

ADSP2192-12 EZ-KIT LITE™ EVALUATION SYSTEM MANUAL

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The EZ-KIT Lite evaluation board 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. Unused EZ-KIT Lites should be stored in the protective shipping package.



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1 INTRODUCTION

Thank you for purchasing the ADSP2192-12 EZ-KIT Lite™ evaluation kit. The evaluation board is designed to be used in conjunction with the VisualDSP++™ development environment and is based on the ADSP2192-12 fixed-point digital signal processor (DSP). The kit is shipped with an evaluation board and the VisualDSP++ software. Using the EZ-KIT Lite in conjunction with the VisualDSP++ environment and the debug monitor running on the EZ-KIT Lite evaluation board gives users the ability to perform advanced application code development and debug such as:

- Create, compile, assemble, and link application programs written in C and ADSP-219x assembly
- Load, run, step in, step out, step over, halt, and set breakpoints in application programs
- Read and write data and program memory
- Read and write core and peripheral registers
- Plot memory

Access to the ADSP2192-12 processor is achieved via the PC through the PCI bus communicating with the debug monitor or an optional JTAG emulator. The JTAG emulator allows the PC to perform in-circuit emulation through the processor's JTAG interface. JTAG emulators perform debugging at a much faster rate and provide many advanced debug features that are not available with the ADSP2192-12 debug monitor. JTAG emulators can be purchased separately from Analog Devices.

The board's features include:

- Analog Devices ADSP2192-12 DSP running at 33 MHz
- Analog Devices AD1885 AC'97 SoundPort® codec
- Jumper Selectable Line-In or Mic-In via 1/8" Stereo Jack.
- 1/8" Stereo Jack for Headphone Out
- Socket for Optional Serial EEPROM
- PCI version 2.2 Compliant Interface
- USB version 1.1 Compliant Hardware Interface with Connector
- Selectable PCI (Plug-In card) Operation, USB Operation (optional), or Stand-alone Operation (optional)
- Two pushbuttons for GPIO inputs
- Two user programmable LEDs
- 14-Pin Connector for JTAG Emulator Interface
- User Installed expansion header
- Small (2.5" x 3.5") breadboard area with typical SMT footprints provided

The EZ-KIT Lite board is equipped with hardware that facilitates interactive demonstrations. The push button switches and user-programmable LEDs provide user control and board status. The AD1885 AC'97 SoundPort[®] codec provides access to an audio input (selectable as line level or microphone) and an audio output (head phone out). Additionally, by installing an optional expansion connector, you can add additional AC'97 compliant devices, as well as gain access to the general-purpose I/Os (GPIOs) pins.

1.1 For More Information About Analog Devices, Inc. Products

Analog Devices is accessible on the Internet at www.analog.com. The DSP Web page is directly accessible at www.analog.com/dsp. This page provides access to DSP specific technical information and documentation, product overviews, and product announcements.

1.2 For Technical or Customer Support

You can reach our Customer Support group in the following ways:

- Fill out the Technical support form located on the Analog Devices Web site at: <http://www.analog.com/technology/dsp/contactUs.html>
- Email questions to dsptools.support@analog.com
- Contact your local Analog Devices sales office or an authorized Analog Devices distributor

1.3 Purpose of This Manual

The ADSP2192-12 EZ-KIT Lite Evaluation System Manual provides directions for installing the EZ-KIT Lite hardware and software on your PC. Also, this manual provides guidelines for running your own code on the ADSP2192-12.

1.4 Intended Audience

This manual is a user's guide and reference to the ADSP2192-12 EZ-KIT Lite™ evaluation board. DSP programmers who are familiar with Analog Devices fixed-point architecture, operation, and programming are the primary audience for this manual.

DSP programmers who are unfamiliar with Analog Devices DSPs can use this manual, but should supplement this manual with the *ADSP-219x DSP Instruction Set Reference*, *ADSP-219x/2192 DSP Hardware Reference* and the VisualDSP++ tools manuals. These documents describe the Analog Devices DSP architecture, DSP instruction set, and development tools.

1.5 Manual Contents Description

This manual contains the following information:

- Chapter 1 — Introduction
Provides manual information and Analog Devices contact information.
- Chapter 2 — Getting Started
Provides software and hardware installation procedures, PC system requirements, and basic board information.
- Chapter 3 — Using EZ-KIT Lite Software
Provides information on the EZ-KIT Lite system from a software perspective, and details the monitor program and codec.
- Chapter 4 — Working With EZ-KIT Lite Hardware
Provides information on the hardware aspects of the evaluation system.
- Appendix A — Bill of Materials
Provides a list of components to manufacture of the EZ-KIT Lite board.
- Appendix B — Schematics
Provides a resource to allow EZ-KIT Lite board level debugging or to use as a reference design.

1.6 Documents and Related Products

For more information on the ADSP2192-12 and the components of the EZ-KIT Lite system, see the following documents:

Table 1-1: Related DSP Documents

| Document Name | Description |
|--|--|
| <i>ADSP-2191 DSP Datasheet</i> | General functional description, pinout, and timing. |
| <i>ADSP-219x/2192 DSP Hardware Reference</i> | Description of internal DSP architecture and all register functions. |
| <i>ADSP-219x DSP Instruction Set Reference</i> | Description of all allowed DSP assembly instructions. |

Table 1-2: Related VisualDSP++ Documents

| | Description |
|---|--|
| <i>VisualDSP++ Users Guide for ADSP-21xx DSPs</i> | Detailed description of VisualDSP++ features and usage. |
| <i>VisualDSP++ Assembler and Preprocessor Manual for ADSP-219x DSPs</i> | Description of the assembler function and commands for ADSP-219x family DSPs |
| <i>VisualDSP++ C/C++ Compiler and Library Manual for ADSP-219x DSPs</i> | Description of the compiler function and commands for ADSP-219x family DSPs |
| <i>VisualDSP++ Linker and Utilities Manual for ADSP-21xx DSPs</i> | Description of the linker function and commands for the ADSP-219x family DSPs |
| <i>VisualDSP++ Getting Started Guide for ADSP-21xx DSPs</i> | Step-by-step tutorial that highlights the features of VisualDSP++ |
| <i>VisualDSP++ Kernel (VDK) User's Guide</i> | Description of the VDK function and commands for the ADSP-219x DSPs |
| <i>VisualDSP++ Component Software Engineering User's Guide</i> | Description of the VCSE function and commands for the ADSP-219x DSPs |
| <i>VisualDSP++ Product Bulletin for ADSP-21xx DSPs</i> | Description of the new features and enhancements of VisualDSP++ for ADSP-21xx DSPs |

These documents are found on the Analog Devices Technical Documentation Web site at: <http://www.analog.com/library/dspManuals/16BitIndex.html>. If you plan to use the EZ-KIT Lite in conjunction with the JTAG ICE emulator, refer to the documentation that accompanies that product.

2 GETTING STARTED

2.1 Overview

This chapter provides information you need to install your software and the ADSP2192-12 EZ-KIT Lite evaluation board. It is important that you install your software and hardware in the order presented for correct operation.

2.2 Contents of Your EZ-KIT Lite Package

The EZ-KIT Lite evaluation board 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. Unused EZ-KIT Lites should be stored in the protective shipping package.



Your ADSP2192-12 EZ-KIT Lite evaluation board package should contain the following items. If any item is missing, contact the vendor where you purchased your EZ-KIT Lite or Analog Devices.

- ADSP2192-12 EZ-KIT Lite board
- CD containing:
 - VisualDSP++ for the ADSP-21xx with demo license
 - 2192-12 EZ-KIT Lite debug software (PCI monitor, source)
 - 2192-12 EZ-KIT Lite example programs
 - ADSP2192-12 EZ-KIT Lite manual (this document)
- ADSP2192-12 Anomaly Sheet
- Registration card - *please fill out and return*

2.3 PC Configuration

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

| |
|---|
| Windows 98, Windows 2000, or Windows NT (release 4.0, Service Pack 3 or later) |
| One available PCI slot |
| Pentium processor 166 MHz or faster |
| VGA Monitor and color video card |
| 2-button mouse |
| 100 MB available space |
| 32 MB RAM |
| CD-ROM |

Table 2-1: Minimum PC Configuration

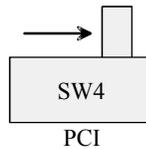
2.4 Installation Procedures

The following procedures ensure reliable operation of the ADSP2192-12 evaluation board. It is important that you follow these instructions in the order presented to ensure correct operation of your software and hardware.

2.4.1 Installing the EZ-KIT Lite Hardware

The ADSP2192-12 EZ-KIT Lite board is designed to run inside your personal computer. You will have to access the inside of your computer to install the board. Use the following steps to configure the EZ-KIT Lite:

1. Remove the EZ-KIT Lite board from the package—be careful when handling the board to avoid the discharge of static electricity, which may damage some components.
2. Make sure the switch (SW4) is in the correct position for PCI operation.



NOTE: Do not change the position of this switch while power is applied to the board. This may damage components on the board.

3. Make sure jumper JP1 is installed correctly. For PCI, JP1 should have jumpers installed on pins 1 & 2 and pins 3 & 4. Refer to Hardware Section (Section 4.5) of this manual if more information of jumper settings is required.
4. To configure your board to take advantage of the audio capabilities, use the following procedure:
 - a) Place the appropriate jumpers on JP4. The default is Line In, and the jumpers should be placed on pins 3 & 5, and pins 4 & 6, respectively.
 - b) If Mic In operation is required, then Jumpers on JP4 should be placed on pins 1 & 3, and pins 2 & 4, respectively.

If more information is required, please see the Hardware Section (Section 4.5.4) of this manual.

5. Turn off power to your PC.
6. Find an empty PCI slot in your computer and place the ADSP2192-12 EZ KIT Lite in the empty PCI slot.
7. Screw in the bracket so that the board has a strong and direct contact to the chassis ground of the computer and the PCI contacts seat securely.
8. If audio capabilities are being used, connect a 1/8" cable from a self-powered speaker into the 1/8" audio jack labeled "OUT" on the bracket of the EZ-KIT Lite.
9. Connect a microphone or the appropriate Line In cable into the 1/8" audio jack, labeled "IN", on the bracket of the EZ-KIT Lite.

10. Turn on the computer and verify that the green PCI LED on the bracket of the EZ-KIT Lite turns on. This indicates that SW4 is in the correct position and that the board is successfully being powered by the computer's PCI bus.
11. Once the PC is running, Windows should detect new hardware and request the appropriate drivers for the board. Please refer to "Installing PCI Drivers" section of the "Installing the EZ-KIT Lite Software" below.

This completes the hardware installation.

2.4.2 Installing the EZ-KIT Lite Software

2.4.2.1 Installing PCI Drivers

You must install the drivers prior to using the PCI interface with the VisualDSP++ debugger. The next few sections will walk you through installing the proper driver for your system.

2.4.2.1.1 Installing the Windows 98 Driver

Upon rebooting your PC, the **Windows 98 Add New Hardware Wizard** dialog box should appear. If it does not, manually run it by hitting the **Start** button on the Windows taskbar. Then choose **Settings** and **Control Panel**. Double-click on the **Add New Hardware** icon.

1. The wizard should detect the EZ-KIT Lite as shown in figure 2-1. Click **Next** to continue.



Figure 2-1: Windows 98 Add New Hardware Wizard detected the EZ-KIT Lite.

2. Select **Search for the best driver for your device** as shown in figure 2-2. Insert the VisualDSP++ CD into the CD-ROM drive and click **Next** to continue.



Figure 2-2: Tell the wizard to search for the driver.

3. The wizard will prompt you for where to search. Select **Specify a location** and enter the drive letter of your CD-ROM drive on which the driver files are located as shown in figure 2-3 then click **Next** to continue.



Figure 2-3: Enter the path to the Windows 98 driver.

- The wizard should detect the driver's information file (INF) as shown in figure 2-4. Click **Next** to continue.



Figure 2-4: The wizard detects the driver information file.

- The wizard may also prompt you for the location on the device driver as shown in figure 2-5. It is also located on the root of the CD. Make sure the path is entered properly and click **OK** to complete the driver installation.

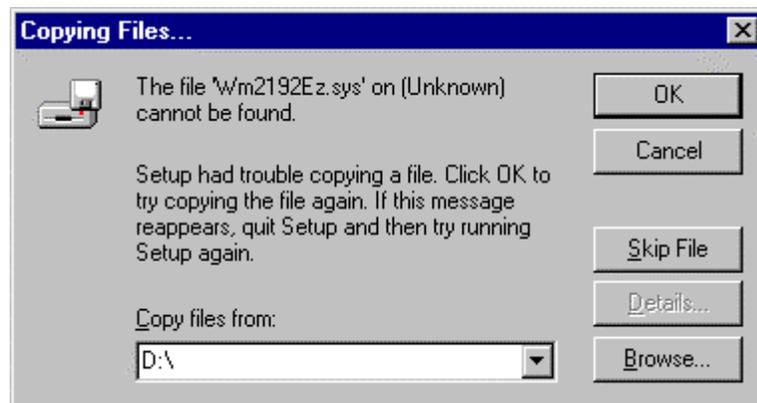


Figure 2-5: Specify the location of the device driver.

- This will complete the driver installation as shown in Figure 2-6. Click **Finish** to exit the wizard.



Figure 2-6: The driver has been installed successfully.

7. Reboot the system before attempting to run the debugger over the PCI interface.

2.4.2.1.2 Installing the Windows NT Driver

The Windows NT driver will automatically be installed during the installation of the EZ-KIT Lite debug software. No additional steps are needed to run under Windows NT.

2.4.2.1.3 Installing the Windows 2000 Driver

Upon rebooting your PC, the **Windows 2000 Add New Hardware Wizard** dialog box should appear. If it does not, manually run it by hitting the **Start** button on the Windows taskbar. Then choose **Settings, Control Panel**, then **Add/Remove Hardware**. Click **Next** and Next again to continue.

1. The wizard should detect the EZ-KIT Lite as shown in figure 2-7. Click **Next** to continue.



Figure 2-7: Windows 2000 Found New Hardware Wizard detected the EZ-KIT Lite.

2. Select **Search for a suitable driver for my device** as shown in figure 2-8. Insert the CD into the CD-ROM drive and click *Next* to continue.



Figure 2-8: Tell the wizard to search for the driver.

3. The wizard will prompt you for where to search, as shown in figure 2-9. **Specify a location** and click **Next** to continue.

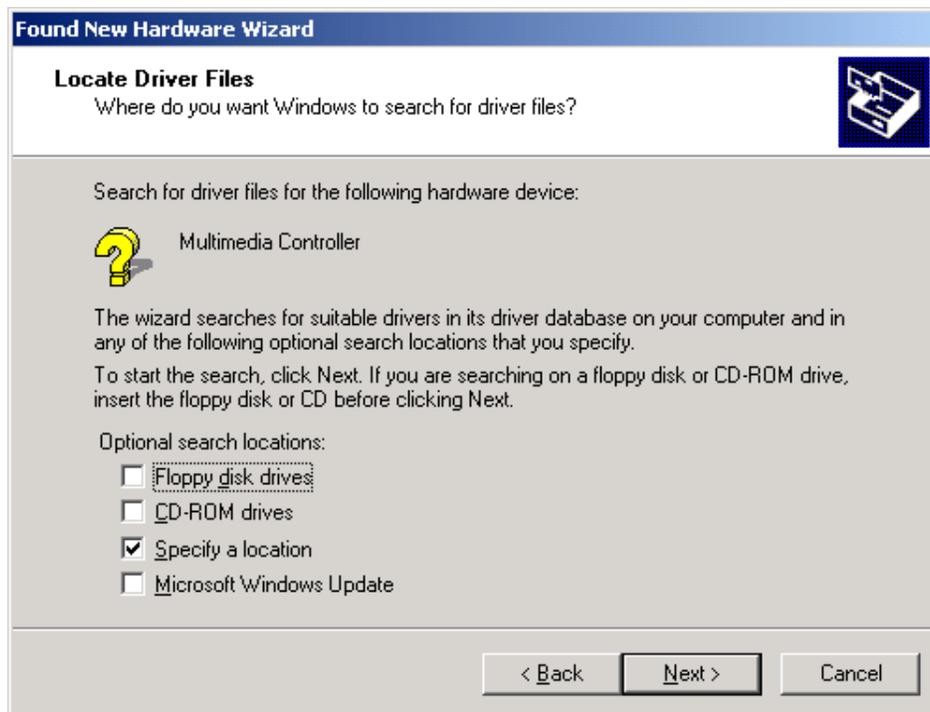


Figure 2-9: Tell the wizard you will specify where to look for the driver.

4. Enter the drive letter of your CD-ROM drive, as shown in figure 2-10 then click **OK** to continue.



Figure 2-10: Specify the location of the device driver.

5. The wizard should detect the driver's information file (INF), as shown in figure 2-11. Click **Next** to continue.

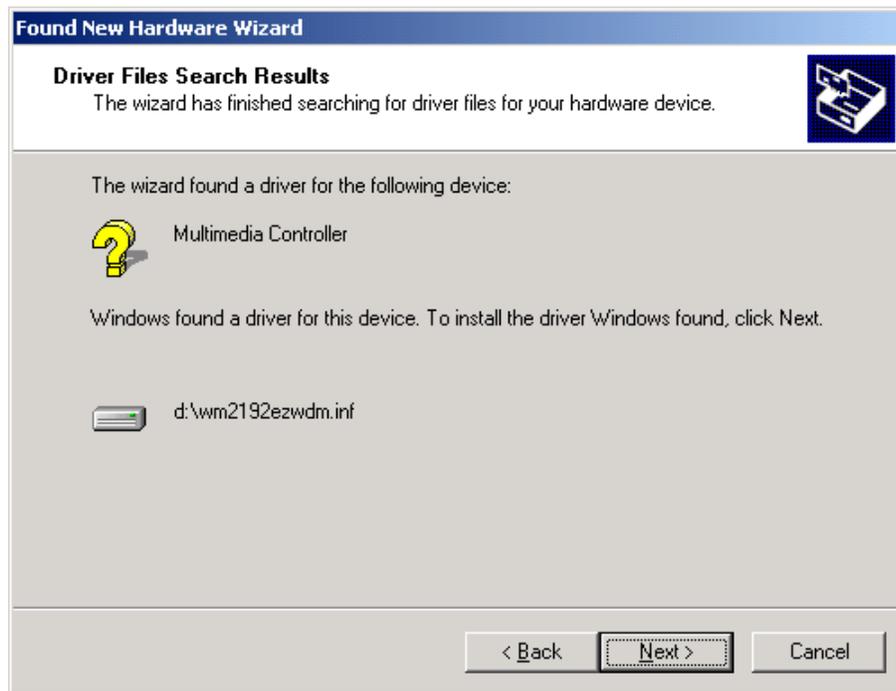


Figure 2-11: The wizard detects the driver information file.

6. The wizard will complete the driver installation as shown in figure 2-12. Click **Finish** to exit the wizard.

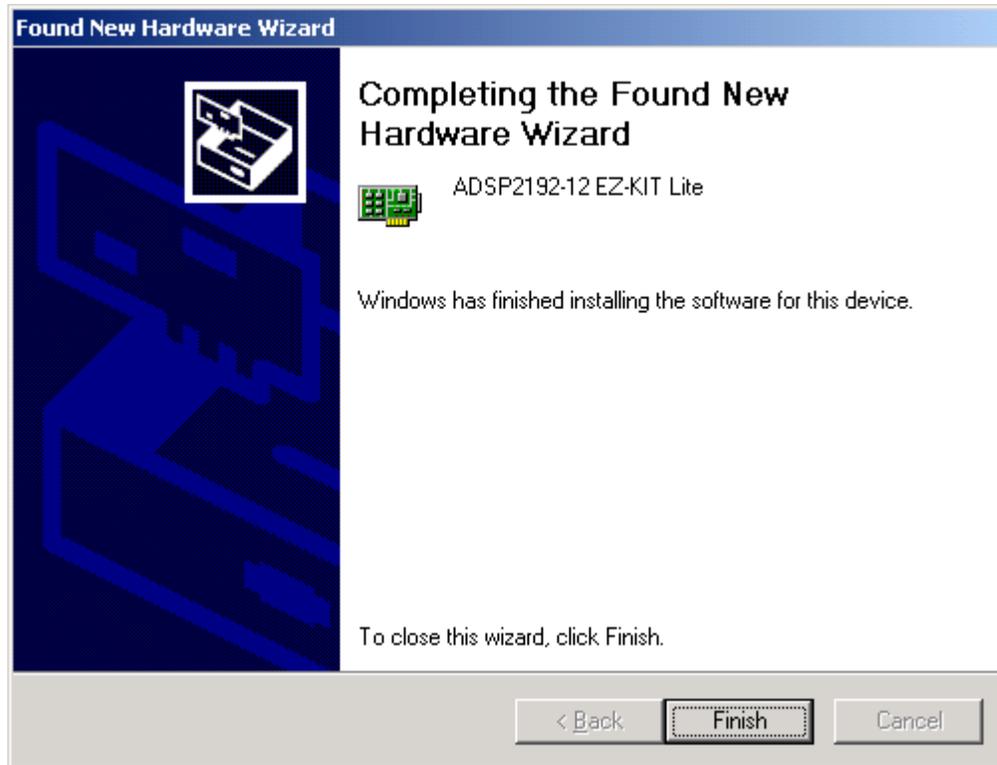


Figure 2-12: The driver has been successfully installed.

7. Reboot the system before attempting to run the debugger over the PCI interface.

2.4.2.2 Installing VisualDSP++ and the EZ-KIT Lite Software

This EZ-KIT Lite comes with the latest version of VisualDSP++ for the ADSP-219x DSP family. Insert the VisualDSP++ CD-ROM into the CD-ROM drive. If Auto Run is enabled on your PC, you see the home screen of the VisualDSP++ install wizard. Otherwise, choose **Run** from the **Start** menu, and enter **D:\Setup.exe** in the **Open** field, where D is the name of your local CD-ROM drive. Click on the **VisualDSP++ 3.0 Installation** option. Then select **Install Tools**. This will launch the setup wizard. At the component selection screen, select **ADSP2192-12 EZ-KIT Lite** to install the EZ-KIT Lite debug software. Follow this wizard with the on-screen instructions to continue installing the software.

2.4.2.3 Installing the EZ-KIT Lite License Software

Before the VisualDSP++ software can be used, the license software must be installed. To install the EZ-KIT Lite license software, follow these steps:

1. Make sure VisualDSP++ has been installed first.
2. Insert the VisualDSP CD into the CD-ROM drive if it is not already in the drive.
3. Once the CD browser is on the screen select the **Install License** option.
4. Follow the setup wizard instructions. (Note: Make sure that you have the proper serial number located on the back of the CD holder.)

3 USING EZ-KIT LITE SOFTWARE

3.1 Overview

The EZ-KIT Lite software contains the files necessary to perform debugging over the PCI bus. Additionally, monitor source code and example programs are provided for use with the EZ-KIT Lite.

The monitor software is a small debug kernel that is loaded onto each core of the ADSP2192-12 DSP when the VisualDSP++ debugger is started. The monitor enables VisualDSP++ running on a host PC to communicate with the DSP over the PCI interface. This allows you to read/write registers, read/write memory, view hardware stacks, run, halt, step and set breakpoints among other debug activities. Understanding how the monitor works and its limitations are essential for proper operation of the EZ-KIT Lite when used with VisualDSP++ over the PCI interface. This chapter provides information on how the monitor works and how to use the EZ-KIT Lite and VisualDSP++ to debug custom programs. Note that references to the monitor are relevant only when using the PCI interface, not the optional JTAG interface to the EZ-KIT Lite.

3.2 Monitor Program Operation

As mentioned previously, the monitor is loaded onto each core when the VisualDSP++ debugger is first started. The monitor performs the functions necessary to perform debugging activities through the VisualDSP++ debugger such as reading/writing registers, reading/writing memory, viewing hardware stacks, running, halting, stepping and setting breakpoints.

To carry out these functions, the monitor must use DSP resources such as memory and interrupts and set restrictions upon what you may do in code. The monitor resources and restrictions are discussed below.

The monitor runs transparently to the user. From the user's point of view, each core is in a running or halted state. While the core is running, it executes user code, and while the core is halted it runs monitor code. While in the halted state, VisualDSP++ can request information from the monitor such as register and memory values.

The source code for the monitor is included with the EZ-KIT Lite setup. You may find the sources helpful in understanding the operation of the monitor and of the ADSP2192-12.

3.2.1 Monitor Resources and Restrictions

This section describes in detail what resources are used and what restrictions are set by the EZ-KIT Lite. Do not tamper with the resources claimed by the monitor. Observe all specified restrictions when using the VisualDSP++ debugger and PCI interface with the EZ-KIT Lite.

3.2.1.1 Resources

The monitor uses two interrupts and small blocks of data and program memory on each core. These resources are therefore not available to user programs.

The two interrupts used by the monitor are:

- Kernel interrupt (bit 2 in IMASK)
- Mailbox interrupt (bit 4 in IMASK)

The memory ranges used by the monitor are:

- 0x7800 - 0x7FFF (16-bit Data Memory)
- 0x10008 - 0x1000B (kernel interrupt vector)
- 0x10010 - 0x10013 (mailbox interrupt vector)
- 0x13A00 - 0x13FFF (24-bit Program Memory)

The debugger will catch any user attempt to overwrite the reserved regions of memory should a write be attempted with a debugger command such as a load or fill. It cannot stop user code from overwriting these regions.

After a program is loaded, the interrupt vectors used by the monitor are automatically filled so you need not include these vectors in their source code.

3.2.1.2 Restrictions

Observe the following restrictions to ensure proper operation of the monitor:

- Only one ADSP2192-12 EZ-KIT Lite may be plugged into the PC at one time. Plugging in more than one EZ-KIT Lite at one time may cause unpredictable behavior.
- Do not press the reset button on the EZ-KIT Lite with the debugger open. See the section below for more information on hard reset. Pressing this button will reset the DSP and cause it to lose communication with the PCI interface on the PC. You can reset each core through the *Reset* command in the Debugger if necessary. This will reset the core without resetting the PCI configuration of the DSP.
- Disabling global interrupts will cause VisualDSP++ to lose all communication with the monitor. Executing the "*DIS INT*;" instruction will disable global interrupts on the core. If user code executes this instruction while running, it must enable global interrupts with the "*ENA INT*;" instruction in order for VisualDSP++ to regain communication. Do not use code to disable global interrupts.
- Disabling the kernel interrupt will cause VisualDSP++ to lose communication with the monitor. Clearing bit 2 in the IMASK register will disable this interrupt. While disabled, you will not be able to single-step or use software breakpoints. Do not use code to disable kernel interrupts.
- Disabling the mailbox interrupt will cause VisualDSP++ to lose communication with the monitor. Clearing bit 4 in the IMASK register will disable this interrupt. While disabled, you cannot halt the core. Do not use code to disable mailbox interrupts.
- Disabling interrupt nesting will cause VisualDSP++ to lose communication with the monitor if the user code uses interrupts. Clearing bit 4 in the ICNTL register will disable interrupt nesting.
- Do not use code to disable nesting if you intend to use interrupts in your code.
- Do not push more than 30 values onto the PC stack. This stack is used for temporary storage upon entering the monitor. It is highly unlikely that user code will ever need more than 30 stack locations. Pay close attention when debugging C programs as the PC stack may grow without your knowledge due to function calls and library routines.

Pressing the reset button on the board will reset the DSP including its PCI configuration. **Do not press this with the debugger open or you will lose communication with the board.** If it is necessary to perform a power on reset the user can either power down the machine or close the debugger, hit the reset button, and reload the driver. Follow the instructions below to reload the driver:

For Windows 98

1. Right-click on **My Computer** and select **Properties**.
2. From the **Device Manager** tab double-click **DSP Emulators** and highlight the **ADSP2192-12 EZ-KIT Lite**.
3. Click **Remove** and then **Ok** to confirm it.
4. Click **Refresh** and Windows will detect the EZ-KIT Lite and bring up the hardware wizard. If necessary, accept the default values and the proper driver will be installed from the previous install.
5. Once the Wizard is complete, you may use the debugger again.

For Window 2000

1. Only users with administrator privileges can add and remove devices, contact the administrator if necessary.
2. Right-click on **My Computer** and select **Properties**.
3. From the **Hardware** tab click **Device Manager** tab.
4. Double-click **DSP Emulators** and highlight the **ADSP2192-12 EZ-KIT Lite**.
5. Press the **Delete** key and then **Ok** to confirm it.
6. Click the **Scan for hardware changes** icon and Windows will detect the EZ-KIT Lite and bring up the hardware wizard.
7. When prompted for where to look, select the **WINNT\INF** folder so Windows will find the INF file from the original installation.
8. Once the Wizard is complete, you may use the debugger again.

For Windows NT

1. Only users with administrator privileges can load the EZ-KIT Lite driver, contact the administrator if necessary.
2. From the **Start** menu go to Settings and choose Control Panel.
3. Double-click on **Devices**.
4. Scroll down to **Wm2192Ez** and highlight it. Click Stop and Yes to confirm it.
5. When it has stopped, press **Start** to reload it.
6. Once started, you may use the debugger again.

3.2.2 User Programs

This section provides information on creating programs that will operate properly with the EZ-KIT Lite. Use the VisualDSP++ ADSP-219x code generation tools (an evaluation version is shipped with this EZ-KIT Lite) to build DSP applications and debug them with the VisualDSP++ debugger (also shipped with this EZ-KIT Lite).

Although there are many ways to develop programs in the VisualDSP++ environment, most include the following steps:

1. Create a new project.
2. Set target processor options.
3. Add and edit project files such as C, assembly, header, and linker description files.
4. Customize project build options such as output filenames, optimizations, etc.
5. Build a debug version of the project.
6. Debug the program with the debugger.
7. Build a release version of the project.

Refer to the VisualDSP++ manuals and on-line help for detailed descriptions on creating projects and the ADSP-2192 manuals for information on programming the DSPs.

Four example programs are included with the EZ-KIT Lite. These are assembly and C programs designed to help you build programs that will work properly with this EZ-KIT Lite and demonstrate some of its capabilities. When building projects for use with the PCI debugger interface:

- A sample linker description file (.ldf) has been included with each example program. This file shows a possible memory allocation scheme that will not conflict with the monitor.
- A modified C run-time header file (2192_hdr.asm) has been included with each example C program. The code in this file performs C initialization routines before arriving at *main()*. This code normally disables all interrupts but has been modified to enable the interrupts needed by the monitor (kernel and mailbox). **Include this file with new C projects you develop for this EZ-KIT Lite. Do not include the 219x_hdr.doj library in the linker description file.**

3.2.2.1 ADSP2192-12 EZ-KIT Lite Memory Map

The ADSP2192-12 EZ-KIT Lite memory map is shown in the table below.

Note the ranges reserved by the monitor.

| Memory Range | Core A | Core B |
|------------------|-------------------------|-------------------------|
| 0x0000 0x3FFF | 16-bit data memory (DM) | 16-bit data memory (DM) |
| 0x4000 0x77FF | 16-bit data memory (DM) | 16-bit data memory (DM) |

| Memory Range | Core A | Core B |
|--------------------|----------------------------|----------------------------|
| 0x7800 0x7FFF | Reserved for monitor | Reserved for monitor |
| 0x8000 0xBFFF | 16 bit data memory (DM) | Reserved |
| 0xC000 0xFFFF | 16 bit data memory (DM) | Reserved |
| 0x10000 0x139FF | 24-bit program memory (PM) | 24-bit program memory (PM) |
| 0x13A00 0x13FFF | Reserved for monitor | Reserved for monitor |
| 0x14000 0x14FFF | 24-bit program ROM | 24-bit program ROM |
| 0x15000 0x1FFFF | Reserved | Reserved |
| 0x20000 0x20FFF | Shared memory | Shared memory |

Table 3-1: ADSP2192-12 EZ-KIT Lite Memory Map

3.3 Connecting With the VisualDSP++ Debugger

In order to start debugging for the first time you must set up a session with the Debugger. To create a new session using the EZ-KIT Lite PCI interface, follow these steps:

- Press and hold down the **Control (CTRL)** key.
- Click the **Start** button on the Windows task bar, then choose **Programs, VisualDSP, Debugger**.
- The **Session List** dialog box will appear. Click on **New Session....** (Release **CTRL** key)
- The **Target Selection** dialog box will appear as shown in figure 3-1.
- Under the **Debug Target** menu choose **EZ-KIT Lite (ADSP2192-12)**. There is one supported platform so you can leave the default selection in the **Platform** list.
- Type the target a name in the **Target Name** field, or accept the default.
- Select both boxes in the **Multiprocessor System** list box.
- Click **OK** to return to the **Session List** dialog box, make sure the new session is highlighted, and click **Activate**.

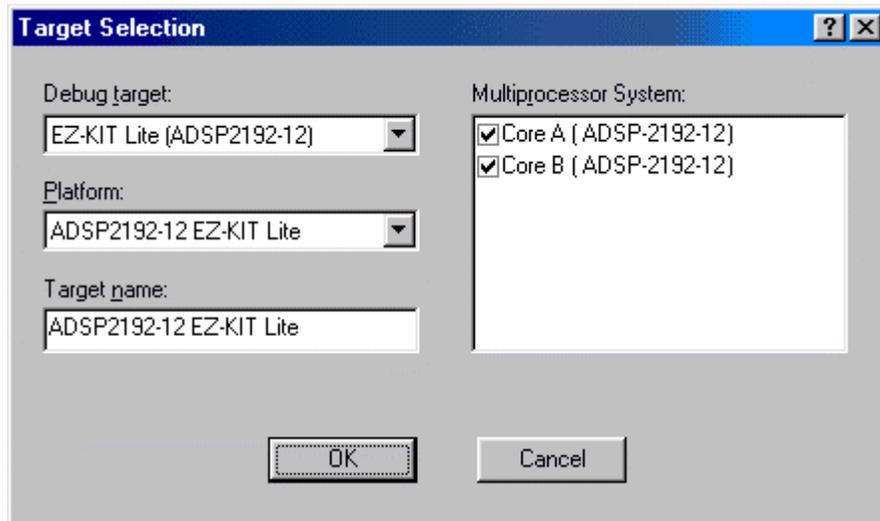


Figure 3-1: VisualDSP++ Debugger *Target Selection* dialog box.

3.4 Using VisualDSP++

For information on operating VisualDSP++, consult the on-line Help and Users manuals that are installed with VisualDSP++ software distribution.

3.5 Example Programs

The ADSP2192-12 EZ-KIT Lite is shipped with four complete example projects, Talkthru, Dual_FIR, MPTimers, and Primes. For more detailed information regarding these projects and the expected output of the applications, see the accompanying .TXT files that are located in each project directory. These project directories can be found in:

\Program Files\Analog Devices\VisualDSP\219x\EZ-KITs\ADSP2192-12\Examples

4 WORKING WITH EZ-KIT LITE HARDWARE

4.1 Overview

This chapter discusses the hardware components on the ADSP2192-12 EZ-KIT Lite board. The following topics are covered:

- Power Supplies (Section 4.4)
- Jumpers (Section 4.5)
- Switches (Section 4.6)
- LEDs (Section 4.7)
- Serial EEPROM (Section 4.8)
- JTAG Connector (Section 4.9)
- Expansion Port Connector (Section 4.10)
- Breadboard Area (Section 4.11)

The EZ-KIT Lite bill of materials and schematics are available at the end of this manual in Appendix A and Appendix B, respectively.

4.2 System Architecture

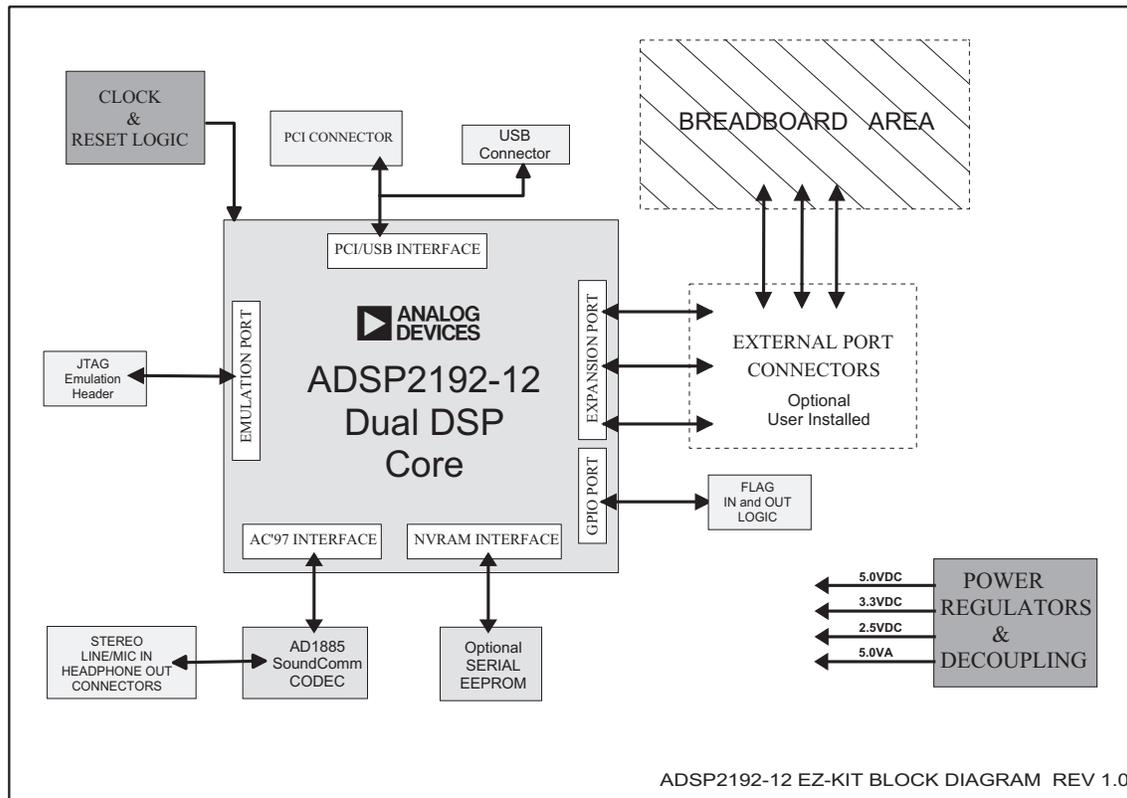


Figure 4-1: Block Diagram of ADSP2192-12 EZ-KIT Lite

4.3 Board Layout

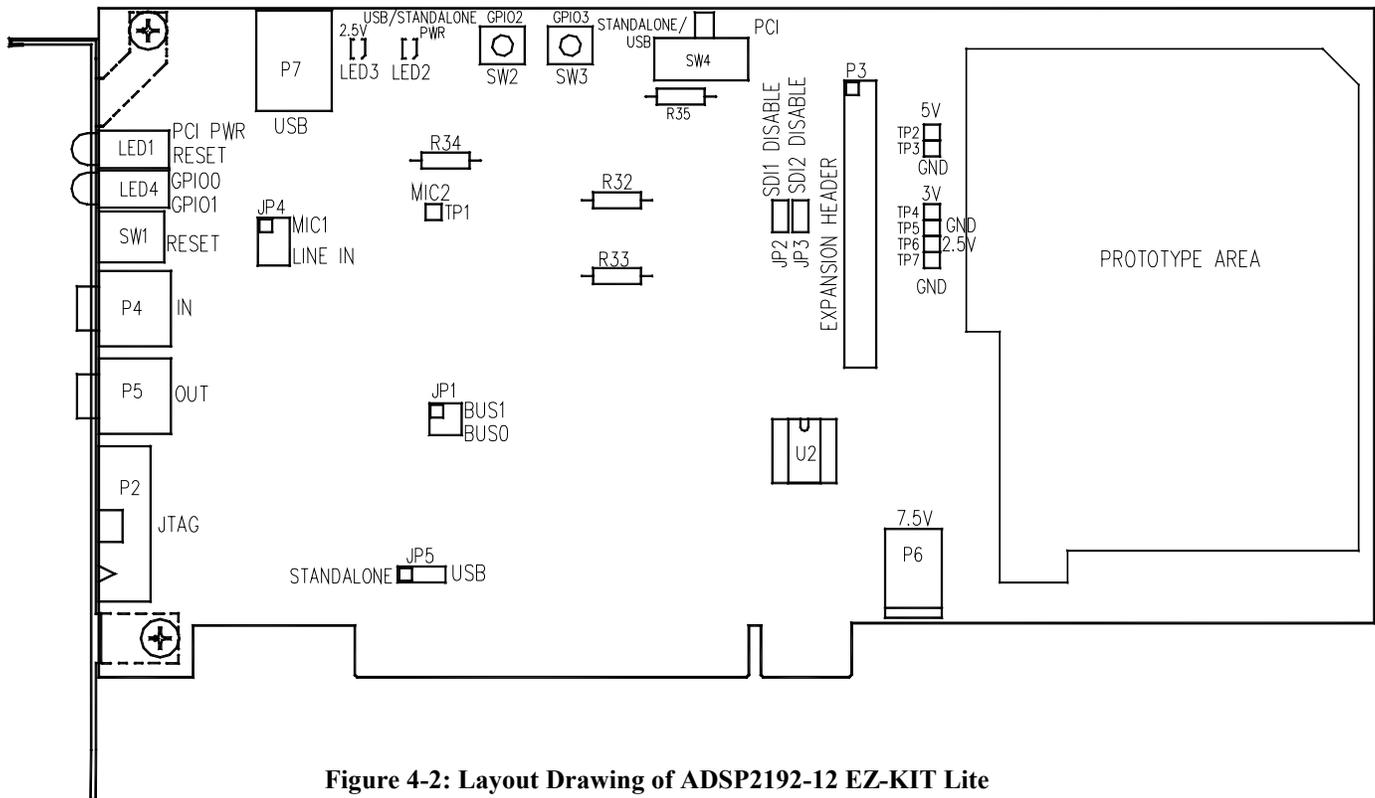


Figure 4-2: Layout Drawing of ADSP2192-12 EZ-KIT Lite

4.4 Power Supplies

In PCI mode, the ADSP2192-12 EZ-KIT Lite uses the PCI bus to supply power to the board. 5V, 3.3V, and 2.5V are derived from the PCI 5V pins. The +5V analog power for the AD1885 codec is derived from the +12V supply of the PCI Bus. This keeps the analog and digital powers isolated from one another.

In USB or Stand-alone mode, the ADSP2192-12 EZ-KIT Lite uses the ADP3338 and ADP3339 parts to regulate the 5V, 3.3V, and 2.5V digital power and +5V analog power required by the board. An external power supply (not provided in the EZ-KIT Lite) is required for USB mode or Stand-alone mode. Do not use this power supply when using the EZ-KIT Lite via the PCI Interface. Below is a more detailed description of the power connector and power supply specifications.

4.4.1 Power Connector

The power connector supplies DC voltages to the EZ-KIT Lite board. Table 4-1 shows the power connector pin out.

| Terminal | Connection |
|------------|-------------------|
| CENTER PIN | +7.5-12 VDC@2amps |
| Outer Ring | GND |

Table 4-1: Power Connector Pin-out

4.4.2 European Power Supply Specifications

Below is the description of the Power Supply that must be provided if the EZ-KIT Lite is used in USB mode or Stand-alone mode.

| | |
|--------------|--|
| DC VOLTAGE | 7.5V +/- 5% (Full Load) |
| CURRENT | 2 Amps (Maximum Rating) |
| RIPPLE | 500 mV rms (Max @ Full Load) |
| DC CONNECTOR | |
| Type: | Switchcraft 760 style, FEMALE |
| Plug Size: | 5.5 (OD) V 2.5 (ID) X 9.5 (length) millimeters |
| Polarity: | Center is Positive (inside terminal) |

Table 4-2: External Power Supply Specifications

4.5 Jumpers

4.5.1 Bus Mode Selection Jumpers (JP1)

The Bus Mode Jumpers (JP1) are used to configure the BUS [1:0] pins on the ADSP2192-12 DSP. In order to use the board in Stand Alone Mode the DSP must be placed in Sub-ISA mode.

Below are the different configurations for the BUS pins.

NOTE: Use this Jumper in conjunction with JP5 and SW4 to properly set-up the board.

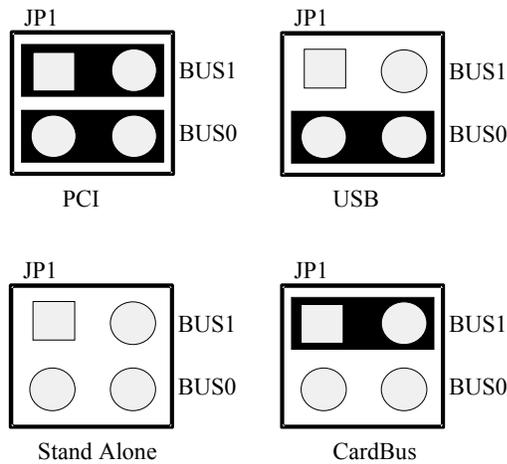


Figure 4-3: BUS Pin Settings (JP1)

| BUS [1:0] | MODE | JP1 (Pin 1 and Pin 2) | JP1 (Pin 3 and Pin 4) |
|-----------|------------------------|-----------------------|-----------------------|
| 00 | *PCI | IN | IN |
| 01 | CardBus (Unused) | IN | OUT |
| 10 | USB | OUT | IN |
| 11 | Sub-ISA Stand Alone | OUT | OUT |

* Denotes Default setting.

Table 4-3: BUS Pin Settings (JP1)

For more information on the ADSP2192-12 DSP bus pins, refer to the ADSP2192-12 datasheet.

4.5.2 USB / Stand-Alone Selection Jumpers (JP5)

The USB / Stand-alone Jumper selection allows a user to choose between USB operation and Stand-alone operation. In PCI mode when the switch SW4 is set accordingly, this jumper is disregarded. USB/stand-alone operation are optional modes and is not supported by the supplied VisualDSP++ monitor-based software.

NOTE: Use this Jumper in conjunction with JP1 and SW4 to properly set-up the board.

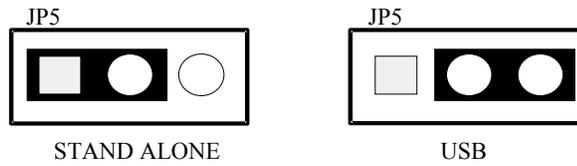


Figure 4-4: USB/Stand-Alone Selection (JP5)

| MODE | JP5 |
|--------------|--------------|
| *Stand Alone | Pins 1 and 2 |
| USB | Pins 2 and 3 |
| PCI | N/A |

* Denotes default setting.

Table 4-4: USB/Stand-Alone Selection (JP5)

4.5.3 External AC'97 Disable Jumpers (JP2, JP3)

The external AC'97 disable jumpers (JP2 and JP3) are used to disable the SDI1 and SDI2 pins of the AC'97 interface in the ADSP2192-12 DSP. These pins are left disabled or grounded so the respective pins on the ADSP2192-12 DSP are not left floating. If the board is using the SDI1 and SDI2 pins via the Expansion Connector, install the respective jumper. The on-board AD1885 codec will not be affected by these jumpers since the AD1885 uses SDI0 as a means of communication with the ADSP2192-12 DSP.

| MODE | SD1 (JP2) | SD2 (JP3) |
|--------------|-----------|-----------|
| *SDI Disable | Install | Install |
| SDI Enable | Uninstall | Uninstall |

*Denotes default setting.

Table 4-5: External AC'97 Settings (JP2, JP3)

4.5.4 Codec Line In / Microphone Jumpers (JP4)

The codec Line In/ Microphone jumpers allow you to choose between the AD1885 being connected to a Line In signal or a Microphone signal from the Audio Connector (P4). The audio connector has an "IN" label on the edge bracket. If Microphone is selected, the AD1885 provides a built-in amplifier with 20 dBs of gain. For more details on the AD1885 codec, refer to the AD1885 datasheet.

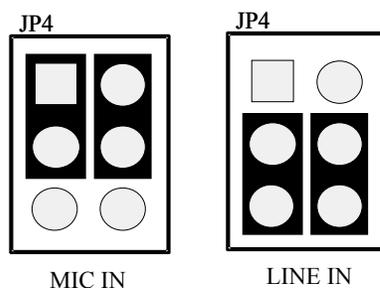


Figure 4-5: Line In / Mic Settings (JP4)

| MODE | JP4 |
|----------|------------------------------|
| MIC | Connect Pins 1 & 3 and 2 & 4 |
| *LINE IN | Connect Pins 3 & 5 and 4 & 6 |

*Denotes default setting.

Table 4-6: Line In / Mic Settings (JP4)

4.5.5 JTAG Jumpers (P2)

The JTAG header (P2), located on the edge, should have jumpers installed when an Analog Devices JTAG emulator is not being used. This holds the JTAG signals in the correct state to allow the DSP to run free.

Remove all the jumpers when connecting the emulator to the JTAG header. Below is a more detailed description of the jumper setting required to set the board to the correct configuration.

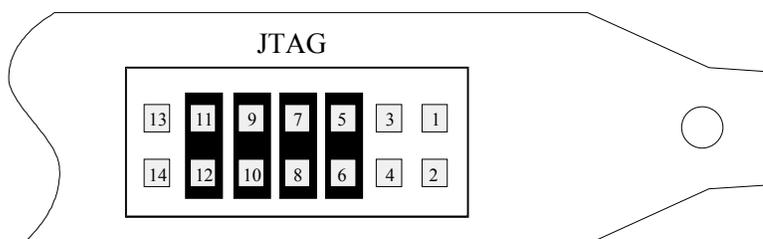


Figure 4-6: JTAG Default Jumper Settings

4.6 Switches

4.6.1 Reset (SW1)

The RESET switch (SW1) located on the edge bracket should be used only if manual intervention is required for the ADSP2192-12. This switch is connected to the \PORST signal of the DSP and causes the DSP to restart by re-executing from the internal ROM. The use of this switch is primarily intended when in Stand-alone mode. For more information on the different modes, refer to section 4.6.3 “Communication Modes.”

NOTE: If this switch is asserted while using the EZ-KIT Lite in PCI mode, communication to the Monitor program will be lost. This is because the DSP will restart by executing from the internal ROM. This, in effect, causes the ADSP2192-12 to re-negotiate with the PCI bus.

You can perform an ADSP2192-12 DSP chip reset using the monitor program. This allows you to reset the DSP without losing PCI communication. Refer to software section (Section 3) of this manual for more details.

4.6.2 GPIO Interrupts (SW2, SW3)

The GPIO2 (SW2) and GPIO3 (SW3) are located at the top-center of the EZ-KIT Lite board. They allow you to send a manual pushbutton interrupt to the ADSP2192-12 DSP. If the pushbuttons are asserted, the respective GPIO2 and GPIO3 signals change from a logic “1” (high) to a logic “0” (low).

4.6.3 Communication Mode (SW4)

The Communication Mode switch (SW4), located at the top center of the EZ-KIT Lite board, is used to choose between PCI, USB, or Stand-alone operation. The switch also allows the circuitry on the board to be powered by the PCI BUS or a user-provided external power supply. The external power supply is required for both the USB and the Stand-alone operation. For more information on the power supply requirements, refer to section 4.4 of this manual.

| MODE | SW4 Position | Actual SW4 Pin Connection |
|-------------|--------------|--|
| *PCI | Right | Pin 2 => Pin 1 Pin 5 => Pin 4 Pin 8 => Pin 7 Pin 11 => Pin 10 |
| Stand Alone | Left | Pin 2 => Pin 3 Pin 5 => Pin 6 Pin 8 => Pin 9 Pin 11 => Pin 12 |
| USB | Left | Pin 2 => Pin 3 Pin 5 => Pin 6 Pin 8 => Pin 9 Pin 11 => Pin 12 |

* Denotes default setting.

Table 4-7: Communication Mode Switch Settings

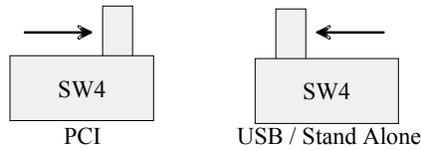


Figure 4-7: Communication Mode Switch Settings

NOTE: In order to properly set-up the board, set this switch in conjunction with JP1 and JP5. For more information on jumper setting please see section 4.5 of this manual.

4.7 LEDs

The ADSP2192-12 EZ-KIT Lite has a total of six LEDs for power indication, reset indication, and GPIO flag indication. The following is a more detailed description of the functionality of each respective LED.

- LED1 is a dual light emitting diode package. The red light emitting diode indicates that pushbutton reset is depressed and the \RESET is asserted. The green light emitting diode indicates that the PCI bus is powering the board and SW4 is set to the correct position signifying PCI operation.
- LED2 is a green light emitting diode, which indicates that the board is being powered by a user-provided external power supply and SW4 is set to the left position signifying, Stand-alone or USB operation.
- LED3 is a green light emitting diode, which indicates that the EZ-KIT Lite has power and ADSP2192-12 DSP core is being powered by 2.5V.
- LED4 is a dual light emitting diode package. Both LEDs are yellow and indicate status of the GPIO1 and GPIO0 lines of the ADSP2192-12 processor.

4.8 Serial EEPROM

The ADSP2192-12 EZ-Kit Lite provides socketed pins (U2) for an optional Serial EEPROM. The EEPROM is not required for operation of the board. It is only necessary if you want to modify the internal ROM code of the ADSP2192-12. If a customer wishes to install an EEPROM, then he or she can use one of the following devices or one that is electrically similar:

| Manufacturer | Part Number | Description |
|-------------------------|----------------|-------------------------------------|
| Fairchild Semiconductor | NM93C56N | 2 Kbit 5V “MicroWire” Serial EEPROM |
| Microchip | 93C56BP | 2 Kbit 5V “MicroWire” Serial EEPROM |

Table 4-8: Suggested Serial EEPROMs

4.9 JTAG Connector

The JTAG Interface allows you to access the ADSP2192-12 DSP via the Emulation Port. By means of an optional Analog Devices Emulator and optional software a user can run, test, and debug their code in any of three modes: PCI, USB, or Stand-alone. For more information on the different types of available emulators, refer to: <http://www.analog.com/industry/dsp/tools/selection.html>.

The JTAG header (Figure 4-8) is the connecting point for the JTAG in-circuit emulator pod. Note that one pin (pin 3) is missing to provide keying. The mating connector should have a plug inserted in the pin 3 location.

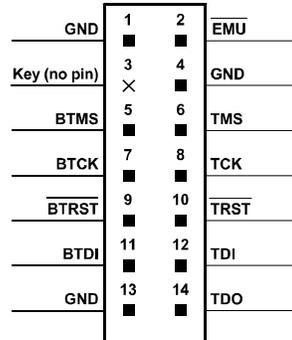


Figure 4-8: JTAG Header Pinout

NOTE: Apply power to the JTAG pod before connecting it to the EZ-KIT Lite board.

For more information regarding the JTAG Interface, please refer to the Analog Devices JTAG Technical Reference:

http://www.analog.com/techsupt/application_notes/EE_notes/pdf_files/ee_68.pdf

4.10 Expansion Port Connector

The expansion port connector provides access to the ADSP2192-12 DSP GPIO and AC'97 signals. You can connect up to two additional AC'97 devices using this connector and breadboard area.

- **WARNING:** External port loading can effect bus speed and performance.

| Pin Number | Name | Pin Number | Name |
|------------|-------------|------------|-------------|
| 1 | Digital GND | 19 | Digital GND |
| 2 | Digital GND | 20 | Digital GND |
| 3 | ACRST~ | 21 | GPIO7 |
| 4 | Digital GND | 22 | Digital GND |
| 5 | SYNC | 23 | GPIO6 |
| 6 | Digital GND | 24 | Digital GND |
| 7 | SDO | 25 | GPIO5 |
| 8 | Digital GND | 26 | Digital GND |
| 9 | SDI2 | 27 | GPIO4 |
| 10 | Digital GND | 28 | Digital GND |
| 11 | SDI1 | 29 | GPIO3 |
| 12 | Digital GND | 30 | Digital GND |
| 13 | SDI0 | 31 | GPIO2 |
| 14 | Digital GND | 32 | Digital GND |
| 15 | Digital GND | 33 | GPIO1 |
| 16 | Digital GND | 34 | Digital GND |
| 17 | BITCLK | 35 | GPIO0 |
| 18 | Digital GND | 36 | Digital GND |

Table 4-9: Expansion Connector Pinout

4.11 Breadboard Area

The ADSP2192-12 EZ-KIT Lite has a 2.5”x3.5” breadboard area allowing you to add additional thru hole or SMT components on the board. Applications may include adding more LEDs or switches to the unused GPIO pins in the Expansion Connector, or connecting other AC’97 compliant devices to the ADSP2192-12.

- **WARNING:** Adding additional hardware may cause the board to malfunction. If additional devices are used while in USB or Stand-alone modes, supply power to them externally.

APPENDIX A: BILL OF MATERIALS

| Item # | QTY | Description | Reference Designators | Manufacturer/Distributor | Part Number |
|--------|-----|-----------------------|-----------------------|--------------------------|----------------------|
| 1 | 4 | 0.00 1/4W 5% RC05 | R32-35 | DIGI-KEY / YAGEO | 0.0QBK-ND |
| | | | | DIGI-KEY / YAGEO | 0.0QTR-ND |
| 2 | 2 | 74LVC14A SOIC14 | U4-5 | TI | 74LVC14AD |
| | | | | PHILIPS | 74LVC14AD |
| 3 | 1 | 24.576MHZ SMT OSC005 | Y1 | EPSON | MA505 24.576M-C2 |
| | | | | DIGI-KEY | SE2538CT-ND |
| 4 | 1 | IDC 7X2 IDC7X2 | P2 | SAMTEC | TST-107-04-S-D-RA |
| 5 | 23 | 0.01uF 100V 10% 1206 | C31,C33,C35, | AVX | 12061C103KAT050M |
| | | | C38,C40,C42, | AVX | 12061C103KAT1A |
| | | | C57-68,C73-77 | AVX | 12061C103KAT2A |
| | | | | AVX | 12061C103KATATMA |
| | | | | AVX | 12061C103KATMA |
| | | | | MUR | GRM42-6X7R103K100BD |
| 6 | 2 | 1000pF 50V 5% 1206 | C20,C21 | AVX | 12065A102JAT2A |
| | | | | AVX | 12065A102JATMA |
| | | | | KEMET | C1206C102J5GAC |
| 7 | 42 | 0.1uF 50V 10% 1206 | C13, | PHILIPS | 12062R104K9BB2 |
| | | | C17-19,C22-30, | AVX | 12065C104KAT1A |
| | | | C32,C34,C36- | AVX | 12065C104KAT2A |
| | | | 37,C39,C41, | AVX | 12065C104KATMA |
| | | | C43-56,C69-72, | AVX | 12065C104KATRE |
| | | | C78-82 | KEMET | C1206C104K5RAC |
| | | | | MUR | GRM42-6X7R104K050BD |
| 8 | 1 | ADM708SAR SOIC8 | U6 | ANALOG | ADM708SAR |
| 9 | 1 | AD1885JST LQFP48 | U3 | ADI | AD1885JST |
| 10 | 1 | ADSP-2192-12 LQFP144 | U1 | ADI | ADSP2192-12MKST160 |
| 11 | 1 | ADP3338AKC-33 SOT-223 | VR2 | ANALOG | ADP3338AKC-3.3 |
| 12 | 1 | ADP3338AKC-5 SOT-223 | VR4 | ANALOG | ADP3338AKC-5 |
| 13 | 1 | ADP3338AKC-25 SOT-223 | VR3 | ANALOG | ADP3338AKC-2.5 |
| 14 | 1 | ADP3339AKC-5 SOT-223 | VR1 | ANALOG | ADP3339AKC-5-REEL |
| 15 | 1 | PWR 2.5MM_JACK CON005 | P6 | SWITCHCRAFT | SC1152-ND12 |
| | | | | SWITCHCRAFT | SWC RAPC712 |
| 16 | 1 | USB 4PIN CON009 | P7 | DIGI-KEY | 897-30-004-90-000000 |
| | | | | MILL-MAX | ED90003-ND |
| 17 | 1 | 4P2T SWT011 | SW4 | DIGI-KEY | EG1914-ND |
| | | | | E-SWITCH | EG4208 |
| 18 | 1 | 8 PIN DIP TH-TH | U2 | MILL-MAX | 614-93-308-31-007 |
| 19 | 1 | MOMENTARY SWT010 | SW1 | C&K | TP11-SH-A-B-E |
| 20 | 2 | 3.5MM STEREO | P4,P5 | VEN. SHO00 | SJ-0359AM-5 |

| | | | | | |
|----|--------------|----------------------------|---------------|-----------------|--------------------|
| | | CON001 | | | |
| 21 | 3 | 0.00 1/8W 5% 1206 | R7,R38-39 | DIGI-KEY | 0.0ECT-ND |
| | | | | DIGI-KEY | 0.0ETR-ND |
| | | | | YAGEO | P0.0ETR |
| | | | | YAGEO | P0.0ETR-ND |
| 22 | 2.000 000 | 220uF 10V 20% E | CT5-6 | CORNELL DUBILIR | AVS227M10E16T |
| | | | | AVX | TAJE227M010R |
| 23 | 2 | 22pF 50V 5% 805 | C1-2 | AVX | 08055A220JAT |
| | | | | MURATA | GRM40COG220J050AD |
| | | | | MURATA | GRM40COG220J050AL |
| 24 | 3 | 4.7K 100MW 5% 805 | R2-4 | AVX | CR21-4701F-T |
| | | | | AVX | CR21-472J-T |
| | | | | DALE | CRCW0805-472JTR |
| 25 | 1 | 120 1/8W 5% 1206 | R17 | AVX | CR32-121JTR |
| | | | | DALE | CRCW1206-121JRT1 |
| | | | | DALE | CRCW1206-523FTR1 |
| 26 | 2 | 1.8K 1/8W 5% 1206 | R20-21 | AVX | CR32-182J-T |
| 27 | 1 | 2.21K 1/8W 1% 1206 | R6 | AVX | CR32-2211F-T |
| | | | | ROHM | MCR18EZH2211 |
| 28 | 2 | 2.2uF 35V 10% B | CT10,CT11 | AVX | TAJB225K035R |
| 29 | 7 | 10uF 16V 10% B | CT7,CT18-23 | AVX | TAJB106K016R |
| 30 | 1 | 1000 100MHZ 1.5A FER002 | FER5 | MURATA | PLM250S40T1 |
| 31 | 2 | 2A S2A_RECT DO- 214AA | D1-2 | GENERALSEMI | S2A |
| | | | | MICROSEMI | S2A |
| 32 | 7 | 600 100MHZ 500MA 1206 | FER1-4,FER6-8 | DIGI-KEY | 240-1019-1-ND |
| | | | | DIGI-KEY | 240-1019-2-ND |
| | | | | STEWART | HZ1206B601R |
| 33 | 1 | 0.047UF 16V 10% 1206 | C16 | AVX | 1206YC473KAT05 |
| | | | | AVX | 1206YC473KAT2A |
| | | | | DIGI-KEY | PCF1042CT-ND |
| | | | | DIGI-KEY | PCF1084CT-ND |
| 34 | 1 | 1.50K 1/8W 1% 1206 | R37 | DALE | CRCW12061501FRT1 |
| | | | | DIGI-KEY | P1.50KFCT-ND |
| | | | | DIGI-KEY | P1.50KFTR-ND |
| 35 | 1 | YELLOW LED006 | LED4 | DIALIGHT | 552-0933 |
| | | | | IDI CHICAGO | 5670H7LC |
| | | | | BIVAR OPTO | H278CYDL |
| | | | | LUMEX | SSF-LXH250LYYD |
| 36 | 1 | RED/GREEN LED006 | LED1 | DIALIGHT | 552-0711 |
| | | | | BIVAR | H278CBC |
| | | | | LUMEX | SSF-LXH250IGIW |
| 37 | 2 | 270PF 50V 10% 805 | C14-15 | KEMET | C1206C271K5GACTR |
| 38 | 1 | 75 1/8W 5% 1206 | R19 | PHILIPS | 9C12063A75R0JLRT/R |
| 39 | 4 | 470PF 100V 10% 1206 | C8-11 | AVX | 12061A471KAT2A |

| | | | | | |
|--|----|---------------------------|--------------------------------------|-----------------|------------------|
| 40 | 1 | 47PF 100V 10% 1206 | C7 | KEMET | C1206C470K1GACTU |
| | | | | KEMET | C206C470K1GACTU |
| 41 | 1 | 47.5 1/8W 1% 1206 | R5 | DALE | CRCW120647R5FRT1 |
| | | | | DALE | CRCW120647R5FTR1 |
| 42 | 14 | 10K 1/8W 5% 1206 | R1,R12-15,R22-26, R28,R30,R36,R40 | DALE | CRCW1206-103JRT1 |
| | | | | KOA | RM73B2BT103JJRT1 |
| 43 | 1 | 100K 1/8W 5% 1206 | R31 | DALE | CR1206-1003JTR |
| 44 | 4 | 4.7K 1/8W 5% 1206 | R8-11 | AVX | CR32-472J-T |
| | | | | DALE | CRCW1206472JRT1 |
| | | | | ROHM | MCR18EZHMJW472 |
| 45 | 2 | 680 1/8W 5% 1206 | R16,R18 | AVX | CR32-681J-T |
| | | | | DALE | CRCW1206-681JRT1 |
| | | | | KOA | RM73B2BT681J |
| 46 | 2 | 100 1/4W 5% 1210 | R27,R29 | PANASONIC | ERJ-14YJ101 |
| | | | | PANASONIC | ERJ-14YJ101U |
| | | | | DIGI-KEY | P100VCT-ND |
| 47 | 2 | GREEN-SMT LED001 | LED2-3 | PANASONIC | LN1361C |
| | | | | DIGI-KEY | P504CT-ND |
| | | | | DIGI-KEY | P504TR-ND |
| 48 | 2 | SPST_MOMENTAR Y SWT005 | SW2-3 | PANASONIC | EVQ-QS205K |
| 49 | 10 | 1uF 25V 20% A | CT3-4,CT8,CT9,CT12-17 | PANASONIC | ECS-T1EY105R |
| | | | | AVX | TAJA105K020R |
| | | | | AVX | TAJA105K025R |
| | | | | AVX | TAJA105K035R |
| 50 | 1 | 0.22uF 35V 20% A | CT2 | DIGI-KEY | PCT6224CT-ND |
| 51 | 1 | QS3257Q QSOP16 | U7 | FAIRCHILD SEMI | FST3257QSC |
| | | | | QUALITY SEMICON | QS3257Q |
| 52 | 2 | IDC 2X1 IDC2X1 | JP2-3 | DIGI-KEY | S1011-02-ND |
| 53 | 1 | IDC 3X1 IDC3X1 | JP5 | SULLINS | S1012-03 |
| | | | | SULLINS | PTC03SAAN |
| 54 | 1 | IDC 2X2 IDC2X2 | JP1 | SULLINS | PTC02DAAN |
| | | | | DIGI KEY | S2012-02 |
| 55 | 1 | IDC 3X2 IDC3X2 | JP4 | SULLINS | PTC03DAANR |
| | | | | DIGI KEY | S2012-03-ND |
| 56 | 1 | 2.5A RESETABLE FUS001 | F1 | RAYCHEM CORP. | SMD250-2 |
| | | | | DIGI KEY | SMD250CT-ND |
| NOTE: DO NOT POPULATE P1,P3,TP1-7 & C12 | | | | | |

APPENDIX B:SCHEMATICS

ADSP2192-12 EZ-KIT LITE

| D REVISIONS | | | | | |
|----------------|-----|----------------------|------|----------|------|
| REV | ECO | DESCRIPTION | ENGR | DATE | APPR |
| 1.0 | | New Release | | 07/18/00 | |
| 1.1 | | REFER TO ECO2000-09B | | 10/06/00 | |

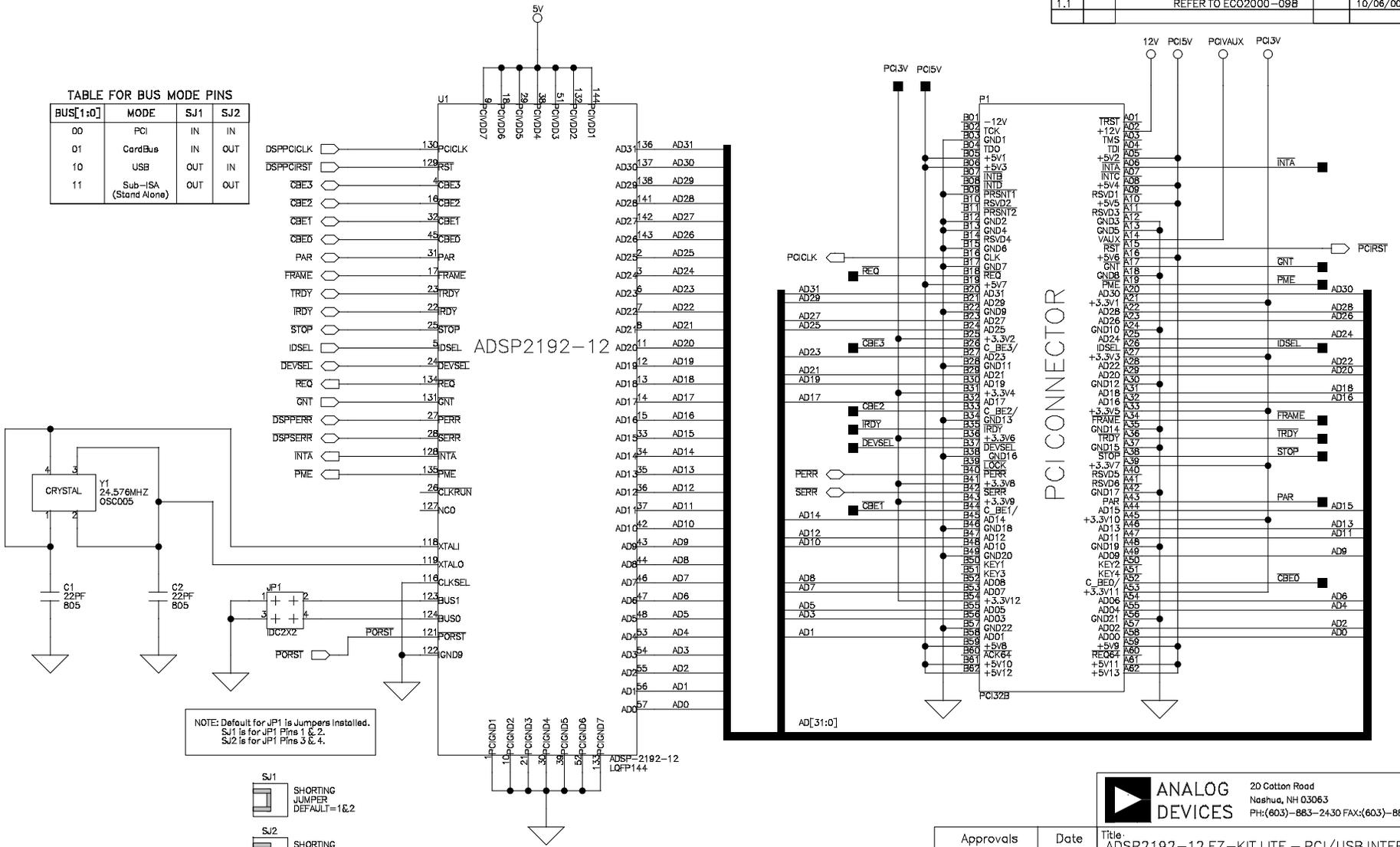
| | | | |
|---|--|--|--|
|  | ANALOG DEVICES | | 20 Cotton Road Nashua, NH 03063 PH: (603)-883-2430 FAX: (603)-882-2655 |
| | Title: ADSP2192-12 EZ-KIT LITE - TITLE SHEET | | |

| | | | | |
|-------------|----------|------|------------------|--------------|
| Approvals | Date | Size | Board No. | Rev |
| Drawn | 10/13/00 | B | A0159-2000 | 1.1 |
| Checked | | Date | 10-13-2000 17:10 | Sheet 1 OF 8 |
| Engineering | | | | |

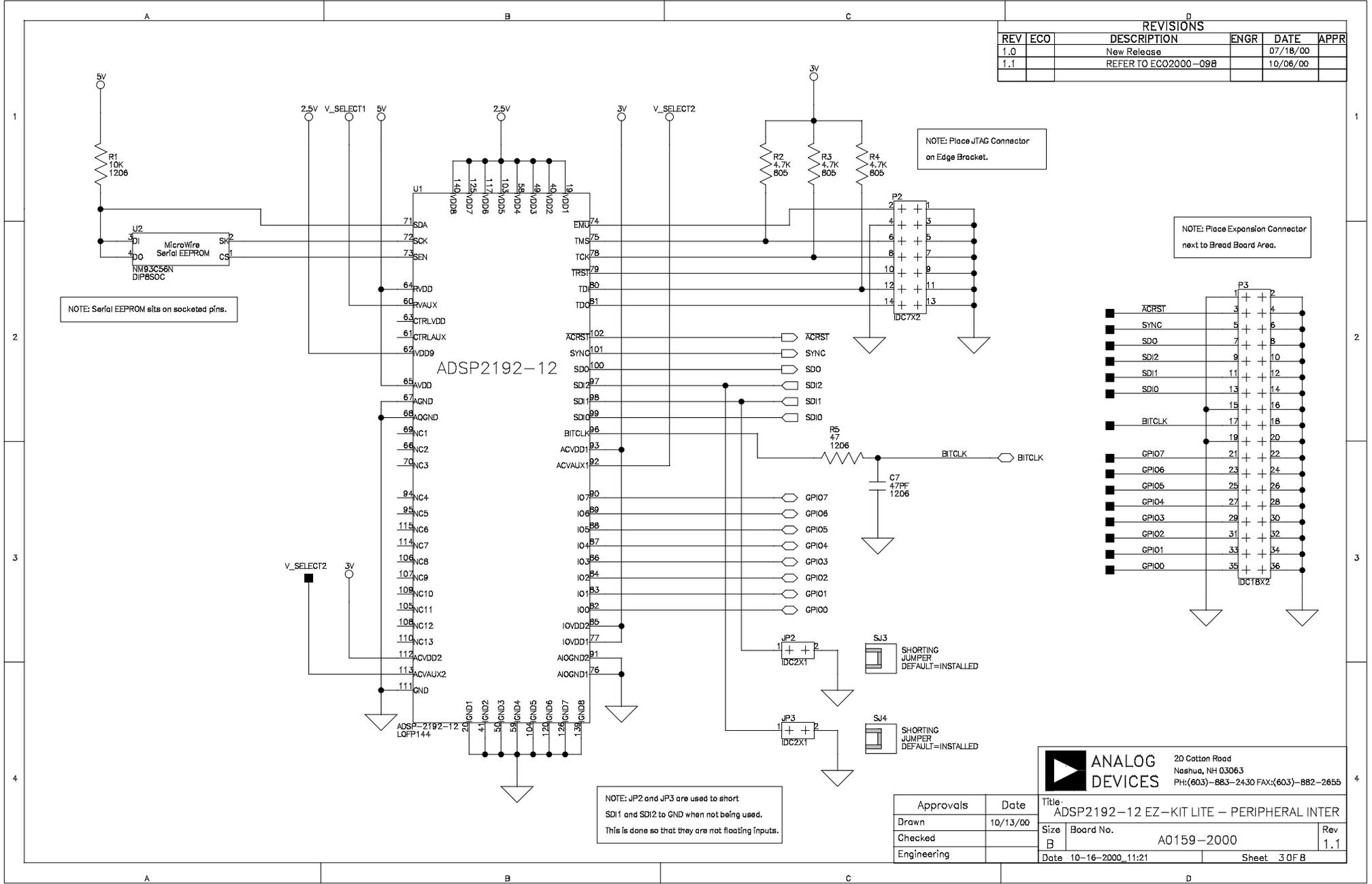
| REVISIONS | | | | | |
|-----------|-----|----------------------|------|----------|------|
| REV | ECO | DESCRIPTION | ENGR | DATE | APPR |
| 1.0 | | New Release | | 07/18/00 | |
| 1.1 | | REFER TO ECO2000-09B | | 10/06/00 | |

TABLE FOR BUS MODE PINS

| BUS[1:0] | MODE | SJ1 | SJ2 |
|----------|--------------------------|-----|-----|
| 00 | PCI | IN | IN |
| 01 | CardBus | IN | OUT |
| 10 | USB | OUT | IN |
| 11 | Sub-ISA (Stand Alone) | OUT | OUT |



| REVISIONS | | | | | |
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| REV | ECO | DESCRIPTION | ENGR | DATE | APPR |
| 1.0 | | New Release | | 07/18/00 | |
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NOTE: Serial EEPROM sits on socketed pins.

NOTE: Place JTAG Connector on Edge Bracket.

NOTE: Place Expansion Connector next to Bread Board Area.

NOTE: JP2 and JP3 are used to short SDI1 and SDI2 to GND when not being used. This is done so that they are not floating inputs.

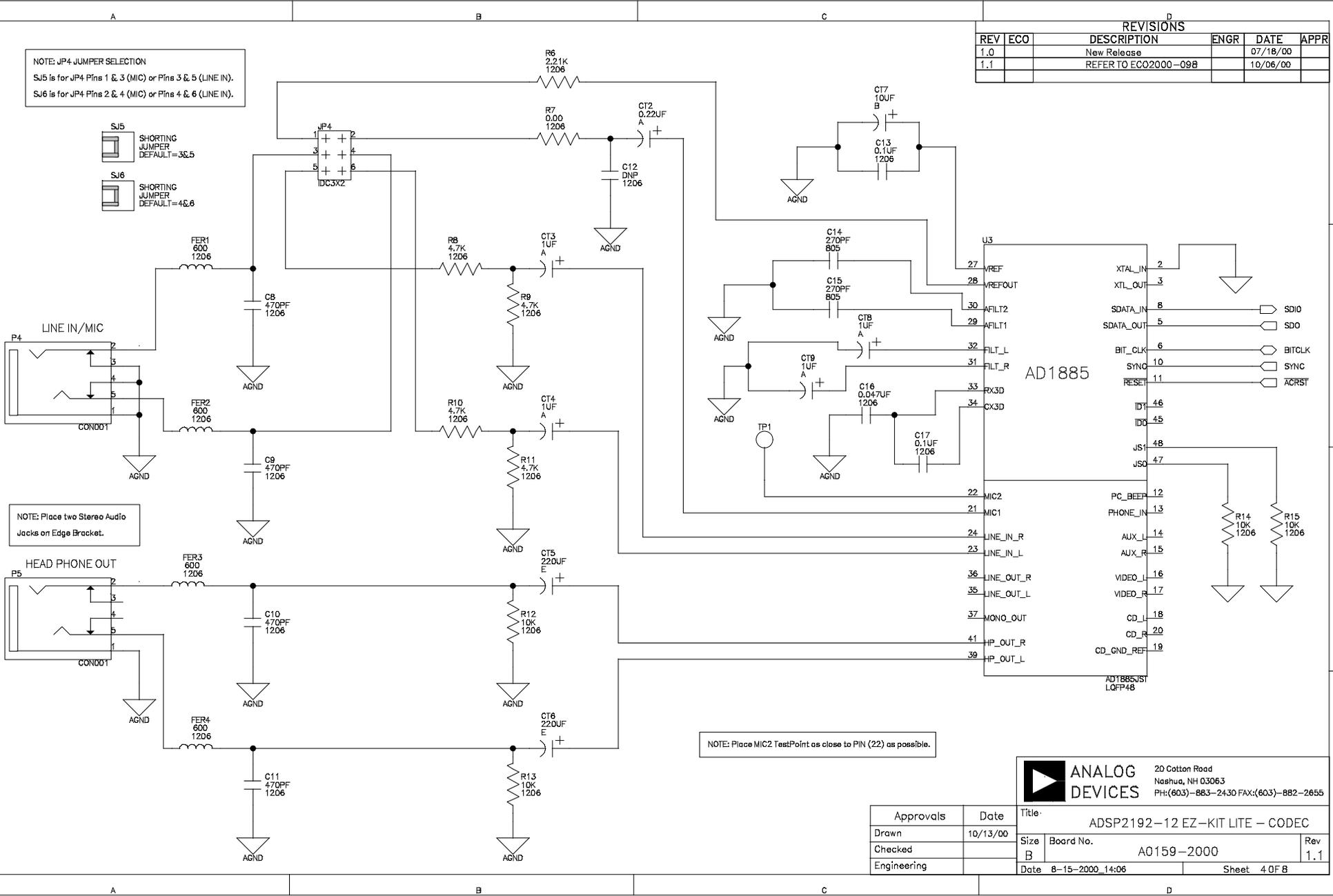
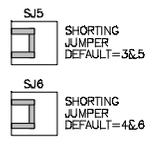
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| Engineering | | B | A0159-2000 |
| | | Date | Rev |
| | | 10-16-2000_11:21 | 1.1 |

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| 1.1 | | REFER TO ECO2000-09B | | 10/06/00 | |

NOTE: JP4 JUMPER SELECTION
 SJ5 is for JP4 Pins 1 & 3 (MIC) or Pins 3 & 5 (LINE IN).
 SJ6 is for JP4 Pins 2 & 4 (MIC) or Pins 4 & 6 (LINE IN).



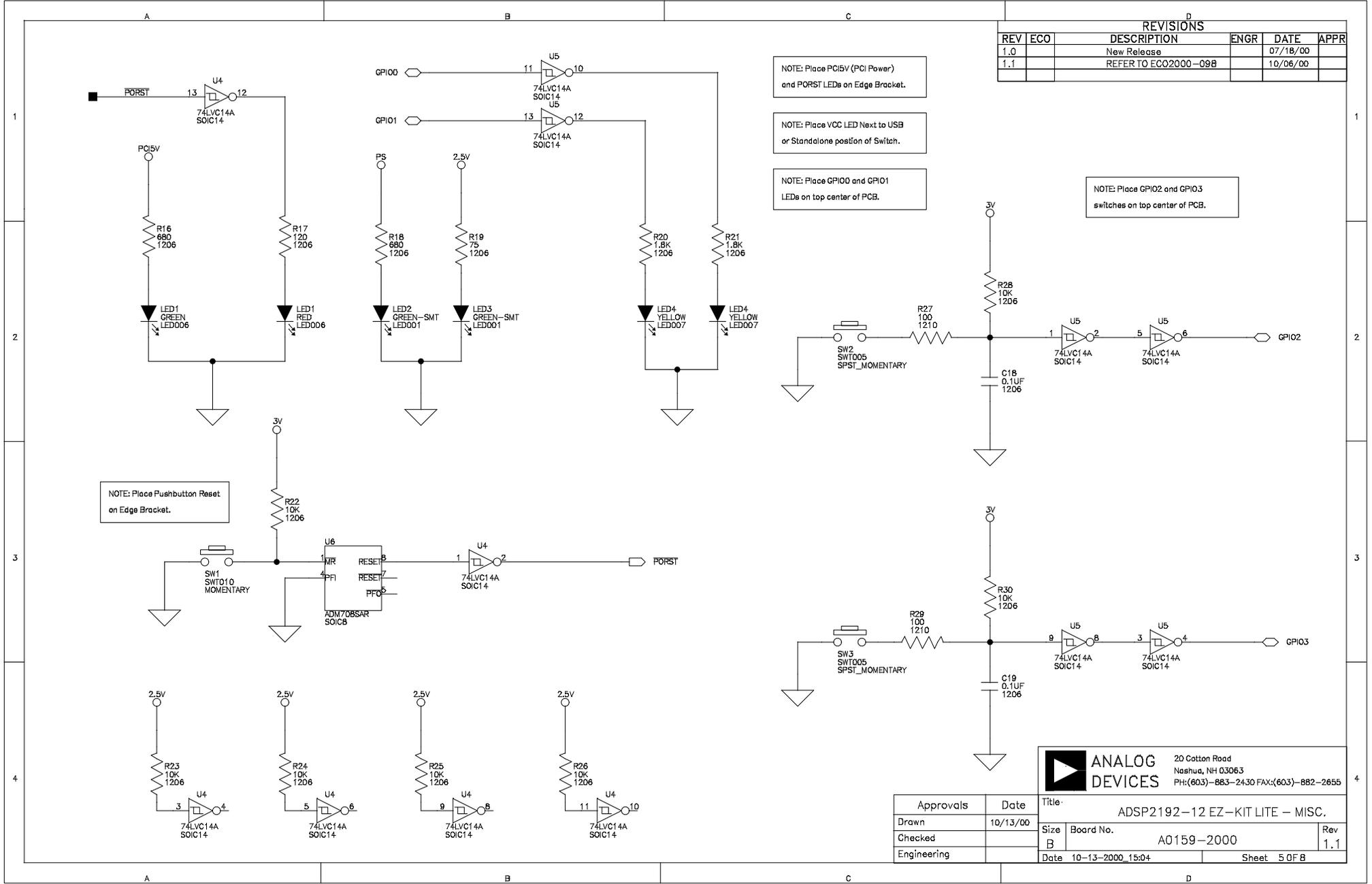
NOTE: Place two Stereo Audio Jacks on Edge Bracket.

NOTE: Place MIC2 TestPoint as close to PIN (22) as possible.

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| Drawn | 10/13/00 | Size | Board No. | Rev |
| Checked | | B | A0159-2000 | 1.1 |
| Engineering | | Date | 8-15-2000 14:06 | Sheet 4 OF 8 |

| REVISIONS | | | | | |
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| REV | ECO | DESCRIPTION | ENGR | DATE | APPR |
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NOTE: Place PCI5V (PCI Power) and PORST LEDs on Edge Bracket.

NOTE: Place VCC LED Next to USB or Standalone position of Switch.

NOTE: Place GPIO0 and GPIO1 LEDs on top center of PCB.

NOTE: Place GPIO2 and GPIO3 switches on top center of PCB.

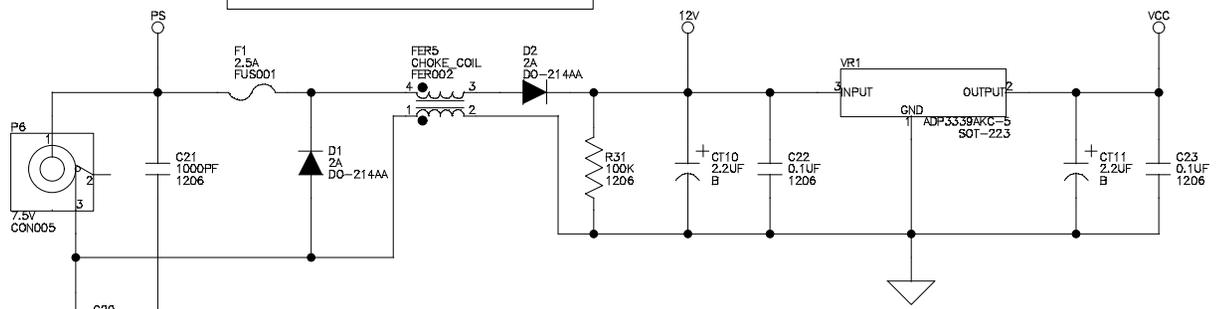
NOTE: Place Pushbutton Reset on Edge Bracket.

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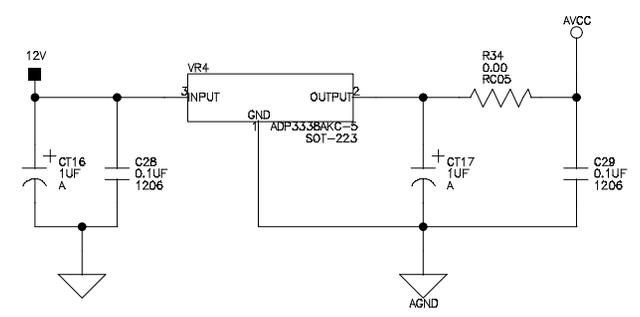
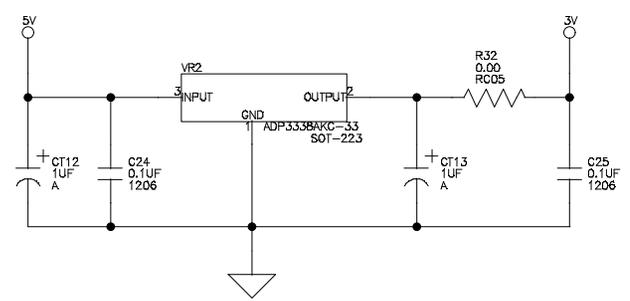
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| Approvals | Date | Title: ADSP2192-12 EZ-KIT LITE - MISC. | |
| Drawn | 10/13/00 | Size | Board No. |
| Checked | | B | A0159-2000 |
| Engineering | | Date | 10-13-2000 15:04 |
| | | Sheet | 5 OF 8 |
| | | Rev | 1.1 |

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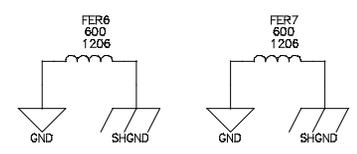
NOTE: Place Caps next to Input and Outputs pins of Regulators (VR1, VR2 and VR3) as close to their respective pins as possible.



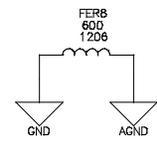
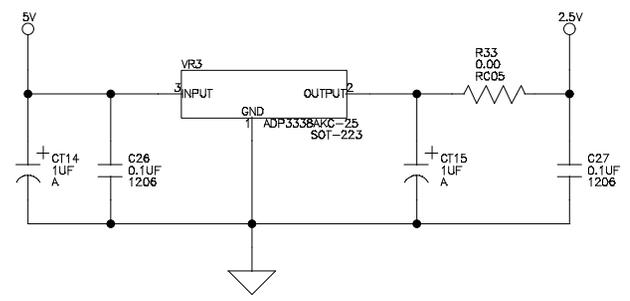
NOTE: R32, R33, and R34 are Zero Ohme Resistors. They can be used for current measurement in each of their respective planes.



NOTE: Place Ferrite Beads for Ground and Shield Ground on opposite ends of PCB.



NOTE: Create isolated (Trench) for Analog Plane and connect planes with Ferrite Bead. Place VR4 and FER8 over trench and keep U3 as close to FER8 as possible.



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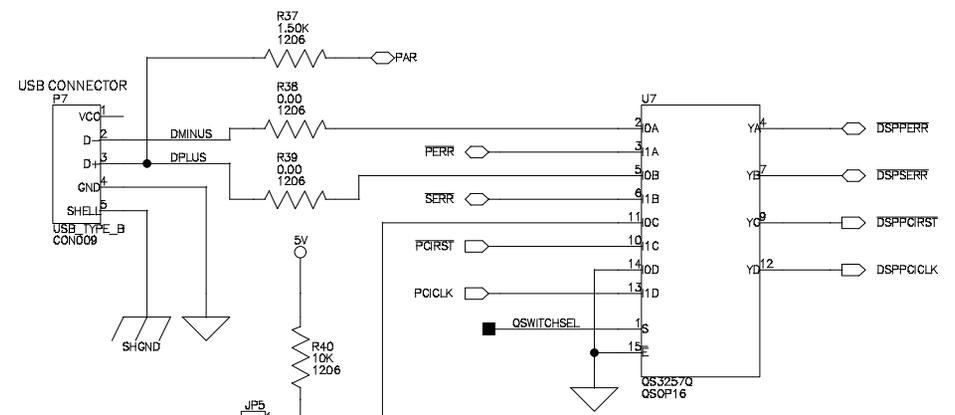
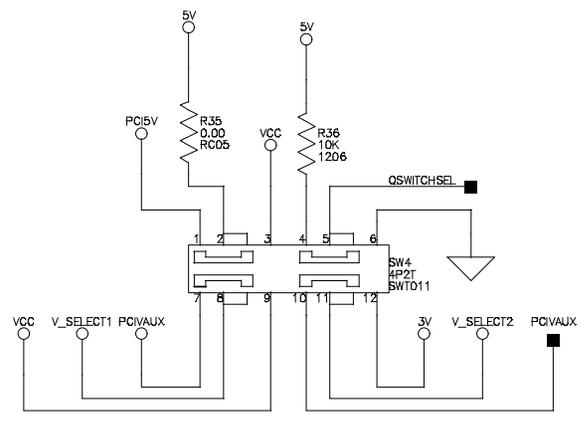
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| Approvals | Date | Title: ADSP2192-12 EZ-KIT LITE - POWER | | |
| Drawn | 10/13/00 | Size | Board No. | Rev |
| Checked | | B | A0159-2000 | 1.1 |
| Engineering | | Date | 10-24-2000 15:59 | Sheet 6 OF 8 |

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| REV | ECO | DESCRIPTION | ENGR | DATE | APPR |
| 1.0 | | New Release | | 07/18/00 | |
| 1.1 | | REFER TO ECO2000-09B | | 10/06/00 | |

Switch Operation:
 Left Position; Pins 1, 4, 7, and 10 for PCI (PC PlugIn) Power.
 Right Position; Pins 3, 6, 9, and 12 for USB / Standalone Power

TABLE FOR QUICK SWITCH (U7) OPERATION

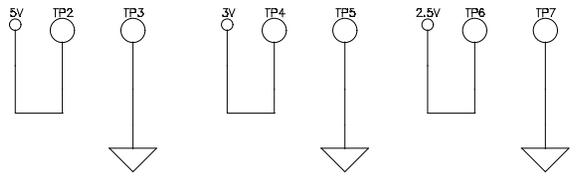
| SWITCH (SW4) POSITION | MODE | QSWITCHSEL | DSPERR CONNECTED TO: | DSPERR CONNECTED TO: | DSPPCIRST CONNECTED TO: | DSPPCICKL CONNECTED TO: | JP5 JUMPER ON: |
|-----------------------|-------------|-------------|----------------------|----------------------|-------------------------|-------------------------|----------------|
| LEFT | PCI | LOGICAL '1' | PEERR | SERR | PCIRST | PCICKL | N/A |
| RIGHT | USB | LOGICAL '0' | DMINUS | DPLUS | GND | GND | PINS 2 & 3 |
| RIGHT | STAND ALONE | LOGICAL '0' | N/A | N/A | 5V | GND | PINS 1 & 2 |



NOTE: R35 is a Zero Ohm Resistor.
 It can be used to for current measurement.

NOTE: Place TestPoints Near Bread Board Area.

NOTE: JP5 is Defaulted to Stand Alone Operation.
 For USB Operation Place Jumper on Pins 2 and 3.

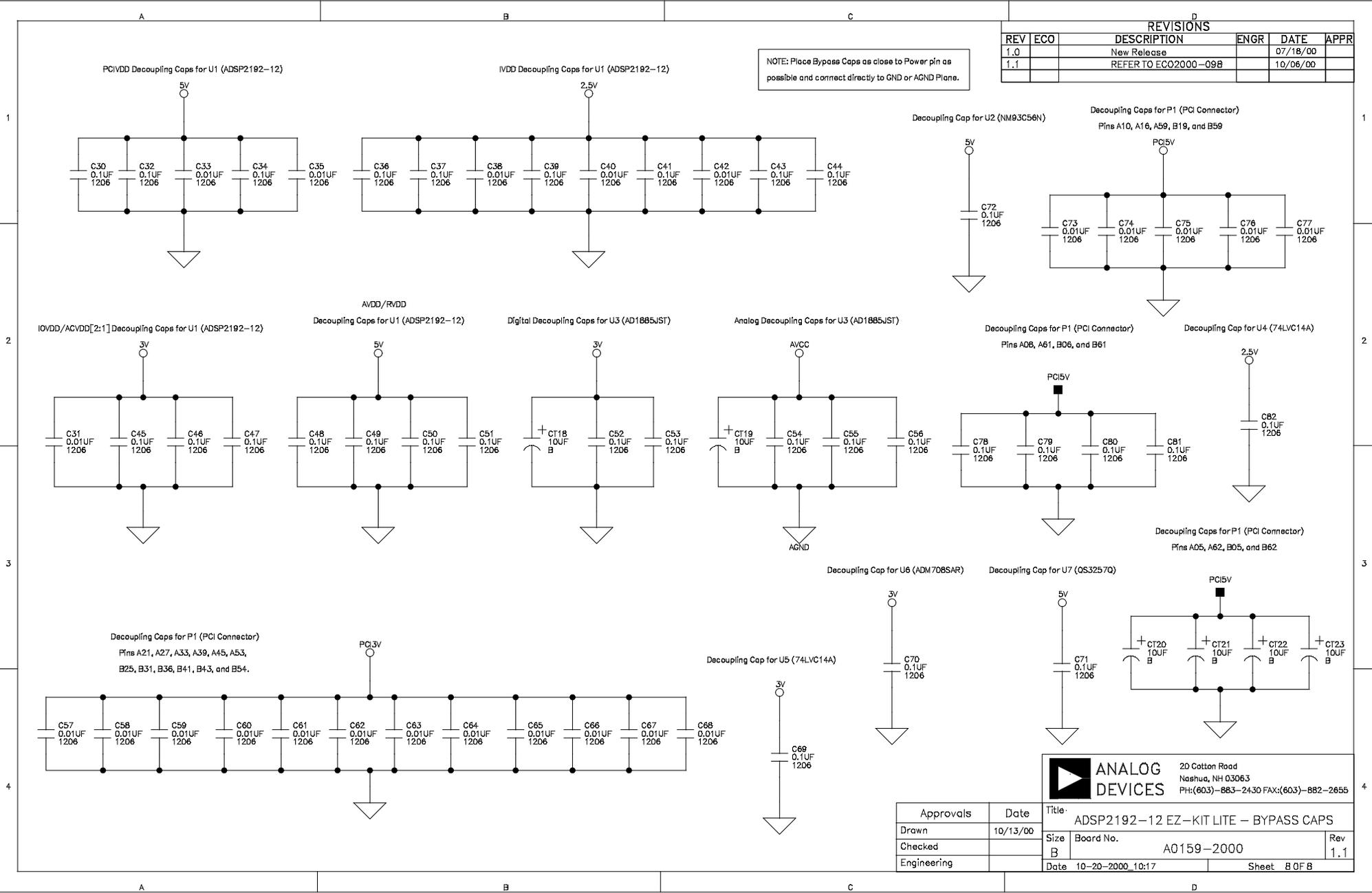


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| Drawn | 10/13/00 | Size | Board No. |
| Checked | | B | A0159-2000 |
| Engineering | | Date | 10-13-2000 17:10 |
| | | | Sheet 7 OF 8 |

| REVISIONS | | | | | |
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| REV | ECO | DESCRIPTION | ENGR | DATE | APPR |
| 1.0 | | New Release | | 07/18/00 | |
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NOTE: Place Bypass Caps as close to Power pin as possible and connect directly to GND or AGND Plane.



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| Checked | | B | A0159-2000 |
| Engineering | | Date | 10-20-2000 10:17 |
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