

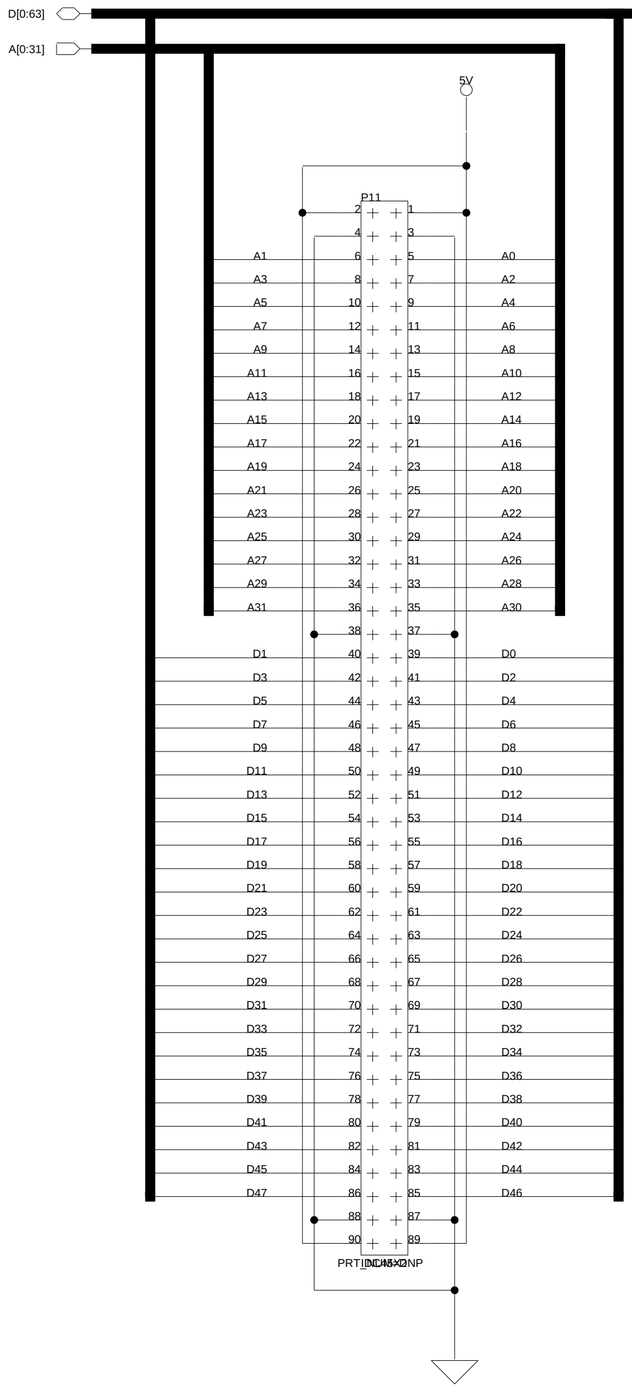

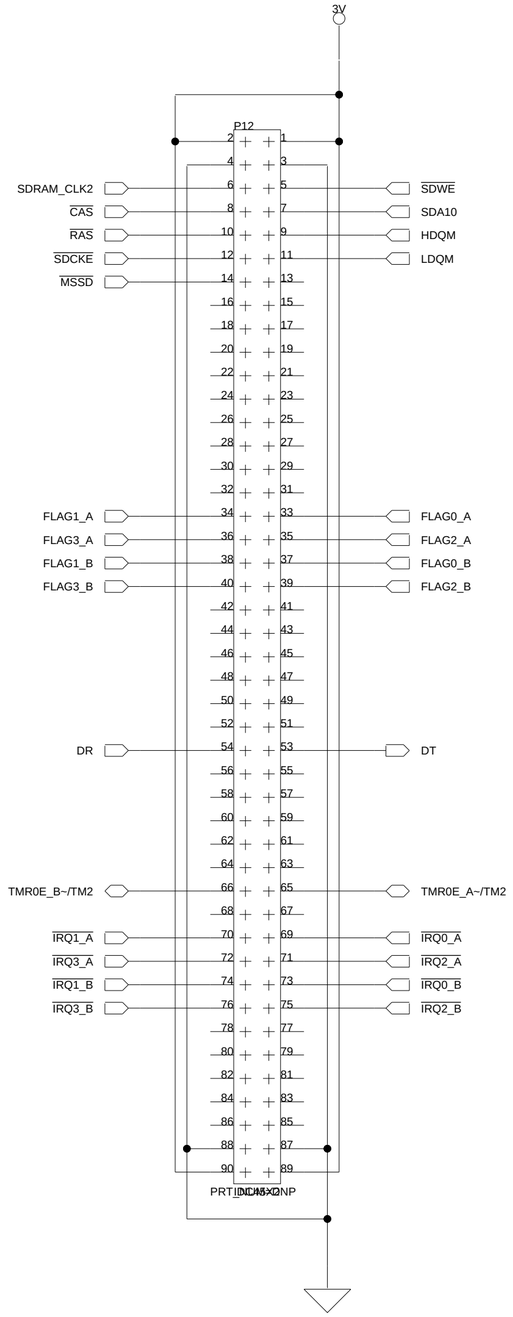

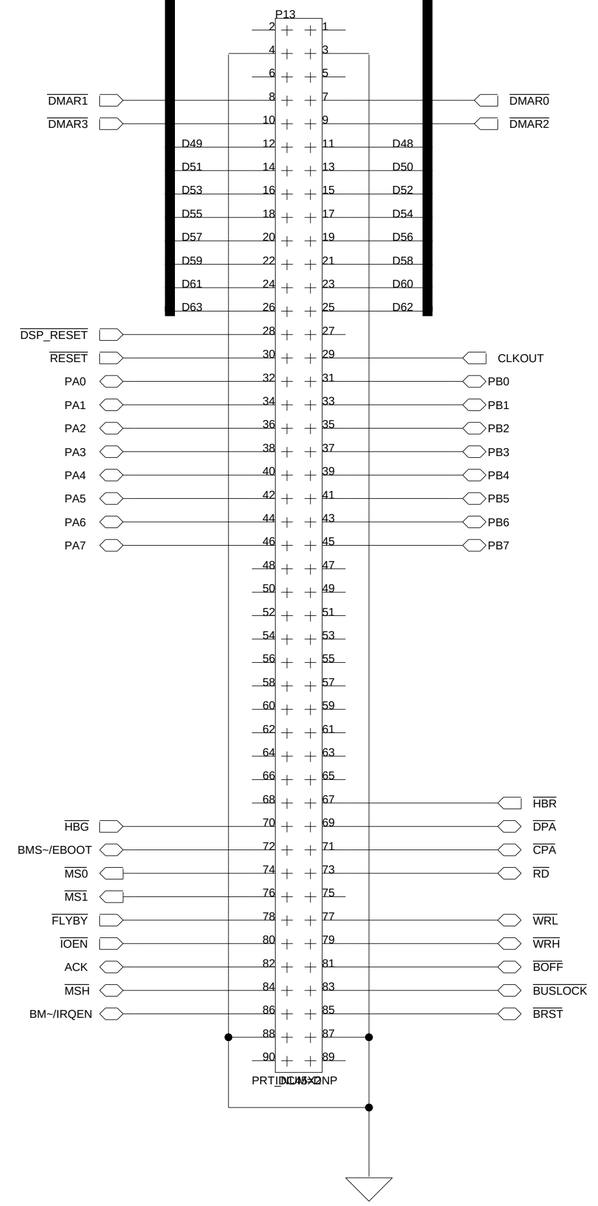

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Title: ADSP-TS101 EZ-KIT LITE - EXPANSION CONNECTORS

Size	Board No.	Rev
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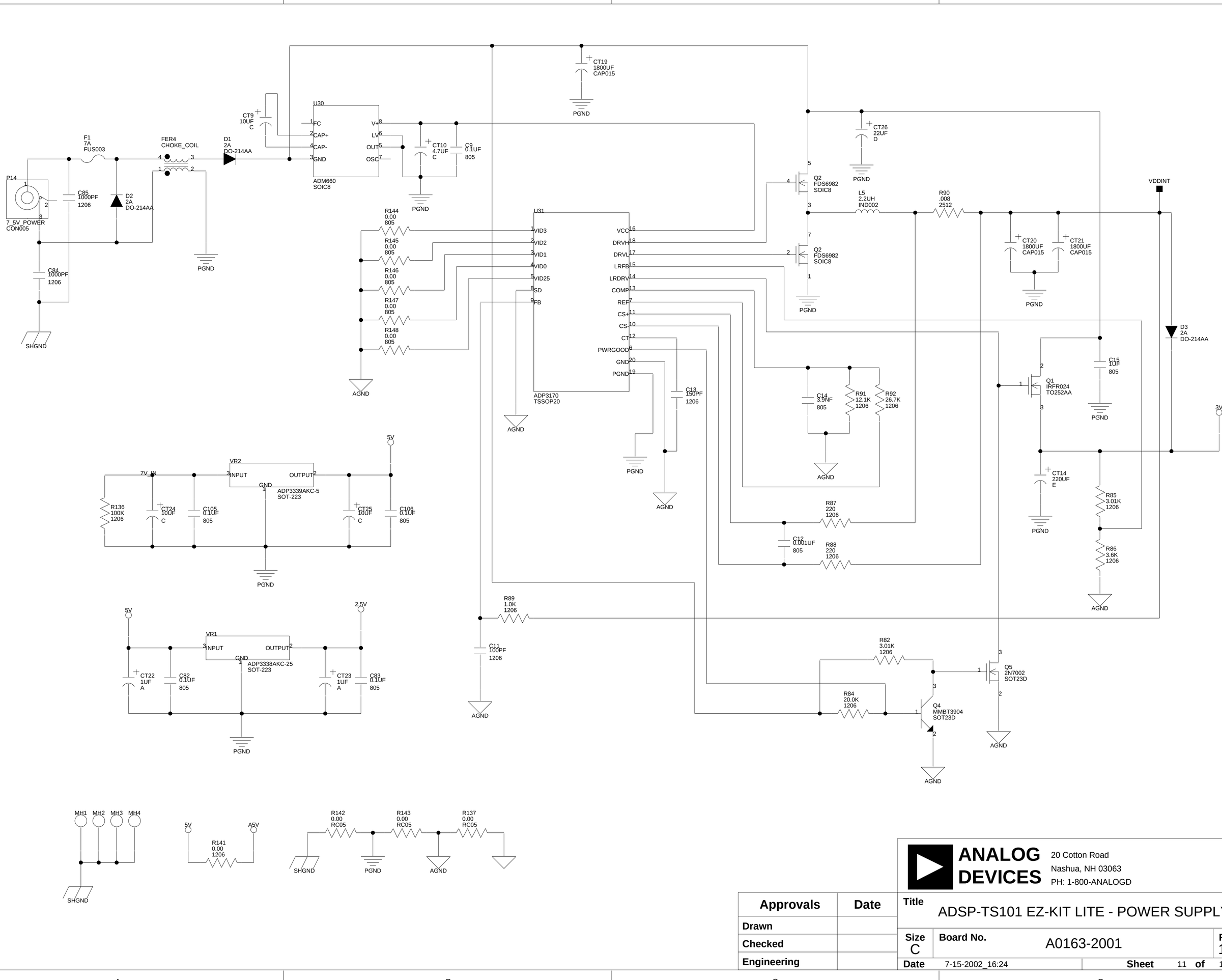

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Title ADSP-TS101 EZ-KIT LITE - POWER SUPPLY

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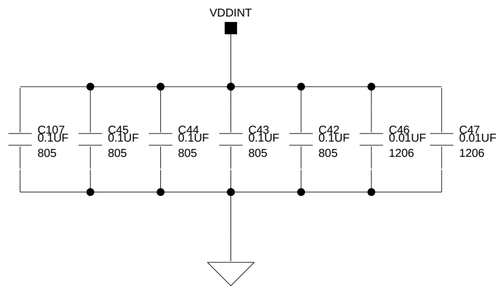

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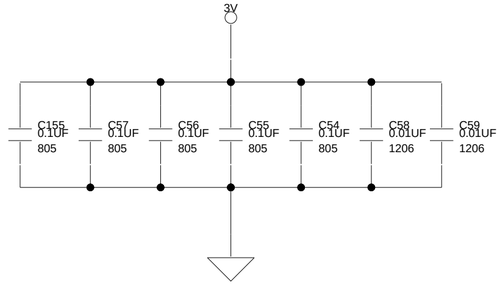

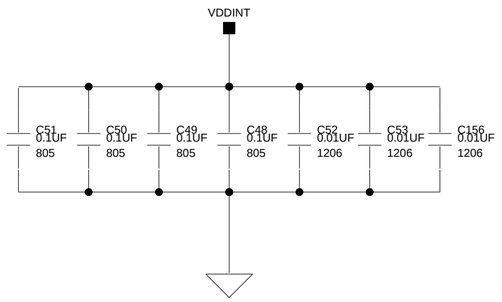

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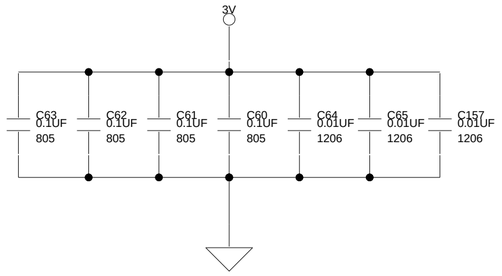

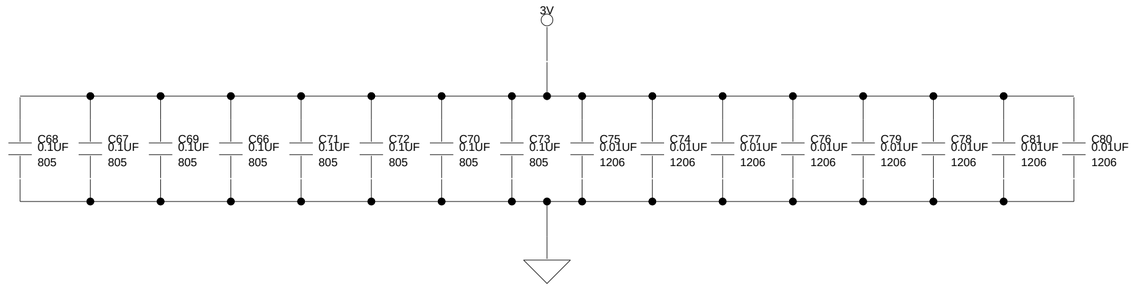

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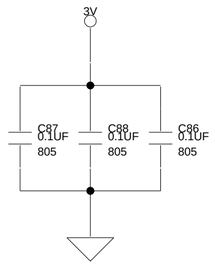

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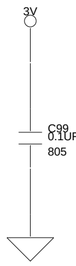

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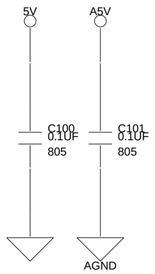

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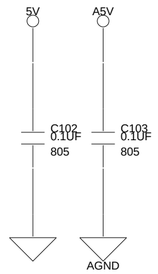

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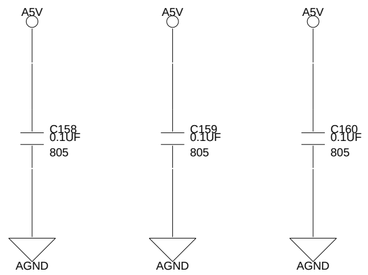

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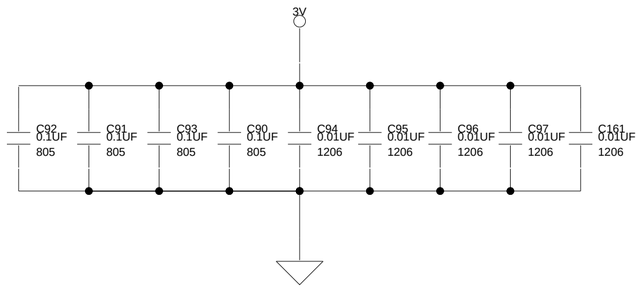

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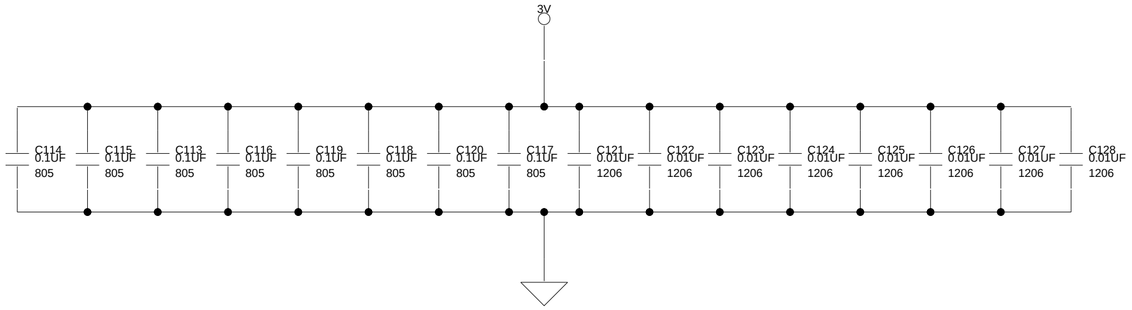

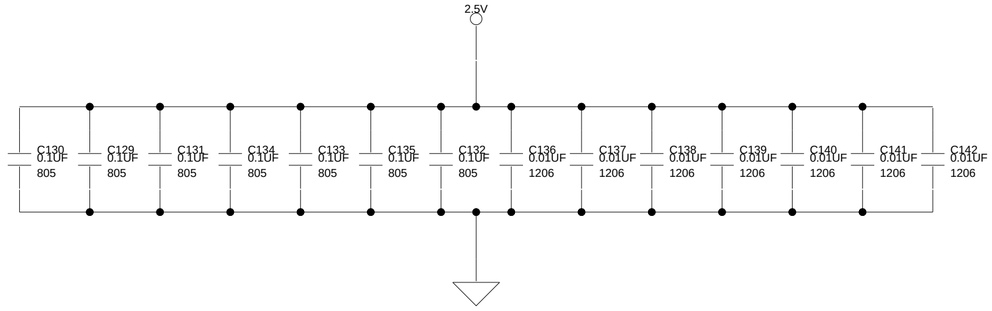

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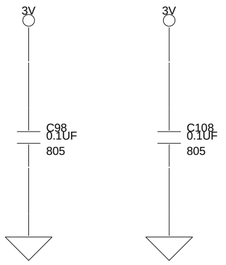

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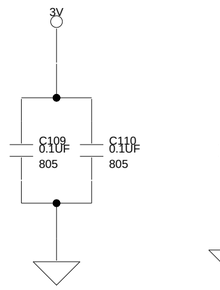

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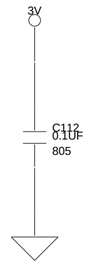

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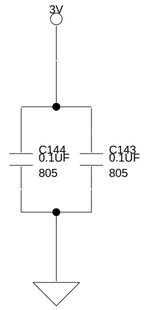

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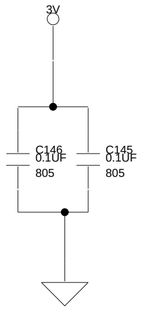

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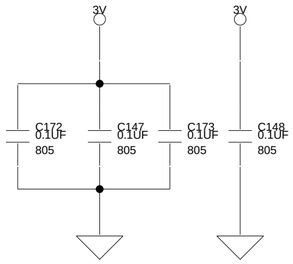

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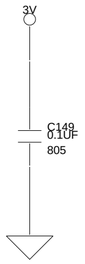

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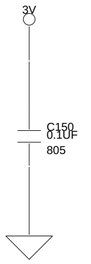

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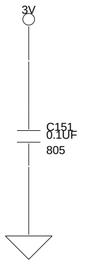

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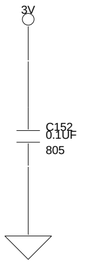

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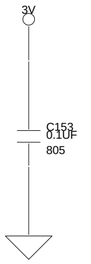

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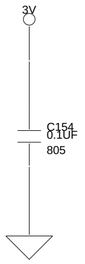

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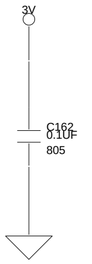

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Title: ADSP-TS101 EZ-KIT LITE - CAPS

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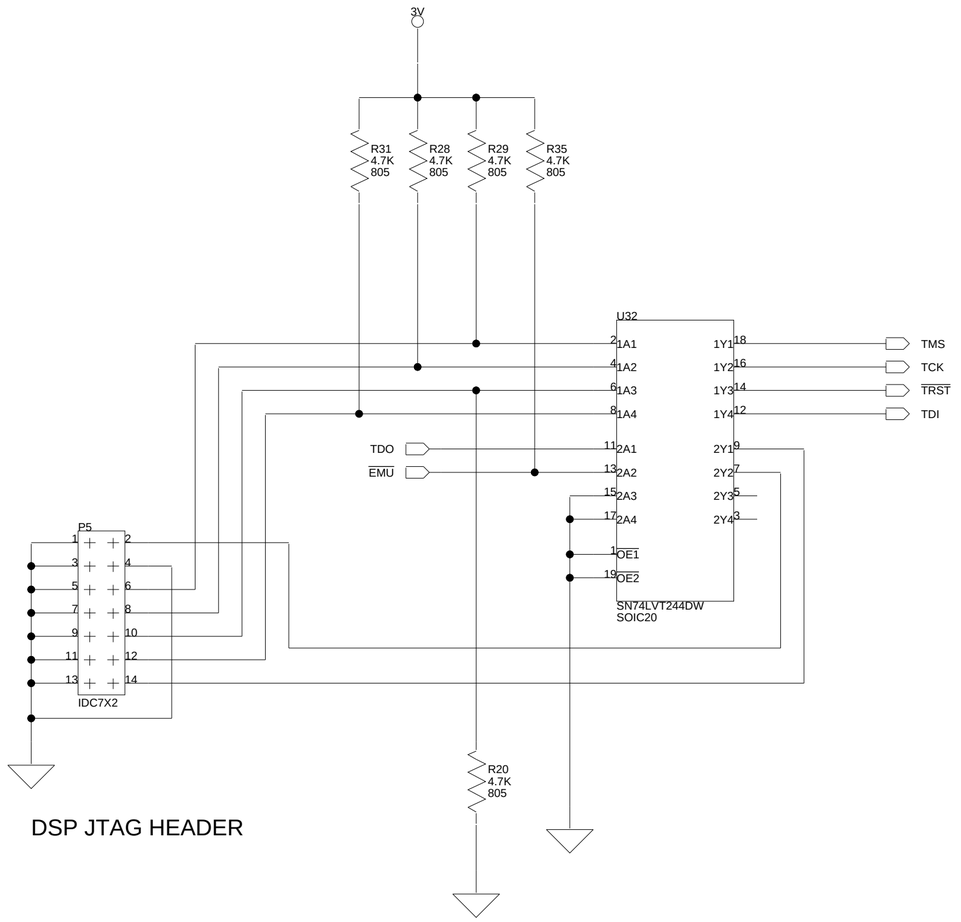

DSP JTAG HEADER

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