

ADSP-21160 EZ-KIT Lite® Evaluation System Manual

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

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Regulatory Compliance

The ADSP-21160 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-21160 EZ-KIT Lite evaluation system had been appended to Analog Devices Development Tools Technical Construction File referenced “DSPTOOLS1” dated December 21, 1997 and was awarded CE Certification by an appointed European Competent Body and is on file.



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



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BILL OF MATERIALS

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PREFACE

Thank you for purchasing the ADSP-21160 EZ-KIT Lite[®], Analog Devices, Inc. evaluation system for SHARC[®] digital signal processors (DSPs).

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

The evaluation system is designed to be used in conjunction with the VisualDSP++[®] development environment to test the capabilities of the ADSP-21160 SHARC processors. 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-21160 assembly
- Load, run, step, halt, and set breakpoints in application program
- Read and write data and program memory
- Read and write core and peripheral registers
- Plot memory

Access to the ADSP-21160 processor from a personal computer (PC) is achieved through a USB port or an optional JTAG emulator. The USB interface provides unrestricted access to the ADSP-21160 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/dsp/tools/>.

ADSP-21160 EZ-KIT Lite provides example programs to demonstrate the capabilities of the evaluation board.



The ADSP-21160 EZ-KIT Lite installation is part of the VisualDSP++ installation. The EZ-KIT Lite is a licensed product that offers an unrestricted evaluation license for the first 90 days. Once the initial unrestricted 90-day evaluation license expires:

- VisualDSP++ allows a connection to the ADSP-21160 EZ-KIT Lite via the USB Debug Agent interface only. Connections to simulators and emulation products are no longer allowed.
- The linker restricts a users program to 20 KB of internal memory for code space with no restrictions for data space.

The EZ-KIT Lite hardware must be connected and powered up to use VisualDSP++ with a valid temporary or permanent license.

Refer to the *VisualDSP++ Installation Quick Reference Card* for details.

The board features:

- Analog Devices ADSP-21160 processor
 - ADSP-21160M processor:
 - ✓ 2.5V core voltage
 - ✓ 80 MHz core clock speed
 - ADSP-21160N processor:
 - ✓ 1.9V core voltage
 - ✓ 95 MHz core clock speed
 - Switch-Configurable Boot Mode
- Analog Devices AD1881A 48 kHz AC'97 SoundMAX[®] Codec
 - ✓ jumper selectable Line-In or Mic-In 3.5 mm stereo jack
 - ✓ Line-Out 3.5 mm stereo jack
- USB Debugging Interface
- SBSRAM
 - ✓ 512 Kb (64K x 32-bits x 2-chips)
- Flash Memory
 - ✓ 512 Kb (512K x 8-bits)
- Interface Connectors
 - ✓ 14-Pin emulator connector for JTAG interface
 - ✓ SPORT0 connectors
 - ✓ 2 link port connectors
 - ✓ expansion interface connectors (not populated)
- General-Purpose IO

Purpose of This Manual

- ✓ 3 push buttons connected to processor IRQs
- ✓ 3 LEDs connected to processor FLAGS

The EZ-KIT Lite board has two types of external memory: flash memory and SBSRAM. The flash memory can store user-specified boot code. By configuring the boot mode switch (SW1) and programming the flash memory, the board can run as a stand-alone unit. For information about the external memory, see section [“Memory Map” on page 1-6](#).

SPORT0 is interfaced to an audio codec, facilitating development of audio signal processing applications. SPORT0 is connected also to an off-board connector for communication with other serial devices. For information about SPORT0, see section [“SPORT0 Audio Interface” on page 2-3](#).

Additionally, the EZ-KIT Lite board provides access to most of the processor’s peripheral ports on populated expansion interface connectors. For information about the expansion interface, see [“External Port” on page 2-3](#).

Purpose of This Manual

The *ADSP-21160 EZ-KIT Lite Evaluation System Manual* provides instructions for installing the product hardware (board) and describes the operation and configuration of the board components. The product software installation is detailed in the *VisualDSP++ Installation Quick Reference Card*. The manual provides guidelines for running your own code on the ADSP-21160 EZ-KIT Lite. Finally, a schematic and a bill of materials are provided as a reference for future designs.

Intended Audience

The primary audience for this manual is a programmer who is familiar with Analog Devices processors. This manual assumes that the audience has a working knowledge of the appropriate processor architecture and instruction set. Programmers who are unfamiliar with Analog Devices processors can use this manual but should supplement it with other texts (such as the *ADSP-21160 SHARC Processor Hardware Reference* and *ADSP-21160 SHARC Processor Instruction Set Reference*) that describe your target architecture.

Programmers who are unfamiliar with VisualDSP++ should refer to the VisualDSP++ online Help and user's or getting started guides. For the locations of these documents, see [“Related Documents”](#) on page -xvii.

Manual Contents

The manual consists of:

- Chapter 1, “[Using EZ-KIT Lite](#)” on page 1-1
Provides information on the EZ-KIT Lite from a programmer’s perspective and provides a simplified memory map.
- Chapter 2, “[EZ-KIT Lite Hardware Reference](#)” on page 2-1
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 two modifications of the EZ-KIT Lite board: ADSP-21160M and ADSP-21160N.
- 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 to the PDF version of the ADSP-21160 EZ-KIT Lite Evaluation System Manual located in the Docs\EZ-KIT Lite Manuals folder on the installation CD to see the schematics. Alternatively, the schematics can be found at the Analog Devices Web site, www.analog.com/processors.

What’s New in This Manual

This edition of the *ADSP-21160 EZ-KIT Lite Evaluation System Manual* includes the updated installation and license registration procedures.

Technical or Customer Support

You can reach processor Tools Support in the following ways.

- Visit the Embedded Processing and processor products Web site at <http://www.analog.com/processors/technicalSupport>
- E-mail tools questions to dsptools.support@analog.com
- E-mail processor questions to dsp.support@analog.com
- Phone questions to **1-800-ANALOGD**
- Contact your Analog Devices, Inc. local sales office or authorized distributor
- Send questions by mail to:

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

Supported Processors

This EZ-KIT Lite evaluation system supports the Analog Devices ADSP-21160 SHARC processors.

Product Information

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

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

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.

Registration:

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.

Processor Product Information

For information on embedded processors and processors, visit our Web site at www.analog.com/processors, which provides access to technical publications, data sheets, application notes, product overviews, and product announcements.

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

- E-mail questions or requests for information to
dsp.support@analog.com
- Fax questions or requests for information to
1-781-461-3010 (North America)
+49 (89) 76 903-557 (Europe)
- Access the FTP Web site at
ftp ftp.analog.com **or** ftp 137.71.23.21
ftp://ftp.analog.com

Related Documents

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

Table 1. Related Processor Publications

Title	Description
<i>ADSP-21160M SHARC DSP Data Sheet</i> <i>ADSP-21160N DSP Microcomputer Data Sheet</i>	General functional description, pinout, and timing
<i>ADSP-21160 SHARC Processor Hardware Reference</i>	Description of internal processor architecture, registers, and all peripheral functions
<i>ADSP-21160 SHARC Processor Instruction Set Reference</i>	Description of all allowed processor assembly instructions

Table 2. Related VisualDSP++ Publications

Title	Description
<i>VisualDSP++ User's Guide</i>	Description of VisualDSP++ features and usage
<i>VisualDSP++ Assembler and Preprocessor Manual</i>	Description of the assembler function and commands

Product Information

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

Title	Description
<i>VisualDSP++ C/C++ Compiler and Library Manual for SHARC Processors</i>	Description of the compiler function and commands for SHARC processors
<i>VisualDSP++ Linker and Utilities Manual</i>	Description of the linker function and commands
<i>VisualDSP++ Loader Manual</i>	Description of the loader function and commands

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

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

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

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

Online Technical Documentation

Online documentation comprises the VisualDSP++ Help system, software tools manuals, hardware tools manuals, processor manuals, the Dinkum Abridged C++ library, and Flexible License Manager (FlexLM) network license manager software documentation. You can easily search across the entire VisualDSP++ documentation set for any topic of interest. For easy printing, supplementary .PDF files of most manuals are provided in the Docs folder on the VisualDSP++ installation CD.

Each documentation file type is described as follows.

File	Description
.CHM	Help system files and manuals in Help format
.HTM or .HTML	Dinkum Abridged C++ library and FlexLM network license manager software documentation. Viewing and printing the .HTML files requires a browser, such as Internet Explorer 4.0 (or higher).
.PDF	VisualDSP++ and processor manuals in Portable Documentation Format (PDF). Viewing and printing the .PDF files requires a PDF reader, such as Adobe Acrobat Reader (4.0 or higher).

If documentation is not installed on your system as part of the software installation, you can add it from the VisualDSP++ CD at any time by running the Tools installation. Access the online documentation from the VisualDSP++ environment, Windows[®] Explorer, or the Analog Devices Web site.

Accessing Documentation From VisualDSP++

To view VisualDSP++ Help, click on the **Help** menu item or go to the Windows task bar and navigate to the VisualDSP++ documentation via the **Start** menu.

To view ADSP-21160 EZ-KIT Lite Help, which is part of the VisualDSP++ Help system, use the **Contents** or **Search** tab of the Help window.

Accessing Documentation From Windows

In addition to any shortcuts you may have constructed, there are many ways to open VisualDSP++ online Help or the supplementary documentation from Windows.

Help system files (.CHM) are located in the `Help` folder, and .PDF files are located in the `Docs` folder of your VisualDSP++ installation CD-ROM. The `Docs` folder also contains the Dinkum Abridged C++ library and the FlexLM network license manager software documentation.

Product Information

Your software installation kit includes online Help as part of the Windows® interface. These help files provide information about VisualDSP++ and the ADSP-21160 EZ-KIT Lite evaluation system.

Accessing Documentation From Web

Download manuals at the following Web site:

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

Select a processor family and book title. Download archive (.ZIP) files, one for each manual. Use any archive management software, such as WinZip, to decompress downloaded files.

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

To purchase VisualDSP++ manuals, call 1-603-883-2430. The manuals may be purchased only as a kit.

If you do not have an account with Analog Devices, you are referred to Analog Devices distributors. For information on our distributors, log onto <http://www.analog.com/salesdir/continent.asp>.

Hardware Tools Manuals

To purchase EZ-KIT Lite and In-Circuit Emulator (ICE) manuals, call 1-603-883-2430. The manuals may be ordered by title or by product number located on the back cover of each manual.

Processor Manuals

Hardware reference and instruction set reference manuals may be ordered through the Literature Center at **1-800-ANALOGD (1-800-262-5643)**, or downloaded from the Analog Devices Web site. Manuals may be ordered by title or by product number located on the back cover of each manual.

Data Sheets

All data sheets (preliminary and production) may be downloaded from the Analog Devices Web site. Only production (final) data sheets (Rev. 0, A, B, C, and so on) can be obtained from the Literature Center at **1-800-ANALOGD (1-800-262-5643)**; they also can be downloaded from the Web site.

To have a data sheet faxed to you, call the Analog Devices Faxback System at **1-800-446-6212**. Follow the prompts and a list of data sheet code numbers will be faxed to you. If the data sheet you want is not listed, check for it on the Web site.

Notation Conventions

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

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



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

Notation Conventions

1 USING EZ-KIT LITE

This chapter provides specific information to assist you with development of programs for the ADSP-21160 EZ-KIT Lite evaluation system.

The information appears in the following sections.

- [“Package Contents” on page 1-2](#)
Lists the items contained in the EZ-KIT Lite package.
- [“Default Configuration” on page 1-3](#)
Shows the default configuration of the ADSP-21160 EZ-KIT Lite.
- [“Installation and Session Startup” on page 1-5](#)
Instructs how to start a new or open an existing EZ-KIT Lite session using VisualDSP++.
- [“Evaluation License Restrictions” on page 1-6](#)
Describes the restrictions of the VisualDSP++ license shipped with the EZ-KIT Lite.
- [“Memory Map” on page 1-6](#)
Defines the EZ-KIT Lite’s memory map.
- [“FLAG Pins” on page 1-8](#)
Describes the board’s FLAG pins.
- [“Interrupt Pins” on page 1-8](#)
Describes the board’s interrupt pins.
- [“Example Programs” on page 1-9](#)
Provides information about example programs included in the ADSP-21160 EZ-KIT Lite.

Package Contents

- [“Flash Programmer Utility” on page 1-9](#)
Provides information on the Flash Programmer utility included with the EZ-KIT Lite software.
- [“VisualDSP++ Interface” on page 1-10](#)
Describes the boot loading, target options, and other facilities of the EZ-KIT Lite system.

For detailed information on how to program the ADSP-21160 SHARC processor, refer to the documents referenced in [“Related Documents” on page -xvii](#).

Package Contents

Your ADSP-21160 EZ-KIT Lite evaluation system package contains the following items.

- ADSP-21160M or ADSP-21160N EZ-KIT Lite board
- *VisualDSP++ Installation Quick Reference Card*
- CD containing:
 - ✓ VisualDSP++ software
 - ✓ ADSP-21160 EZ-KIT Lite debug software
 - ✓ USB driver files
 - ✓ Example programs
 - ✓ *ADSP-21160 EZ-KIT Lite Evaluation System Manual* (this document)
- Universal 7.5V DC power supply

- USB 2.0 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.

Default Configuration

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-21160 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.

When removing the EZ-KIT Lite board from the package, handle the board carefully 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. Confirm that your board is set up in the default configuration before using the board.

Default Configuration

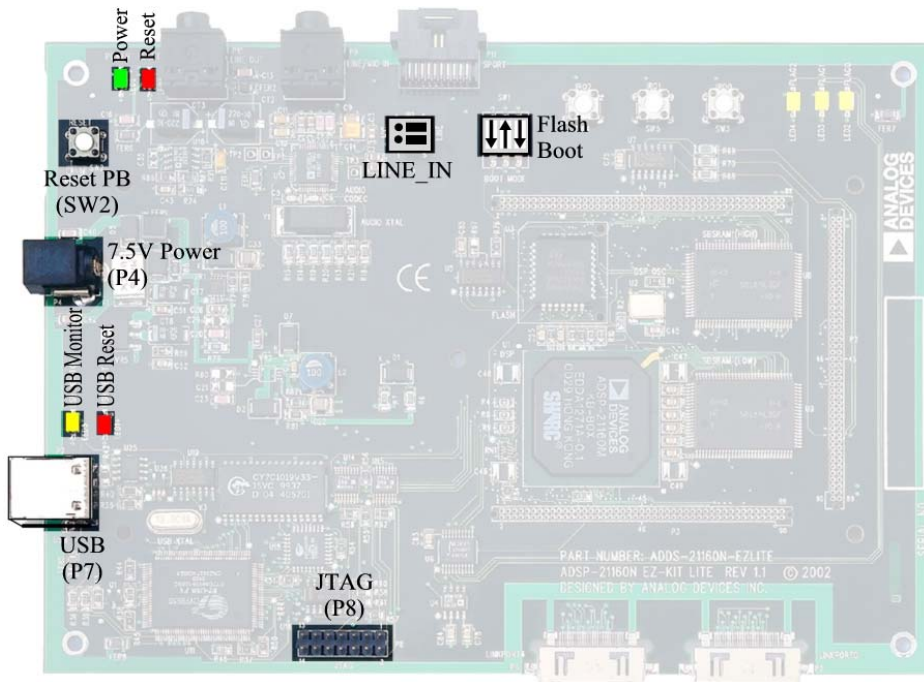


Figure 1-1. EZ-KIT Lite Hardware Setup

Installation and Session Startup



For correct operation, install the software and hardware in the order presented in the *VisualDSP++ Installation Quick Reference Card*.

1. Verify that the yellow USB monitor LED (LED5, 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. From the **Start** menu, navigate to the VisualDSP++ environment via the **Programs** menu.
If you are running VisualDSP++ for the first time, the **New Session** dialog box appears on the screen (skip the rest of the procedure and go to step 3).
If you have run VisualDSP++ previously, the last opened session appears on the screen.
To switch to another session, via the **Session List** dialog box, hold down the **Ctrl** key while starting VisualDSP++ (go to step 5).
3. In **Debug target**, select **EZ-KIT Lite (ADSP-21xxx)**.
In **Platform**, select **ADSP-21xxx EZ-KIT Lite**.
In **Processor**, choose the appropriate processor, **ADSP-21160**.
In **Session name**, type a new name or accept the default.
4. Click **OK** to return to the **Session List**.
5. Highlight the session and click **Activate**.

Evaluation License Restrictions

The ADSP-21160 EZ-KIT Lite installation is part of the VisualDSP++ installation. The EZ-KIT Lite is a licensed product that offers an unrestricted evaluation license for the first 90 days. Once the initial unrestricted 90-day evaluation license expires:

- VisualDSP++ allows a connection to the ADSP-21160 EZ-KIT Lite via the USB Debug Agent interface only. Connections to simulators and emulation products are no longer allowed.
- The linker restricts a users program to 21K words of internal memory for code space with no restrictions for data space.



The EZ-KIT Lite hardware must be connected and powered up to use VisualDSP++ with a valid temporary or permanent license.

Refer to the *VisualDSP++ Installation Quick Reference Card* for details.

Memory Map

The ADSP-21160 processors includes internal SRAM for instruction storage or data storage. The configuration of internal SRAM is detailed in the *ADSP-21160 SHARC Processor Hardware Reference*.

The External Port (EP) of the ADSP-21160 processor connects to the flash memory and SBSRAM. ADSP-21160 EZ-KIT Lite board contains 512 Kb x 8-bits of external flash memory. The flash memory connects to the processors's ~MS0 and ~BMS memory select pins.

SBSRAM is 512 Kb (64K x 32-bit x 2-chips). The SBSRAM memory connects to the ~MS1 memory select pin. This memory is flow-through SBSRAM, capable of burst reads and writes. For information on how to set up burst moves, refer to the *ADSP-21160 SHARC Processor Hardware Reference*.

The memory map in [Figure 1-1](#) is dependant on the value of the MSIZE bits in the SYSCON register. The memory maps shows MSIZE set to 1100b.

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

Start Address		End Address	Content
Internal Memory	0x0000 0000	0x0000 FFFF	IOP Registers
	0x0002 0000	0x0003 FFFF	Long Word Addressing
	0x0004 0000	0x0007 FFFF	Normal Word Addressing
	0x0008 0000	0x000F FFFF	Short Word Addressing
Multipro- cessor Space	0x0010 0000	0x001F FFFF	ID = 001 Internal Memory
	0x0020 0000	0x002F FFFF	ID = 010 Internal Memory
	0x0030 0000	0x003F FFFF	ID = 011 Internal Memory
	0x0040 0000	0x004F FFFF	ID = 100 Internal Memory
	0x0050 0000	0x005F FFFF	ID = 101 Internal Memory
	0x0060 0000	0x006F FFFF	ID = 110 Internal Memory
	0x0070 0000	0x007F FFFF	ID = 111 Internal Memory
External Memory	0x0080 0000	0x0087 FFFF	MS0 and BMS (flash memory ¹)
	0x0280 0000	0x0281 FFFF	MS1 (SBRAM)
	All other locations		Not Used

¹ When viewing external memory with VisualDSP++, ensure that MSIZE is set to 0xC.

FLAG Pins

The ADSP-21160 processor holds four general-purpose FLAG IO pins. The FLAG pins can be used as inputs or output depending on how they are configured in the `MODE2` system register. The state of a FLAG can be written to and read from the `FLAGS` system register. When the FLAG pins are input, their current state can be found by reading the `FLAGS` system register. FLAG pins set as outputs are driven to the value written to the `FLAGS` system register.

The location of the signals can be found in [Appendix B, “Schematics”](#). The FLAG pins are summarized in [Table 1-2](#). For more information on FLAGS, refer to the *ADSP-21160 SHARC Processor Hardware Reference*

Table 1-2. FLAG Pin Summary

FLAG ¹ Pin	Connects To	Description
FLAG0	LED3	FLAG2-0 connect to the LEDs. These can be used, for example, to light a LED when a routine completes.
FLAG1	LED2	
FLAG2	LED1	
FLAG3	AD1881A Reset	FLAG3 connects directly to the reset pin of the AD1881A audio codec. To reset the AD1881A, drive this signal low.

1 FLAG0-3 are available on connector P2.

Interrupt Pins

The ADSP-21160 holds three interrupt request ($\sim$ IRQ) pins that let you interact with the running program. The $\sim$ IRQ pins can be used only as inputs. To use these pins, you must enable the specific IRQ interrupt, as well as enable global interrupts. You also need to write a special interrupt service routine to handle the interrupts when they occur.

The location of the signals can be found in [Appendix B, “Schematics”](#). Interrupt pins are summarized in [Table 1-3](#). For more information on configuring the $\sim$ IRQ pins, see the *ADSP-21160 SHARC Processor Hardware Reference*.

Table 1-3. Interrupt Pin Summary

Interrupt ¹	Connects To	Description
IRQ0	SW3	IRQ0-2 connect to the push buttons and supply feedback for program execution. For instance, you can write your code to trigger a FLAG when a routine is complete.
IRQ1	SW4	
IRQ2	SW5	

¹ IRQ0-2 are available on connector P2.

Example Programs

Example programs are provided with the ADSP-21160 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 the `\...\211xx\EZ-KITs\ADSP-21160\Examples` subdirectory of the VisualDSP++ installation directory. Please refer to the readme file provided with each example for more information.

Flash Programmer Utility

The ADSP-21160 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, go to online Help.

VisualDSP++ Interface

This section provides information about the following parts of the VisualDSP++ graphical user interface:

- [“Boot Load” on page 1-10](#)
- [“Target Options” on page 1-10](#)
- [“Core Hang Conditions” on page 1-12](#)
- [“Restricted Software Breakpoints” on page 1-13](#)

Boot Load

Choosing **Boot Load** from the **Settings** menu runs the processor and performs a hard reset on the board. This command saves you from having to shut down VisualDSP++, reset the EZ-KIT Lite board, and bring up VisualDSP++ again when you want to perform a hard reset.

Use this feature when loading debug boot code from an external part or when you want to put the device into a known state.

Target Options

Choosing **Target Options** from the **Settings** menu opens the **Target Options** dialog box ([Figure 1-2](#)). Use target options to control certain aspects of the processor on the ADSP-21160 EZ-KIT Lite evaluation system.

While Target is Halted and On Emulator Exit Options

This target option controls the processor’s behavior when VisualDSP++ relinquishes processor control (for example, when exiting VisualDSP++). The options are detailed in [Table 1-4](#) and [Table 1-5](#).

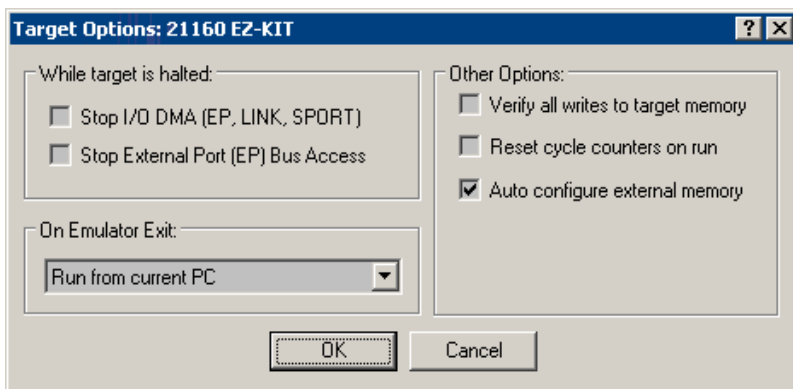


Figure 1-2. Target Options Dialog Box

Table 1-4. While Target is Halted Options

Option	Description
Stop I/O DMA	Stops IO DMAs in emulator space. This option disables DMA requests when the emulator has control of the processor. Data in the EP, LINK, or SPORT DMA buffers are held there unless the internal DMA request was already granted. This option holds off incoming data and ceases outgoing data. Because SPORT-receive data cannot be held off, it is lost, and the overrun bit is set. The direct write buffer (internal memory write) and the EP pad buffer are allowed to flush any remaining data to internal memory.

Table 1-5. On Emulator Exit Options

Option	Description
On Emulator Exit	Determines the state the processor is left in when the emulator relinquishes control of the processor: Reset DSP and Run causes the processor to reset and begin execution from its reset vector location. Run from current PC causes the processor to begin running from its current location.

Other Options

Table 1-6 describes other available target options.

Table 1-6. Other Target Options

Option	Description
Verify all writes to target memory	Validates all memory writes to the processor. After each write, a read is performed and the values are checked for a matching condition. Enable this option during initial program development to locate and fix initial build problems (such as attempting to load data into non-existent memory). Clear this option to increase performance while loading executable files since VisualDSP++ does not perform the extra reads that are required to verify each write.
Reset cycle counters on run	Resets the cycle count registers to zero before a Run command is issued. Select this option to count the number of cycles executed between breakpoints in a program.
Auto configure external memory	Enables the automatic configuration of the SDRAM registers (done through the debugger).

Core Hang Conditions

Certain peripheral devices, such as host ports, DMA, and link ports, can hold off the execution of processor instructions. This is known as a hung condition and commonly occurs when reading from an empty port or writing to a full port. If an attempt to halt the processor is made during one of these conditions, the EZ-KIT Lite may encounter a core hang.

Normally, a core hang can be cleared by the board using a special clear/abort bit. However, there are cases in which it is desirable or possible not to clear the core hang. Sometimes it is desirable to wait for the core hang to clear itself, such as when waiting for a host processor to read or write data. In other cases, it is not possible to clear the core hang, and a processor reset must occur to continue the debugging session.

Table 1-7 describes the EZ-KIT Lite's core hang operations.

Table 1-7. Core Hang Operations

Option	Description
Abort	Abort the hung operation. This causes the offending instruction to be aborted in the pipeline.
Retry	Allows you to remedy the hung operation. For example, if a host processor is holding off the processor, you can cause the host to clear the hung condition.
Ignore	Performs a software reset on the target board.
Clear	Aborts the hung operation. This causes the offending instruction to be aborted in the pipeline.
Acknowledge	Allows you to remedy the hung operation. For example, if a host processor is holding off the processor, you can cause the host to clear the hung condition.
Reset	Performs a software reset on the target board.

Restricted Software Breakpoints

The EZ-KIT Lite development system restricts breakpoint placement when certain conditions are met. That is, under some conditions, breakpoints cannot be placed effectively. Such conditions depend on bus architecture, pipeline depth, and ordering of the EZ-KIT Lite and its target processor.

2 EZ-KIT LITE HARDWARE REFERENCE

This chapter describes the hardware design of the ADSP-21160 EZ-KIT Lite board. The following topics are covered.

- [“System Architecture” on page 2-2](#)
Describes the configuration of the ADSP-21160 EZ-KIT Lite board and explains how the board components interface with the processor.
- [“Jumper and DIP Switch” on page 2-5](#)
Shows the location and describes the function of the on-board jumper and DIP switch.
- [“LEDs and Push Buttons” on page 2-7](#)
Shows the location and describes the function of the LEDs and push buttons.
- [“Connectors” on page 2-10](#)
Shows the location and gives the part number for the on-board connectors. Also, the manufacturer and part number information is given for the mating parts.
- [“Specifications” on page 2-14](#)
Provides the board’s measurements and power supply specifications.

System Architecture

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

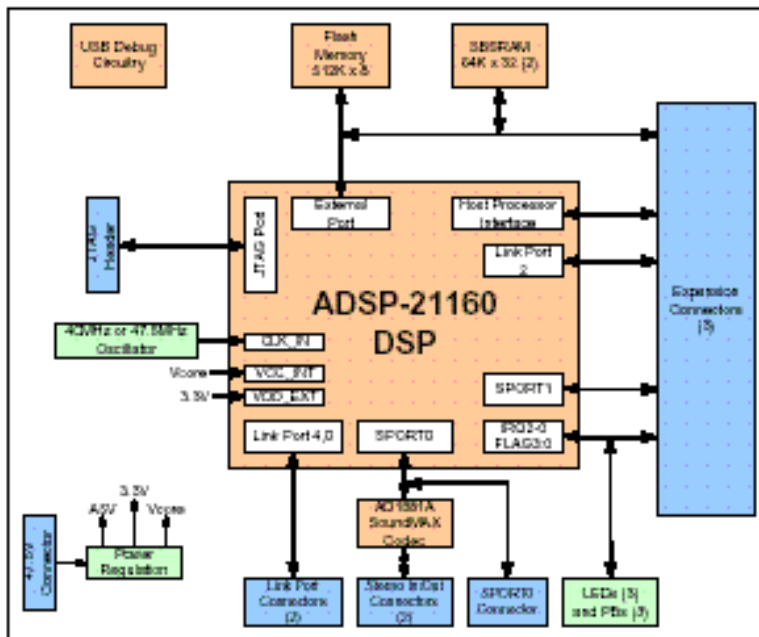


Figure 2-1. System Architecture Block Diagram

The ADSP-21160N processor's core voltage is 1.9V, and ADSP-21160M processor's core voltage is 2.5V. The voltage of the processors' peripheral interface is 3.3V.

The core frequency of the processor is configured by multiplying the external oscillator by 2x. If there is a ADSP-21160M processor on the board, the external oscillator is 40 MHz. If there is a ADSP-21160N processor on the board, the external oscillator is 47.5 MHz.

The EZ-KIT Lite board can be configured to boot in all of the possible ADSP-21160 processor boot modes. The default boot mode is from the external 8-bit Flash memory. For information about configuring the boot mode, see [“Boot Mode Select Switch \(SW1\)” on page 2-6](#).

External Port

The External Port (EP) of the processor connects to a 512 Kb (64K x 32-bits x 2-chips) SBSRAM. The SBSRAM connects to the memory select pin ($\sim$ MS1), providing a 64-bit memory interface.

The EP also connects to a 512 Kb (512K x 8-bits) flash memory. The flash memory connects to both the $\sim$ BMS and $\sim$ MS0 memory select pins. The connection allows the processor to boot from the flash memory using $\sim$ BMS and program it using $\sim$ MS0.

All of the address, data, and control signals are available externally via the expansion connectors (P1-3). The pinout of these connectors can be found in [Appendix B, “Schematics”](#).

SPORT0 Audio Interface

SPORT0 connects to the AD1881A SoundMAX codec (U13). Two 3.5 mm stereo jacks (P9, P10) allow audio to be input and output. You can supply an audio input to the codec microphone input channel (MIC1) or to the stereo input channel (LINE_IN). The jumper settings of JP1 determine the codec channel driven by the input jack (P9). For information about configuring JP1, see [“Audio Input Selection Jumper \(JP1\)” on page 2-6](#).

SPORT0 is also routed to an off-board connector (P11). When using the off-board connector, the codec must be held in reset, so it does not drive any of the SPORT0 signals. The codec can be held in reset by driving FLAG3 “low” (0). The processor must drive FLAG3 “high” (1) to start the codec.



The TCLK0 and RCLK0 pins are shorted together using R19 and R20.

Expansion Interface

The expansion interface consists of three unpopulated connectors. [Table 2-1](#) shows the interfaces each connector provides. For the exact pinout of these connectors, refer to [Appendix B, “Schematics”](#). Analog Devices does not populate these connectors or provide any additional support for this interface. The mechanical dimensions of the connectors can be found in [“Board Current Measurements” on page 2-15](#).

Table 2-1. Expansion Interface Connectors

Connector	Interfaces
P1	5V, GND, Address[31–0], Data[47–0]
P2	3.3V, GND, FLAG[3–0], SPORT1, ~IRQ[2–0], TIMEXP
P3	GND, Reset, LINKPORT2, memory control signals, D[63–8]

Limits to the current and to the interface speed must be taken into consideration when using the expansion interface. The maximum current limit is dependent on the capabilities of the 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 interface. When an emulator connects to the board at P8, the USB debugging interface is disabled.

For a detailed description of the interface's connectors, see *EE-68* published on the Analog Devices website. For more information, see “[JTAG Connector \(P8\)](#)” on page 2-12. For more information about available emulators, contact Analog Devices (see “[Product Information](#)”).

Jumper and DIP Switch

This section describes the function of the jumper and DIP switch. [Figure 2-2](#) shows the jumper and switch locations.

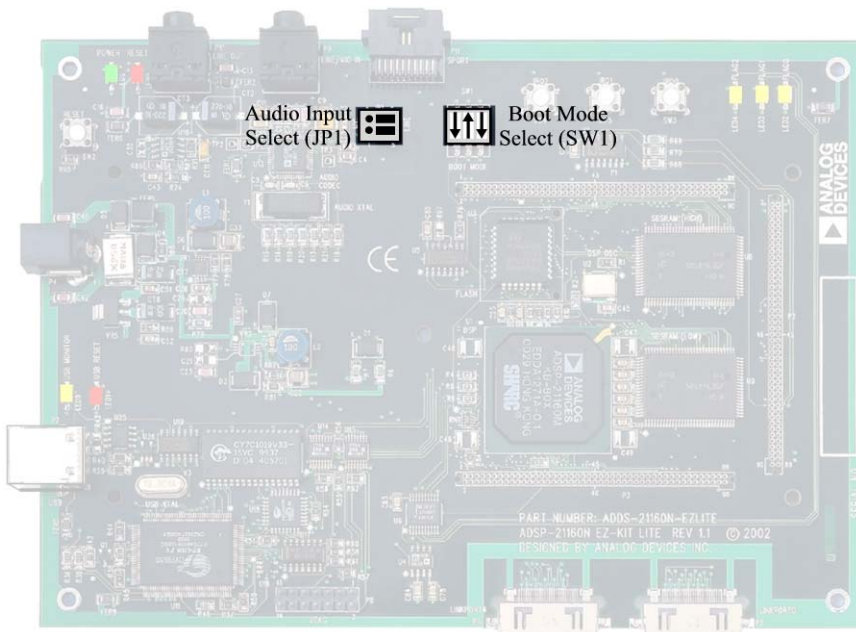
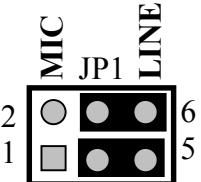
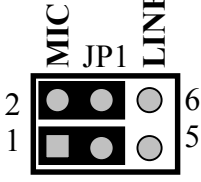


Figure 2-2. Jumper and Switch Locations

Audio Input Selection Jumper (JP1)

The audio input jack (P9) can connect to the MIC1 or LINE_IN input channel of the AD1881A codec (U13). When the JP1 jumper connects pins 1 and 3 and pins 2 and 4, P9 connects to the mono MIC1 channel. When the jumper connects pins 3 and 5 and pins 4 and 6, P9 connects to the stereo LINE_IN channel of the AD1881A codec. These jumper settings are illustrated in [Table 2-2](#). (The labels MIC and LINE appear on the board as a reference).

Table 2-2. Audio Input Jumper Settings (JP1)

Stereo LINE_IN (Default)	Mono MIC1
	

Boot Mode Select Switch (SW1)

The boot mode select switch (SW1) determines how the ADSP-21160 processor boots. [Table 2-3](#) shows the switch settings for the boot modes.

Table 2-3. Boot Mode Select Jumper (SW1) Settings

$\sim$ BMS Pin 1	LBOOT Pins 2	EBOOT Pins 3	Processor Boot Mode
Off (output ¹)	On	Off	Boot from 8-bit Flash memory
Off (input)	On	On	Boot from Host
Off (input)	Off	On	Boot from Link Port
On (input)	On	On	No Boot (execute from external memory)

Table 2-3. Boot Mode Select Jumper (SW1) Settings (Cont'd)

$\sim$ BMS Pin 1	LBOOT Pins 2	EBOOT Pins 3	Processor Boot Mode
On (input)	Off	On	Reserved
X (input)	Off	Off	Reserved

1 Default mode

LEDs and Push Buttons

This section describes the functionality of the LEDs and push buttons. [Figure 2-3](#) shows the locations of the LEDs and push buttons.

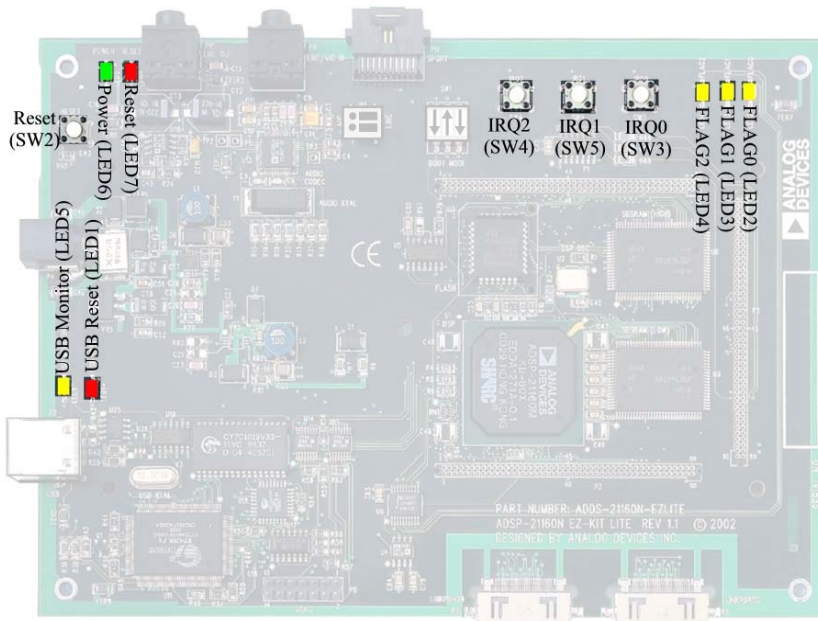


Figure 2-3. LED and Push Button Locations

Reset LEDs (LED1 and LED7)

When LED1 is lit, the master reset of all the major ICs is active.

When LED7 is lit, the USB interface chip (U11) is being reset. The USB interface resets on power-up or when USB communication has not been initialized.

FLAG LEDs (LED2–4)

The FLAG LEDs connect to the processor's FLAG pins (FLAG0–2). The LEDs are active HIGH and are lit by an output of “1” from the processor. Refer to [“LEDs and Push Buttons” on page 2-7](#) for more information on how to program the processor using FLAGS. [Table 2-4](#) shows the FLAG signals and the corresponding LEDs.

Table 2-4. FLAG LEDs

FLAG Pin	LED Reference Designator
FLAG0	LED2
FLAG1	LED3
FLAG2	LED4

USB Monitor LED (LED5)

The USB monitor LED (LED5) indicates that USB communication has been initialized successfully, and you may connect to the processor using a VisualDSP++ EZ-KIT Lite session. If the LED does not light in approximately 15 second after the USB cable connects the board, try cycling power on the board and/or reinstalling the USB driver (see the *VisualDSP++ Installation Quick Reference Card*).

When VisualDSP++ is actively communicating with the EZ-KIT Lite target board, the LED can flicker, indicating communications handshake.

Power LED (LED6)

When LED6 is lit (green), it indicates that power is being properly supplied to the board.

Board Reset Push Button (SW2)

The RESET push button (SW2) resets all of the ICs on the board. This reset does not affect the USB interface chip (U11) unless communication has not been initialized with a PC. After USB communication has been initialized, the only way to reset the USB is by powering down the board.

Interrupt Push Buttons (SW3–5)

Three push buttons connect to the three processor $\sim$ IRQ pins. The pins are always input and, when asserted (0) and when interrupts are enabled, the processor goes to the corresponding interrupt vector. Refer to [“Interrupt Pins” on page 1-8](#) for more information about the use of the IRQs when programming the processor. The push button reference designators and corresponding interrupt signals are summarized in [Table 2-5](#).

Table 2-5. Interrupt Switches

Interrupt Signal	Push Button Reference Designator
IRQ0	SW3
IRQ1	SW4
IRQ2	SW5

Connectors

This section describes the connector functionality and provides information about mating connectors. [Figure 2-4](#) shows the connector locations.

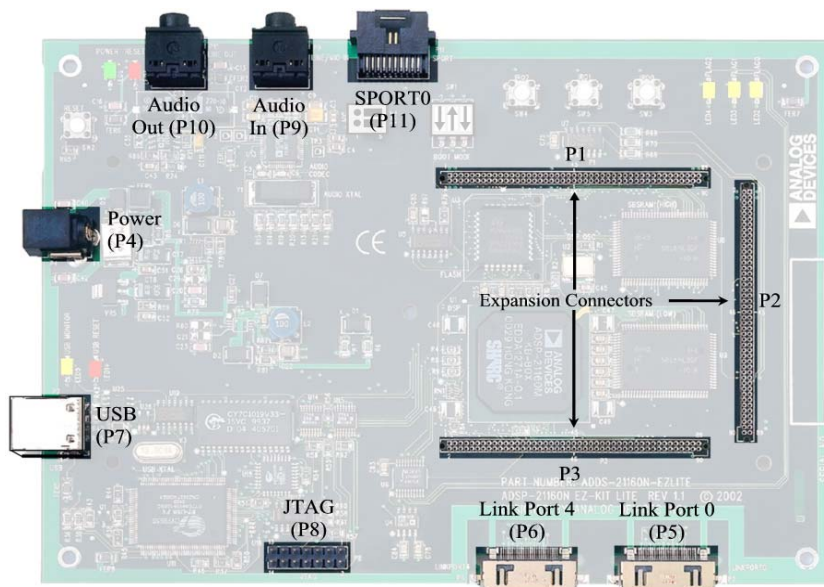


Figure 2-4. Connector Locations

Expansion Connectors (P1–3)

Three board-to-board connectors provide signals for most of the processor's peripheral interfaces. Analog Devices does not populate the expansion connectors or provide any additional support for the interface. See [“Expansion Interface” on page 2-4](#) for more information on the expansion interface. Contact Samtec for the availability and pricing of the connectors. For the exact pinout of the connectors, refer to [Appendix B, “Schematics”](#).

Part Description	Manufacturer	Part Number
90-Position 0.05" Spacing (P1, P2, P3)	Samtec	SFM-145-01-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

Power Connector (P4)

The power connector (P4) provides all of the power necessary to operate the EZ-KIT Lite board.

Part Description	Manufacturer	Part Number
2.5 mm Power Jack (P4)	SWITCHCRAFT	RAPC712
	Digi-Key	SC1152-ND
Mating Power Supply (shipped with EZ-KIT Lite)		
7.5V Power Supply	GlobTek	TR9CC2000LCP-Y

Link Port Connectors (P5–6)

Each link port links to a 26-pin connector. Refer to *EE-106* found on the ADI website at <http://www.analog.com> for more information about the link port connectors.

Part Description	Manufacturer	Part Number
26-position connector (P5, P6)	Honda	RMCA-26JL-AD
Mating Connector		
Cable Assembly (30 cm)	Analog Devices	ADDS-LPCAB-30
Cable connector	Honda	RMCA-E26F1S-A

Connectors

Part Description	Manufacturer	Part Number
Shroud	Honda	RMCA-E26L1A
Coaxial cable	Gore	DXN2132

USB Connector (P7)

The USB connector (P7) is a standard Type B USB receptacle. The USB connector is used to debug the processor. The connectors does not link to the processor's USB interface.

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

JTAG Connector (P8)

The JTAG header (P8) is the connecting point for a JTAG in-circuit emulator pod. When an emulator is connected to the JTAG header, the USB debug interface is disabled.

Pin 3 is missing to provide keying. Pin 3 in the mating connector should have a plug.



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

Part Description	Manufacturer	Part Number
14-pin IDC Header (P8)	Berg	54102-T08-07

Audio Connectors (P9–10)

There are two 3.5 mm stereo audio jacks: one input and one output.

Part Description	Manufacturer	Part Number
3.5 mm stereo jack (P9 and P10)	Shogyo	SJ-0359AM-5
Mating Connectors		
3.5 mm stereo plug to 3.5 mm stereo cable	Radio Shack	42-2387A

SPORT0 Connector (P11)

SPORT0 links to a 20-pin connector. The pinout for this connector can be found in [Appendix B, “Schematics”](#).

Part Description	Manufacturer	Part Number
20-position AMPMODU system 50 receptacle (P11)	AMP	104069-1
Mating Connector		
20-position AMPMODU system 20 connector	AMP	2-487937-0
20-position AMPMODU system 20 connector (w/o lock)	AMP	2-487938-0
Flexible film contacts (20 per connector)	AMP	487547-1
Mating Assembly		
Straight-through assembly with locking connector on each end	Gopher Electronics	DRFFC10X7RHU-RHU5

Specifications

This section provides the requirements for the power supply as well as the mechanical dimensions of the board.

Power Supply

The power connector supplies DC power to the EZ-KIT Lite board. [Table 2-6](#) shows the power supply specifications.

Table 2-6. Power Supply Specifications

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

Board Current Measurements

Figure 2-5 shows the location of the mounting holes as well as pin 1 of each of the expansion connectors.

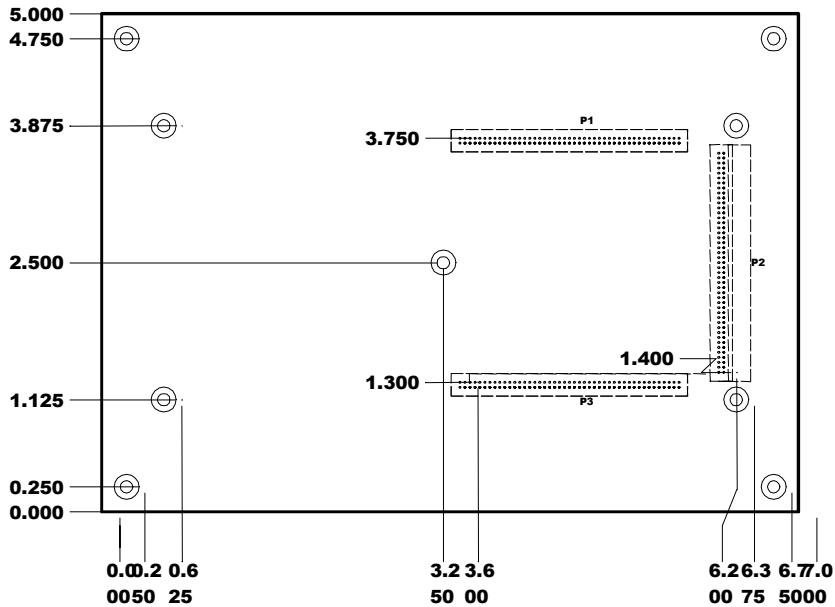


Figure 2-5. Mechanical Drawing

Specifications

A BILL OF MATERIALS

The two bills of materials are for the 2.5V and 1.9V versions of the EZ-KIT Lite evaluation system, featuring the ADSP-21160M and ADDS-21160N processor, respectively:

- “ADSP-21160M EZ-KIT Lite” on page A-2
- “ADSP-21160N EZ-KIT Lite” on page A-9

The bill of materials corresponds to the board schematics on page B-1.

Please check the latest schematics on the Analog Devices website,

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

Table A-1. ADSP-21160M EZ-KIT Lite

Ref. #	Description	Reference Designator	Manufacturer	Part Number
1	M29W040 PLCC32 FLASH-512K-X-8-3V	U3	ST MICRO	M29W040B120K6
2	74LVC14A SOIC14 HEX-INVER-SCHMITT-TRIGGER	U7, U19	TI	74LVC14AD
3	IDT74FCT3244APY SSOP20 3.3V-OCTAL-BUFFER	U6	IDT	IDT74FCT3244APY
4	24.576MHZ SMT OSC005 CRYSTAL	Y1	EPSON	MA505 24.576M-C2
5	CY7C64603-128 PQEP128 USB-TX/RX MICROCONTROLLER	U11	CYPRESS	CY7C64603-128NC
6	MMBT4401 SOT-23 NPN TRANSISTOR 200MA	Q1	FAIRCHILD	MMBT4401
7	74LVC00AD SOIC14	U5	PHILIPS	74LVC00AD
8	24LC00-SN SOIC8 128 BIT SERIAL EEPROM	U25	MICROCHIP	24LC00-SN
9	CY7C1019BV33-15VC SOJ32 128K X 8 SRAM	U12	CYPRESS	CY7C1019BV33-12VC
10	AD8532AR SOIC8 DUAL AMP 250MA	U10	ANALOG DEVICES	AD8532AR
11	SN74AHC1G02 SOT23-5 SINGLE-2 INPUT-NOR	U16	TI	SN74AHC1G02DBVR
12	SN74LV164A SOIC14 8-BIT-PARALLEL-SERIAL	U17	TI	SN74LV164AD

Table A-1. ADSP-21160M EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
13	CY7C4201V-15AC TQFP32 64-BYTE-FIFO	U18	CYPRESS	CY7C4201V-15AC
14	12.0MHZ THR OSC006 CRYSTAL	Y3	DIG01	300-6027-ND
15	SN74AHC1G00 SOT23-5 SINGLE-2-INPUT-NAND	U26	TI	SN74AHC1G00DBVR
16	MT58L64L32 TQFP100_B 64KX32-SBSRAM	U8-9	MICRON	MT58L64L32FT-10
17	LT1765 SO-8 ADJUSTABLE-3A-SWITCH-REG	VR3	LINEAR TECH	LT1765ES8
18	40MHZ SMT OSC003	U2	DIGIKEY	SG-8002CA-PCC-ND40 .0MHZ
19	1000pF 50V 5% 1206 CERM	C40, C42	AVX	12065A102JAT2A
20	2200pF 50V 5% 1206 NPO	C23		
21	0.1uF 50V 10% 1206 CERM	C9-10	PHILIPS	12062R104K9BB2
22	ADSP-21160MKB-80X	U1	ANALOG DEVICES	ADSP-21160MKB-80
23	AD1881AJST LQFP48 SOUNDMAX-CODEC	U13	ANALOG DEVICES	AD1881AJST

Table A-1. ADSP-21160M EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
24	ADM708SAR SOIC8 VOLTAGE-SUPERVISOR	U4	ANALOG DEVICES	ADM708SAR
25	ADP3339AKC-5 SOT-223 5V-1.5A REGULATOR	VR5	ANALOG DEVICES	ADP3339AKC-5-REEL
26	ADP3088 MsOP8 500mA-BUCK-REGULATOR	VR1	ANALOG DEVICES	ADP3088ARM-REEL
27	RUBBER FEET BLACK	MH1-5	MOUSER	517-SJ-5018BK
28	PWR 2.5MM_JACK CON005 RA	P4	SWITCH- CRAFT	SC1152-ND12
29	USB 4PIN CON009 USB	P7	MILL-MAX	897-30-004-90-000000
30	LNKPRT 12X2 CON010	P5-6	HONDA(TSU SHINK)	RMCA-EA26LMY-0M03 -A
31	.05 10X2 CON014 RA	P11	AMP	104069-1
32	SPST-MOMENTARY SWT013 6MM	SW2-5	PANASONIC	EVQ-PAD04M
33	DIP3 SWT015	SW1	DIGI-KEY	CKN3055-ND
34	0.00 1/8W 5% 1206	R6-7, R17-20, R28, R68-70	YAGEO	0.0ECT-ND
35	220uF 10V 20% E ELEC	CT2-3	SPRAGUE	293D227X9010E2T

Table A-1. ADSP-21160M EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
36	AMBER-SMT LED001 GULL-WING	LED2-5	PANASONIC	LN1461C-TR
37	22pF 50V 5% 805 CERM	C5-6	AVX	08055A220JAT
38	0.01uF 100V 10% 805 CERM	C25, C30-32, C38-39, C44, C53-54, C58, C61-62, C64-65, C70, C74-75, C77-78, C82-87, C89, C91, C94, C96-97, C99-100, C103- 109, C116	AVX	08051C103KAT2A
39	0.22uF 25V 10% 805 CERM	C3	AVX	08053C224FAT
40	0.1uF 50V 10% 805 CERM	C24, C26, C34, C45, C51- 52, C55-57, C59-60, C63, C66-69, C71-73, C88, C90, C92-93, C95, C98	AVX	08055C104KAT
41	10uF 16V 10% C TANT	CT7-8	SPRAGUE	293D106X9025C2T
42	10K 100MW 5% 805	R1, R5, R37, R44-45, R47-54, R57, R59- 61, R65-67, R72, R74, R76, R84	AVX	CR21-103J-T

Table A-1. ADSP-21160M EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
43	33 100MW 5% 805	R2-3, R46	AVX	CR21-330JTR
44	4.7K 100MW 5% 805	R55-56, R58, R62, R92	AVX	CR21-4701F-T
45	1M 100MW 5% 805	R41	AVX	CR21-1004F-T
46	1.5K 100MW 5% 805	R43	AVX	CR21-1501F-T
47	10.5K 1/8W 1% 1206	R81	BECKMAN	BCR1/81052FT
48	2.21K 1/8W 1% 1206	R29, R35, R40	AVX	CR32-2211F-T
49	10uF 16V 10% B TANT	CT1, CT9-10, CT21	AVX	TAJB106K016R
50	1A HSM160J DO-214AA SCHOTTKY	D6-7	MICRO-SEMI	HSM160J
51	22K 100MW 5% 805	R16, R24, R27, R85-87, R90-91	AVX	CR21-223J-T
52	100 100MW 5% 805	R64, R71, R75	AVX	CR21-101J-T
53	1000 100MHZ 1.5A FER002 0.06 CHOKE	FER9	MURATA	PLM250S40T1
54	2A S2A_RECT DO-214AA SILICON RECTIFIER	D1-2, D4-5	GENER- ALSEMI	S2A
55	600 100MHZ 500MA 1206 0.70 BEAD	FER1-8	DIGIKEY	240-1019-1-ND
56	0.047UF 16V 10% 1206	C11	AVX	12065C473JATME
57	270PF 50V 10% 805	C12, C19	KEMET	C1206C271J5GAC210

Table A-1. ADSP-21160M EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
58	1UF 16V 10% 805 X7R	C1-2, C4, C7, C27-28, C37, C41, C43	MURATA	GRM40X7R105K016AL
59	470PF 100V 10% 1206 CERM	C13-16, C20	AVX	12061A471JAT2A
60	30PF 100V 5% 1206	C17-18	AVX	12061A300JAT2A
61	10 100MW 5% 805	R83	DALE	CRCW0805-10R0FRT1
62	10UF 25V +80-20% 1210 Y5V	C22, C33, C46-49	MURATA	GRM235Y.5V106Z025
63	53.6K 1/10W 1% 805	R78	PHILIPS	9C08052A5362FKRT/R
64	10UH 47+/-20 IND001	L1-2	TDK	SLF7045T-100M1R1-2
65	10K 31MW 5% RNET8	RN1	CTS	746X101103J
66	0.00 100MW 5% 805	R4, R8-12, R89	PAN	ERJ-6GE10R00V
67	11.3K 1/10W 1% 805	R82	PHILIPS	9C08052A1132FKRT/R
68	32.4K 1/10W 1% 805	R77	PHILIPS	9C08052A3242FKRT/R
69	1K 1/8W 5% 1206	R38	AVX	CR32-102J-T
70	10K 1/8W 5% 1206	R13-15, R21	DALE	CRCW1206-1002FRT1
71	100K 1/8W 5% 1206	R88		CR1206-1003FTR1
72	20.0K 1/8W 1% 1206	R79		
73	22 1/8W 5% 1206	R36, R39		
74	270 1/8W 5% 1206	R30-32, R34, R63, R73	AVX	CR32-271J-T

Table A-1. ADSP-21160M EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
75	4.7K 1/8W 5% 1206	R22-23, R25-26	AVX	CR32-472J-T
76	680 1/8W 5% 1206	R33	AVX	CR32-681J-T
77	RED-SMT LED001 GULL-WING	LED1, LED7	PANASONIC	LN1261C
78	GREEN-SMT LED001 GULL-WING	LED6	PANASONIC	LN1361C
79	1uF 25V 20% A TANT -55+125	CT4-6, CT11	PANASONIC	ECS-T1EY105R
80	QS3257Q QSOP16 QUICKSWITCH-257	U14-15	ANALOG DEVICES	ADG774ABRQ
81	IDC 3X2 IDC3X2	JP1	BERG	54102-T08-03
82	IDC 7X2 IDC7X2	P8	BERG	54102-T08-07
83	IDC 2PIN_JUMPER 0.1	SJ1-2	MOLEX	15-38-1024
84	2.5A RESETABLE FUS001	F1	RAYCHEM CORP.	SMD250-2
85	3.5MM STEREO_JACK CON001	P9-10		

Table A-2. ADSP-21160N EZ-KIT Lite

Ref. #	Description	Reference Designator	Manufacturer	Part Number
1	M29W040 PLCC32 FLASH-512K-X-8-3V	U3	ST MICRO	M29W040B120K6
2	74LVC14A SOIC14 HEX-INVERT-SCHMITT-TRIGGER	U7, U19	TI	74LVC14AD
3	IDT74FCT3244APY SSOP20 3.3V-OCTAL-BUFFER	U6	IDT	IDT74FCT3244APY
4	24.576MHZ SMT OSC005 CRYSTAL	Y1	EPSON	MA505 24.576M-C2
5	CY7C64603-128 PQFP128 USB-TX/RX MICROCONTROLLER	U11	CYPRESS	CY7C64603-128NC
6	MMBT4401 SOT-23 NPN TRANSISTOR 200MA	Q1	FAIRCHILD	MMBT4401
7	74LVC00AD SOIC14	U5	PHILIPS	74LVC00AD
8	24LC00-SN SOIC8 128 BIT SERIAL EEPROM	U25	MICROCHIP	24LC00-SN
9	CY7C1019BV33-15VC SOJ32 128K X 8 SRAM	U12	CYPRESS	CY7C1019BV33-12VC
10	AD8532AR SOIC8 DUAL AMP 250MA	U10	ANALOG DEVICES	AD8532AR
11	SN74AHC1G02 SOT23-5 SINGLE-2 INPUT-NOR	U16	TI	SN74AHC1G02DBVR

Table A-2. ADSP-21160N EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
12	1 SN74LV164A SOIC14 8-BIT-PARALLEL-SERIAL	U17	TI	SN74LV164AD
13	1 CY7C4201V-15AC TQFP32 64-BYTE-FIFO	U18	CYPRESS	CY7C4201V-15AC
14	1 12.0MHZ THRU OSC006 CRYSTAL	Y3	DIG01	300-6027-ND
15	1 SN74AHC1G00 SOT23-5 SINGLE-2-INPUT-NAND	U26	TI	SN74AHC1G00DBVR
16	2 MT58L64L32 TQFP100_B 64KX32-SBSRAM	U8-9	MICRON	MT58L64L32FT-10
17	1 47.5MHZ SMT OSC003	U2	DIGIKEY	SG-8002CA-PCC-ND47.5MH Z
18	2 1000pF 50V 5% 1206 CERM	C40, C42	AVX	12065A102JAT2A
19	2 0.1uF 50V 10% 1206 CERM	C9-10	PHILIPS	12062R104K9BB2
20	1 AD1881AJST LQFP48 SOUNDMAX-CODEC	U13	ANALOG DEVICES	AD1881AJST
21	1 ADM708SAR SOIC8 VOLTAGE-SUPERVISOR	U4	ANALOG DEVICES	ADM708SAR
22	1 ADP3339AKC-5 SOT-223 5V-1.5A REGULATOR	VR5	ANALOG DEVICES	ADP3339AKC-5-REEL

Table A-2. ADSP-21160N EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
23	ADP3088 MSOP8 500MA-BUCK-REGULATOR	VR1, VR2	ANALOG DEVICES	ADP3088ARM-REEL
24	ADSP-21160N PBGA400 4MBIT-1.9V	U1	ANALOG DEVICES	ADSP-21160NKB-95
25	RUBBER FEET BLACK	MH1-5	MOUSER	517-SJ-5018BK
26	PWR 2.5MM_JACK CON005 RA	P4	SWITCH- CRAFT	SC1152-ND12
27	USB 4PIN CON009 USB	P7	MILL-MAX	897-30-004-90-000000
28	LNKPRT 12X2 CON010	P5-6	HONDA (TSUSHINK)	RMCA-EA26LMY-0M03-A
29	.05 10X2 CON014 RA	P11	AMP	104069-1
30	SPST-MOMENTARY SWT013 6MM	SW2-5	PANASONIC	EVQ-PAD04M
31	DIP3 SWT015	SW1	DIGI-KEY	CKN3055-ND
32	0.00 1/8W 5% 1206	R6-7, R17-20, R28, R68- 70	YAGEO	0.0ECT-ND
33	220uF 10V 20% E ELEC	CT2-3	SPRAGUE	293D227X9010E2T
34	AMBER-SMT LED001 GULL-WING	LED2-5	PANASONIC	LN1461C-TR

Table A-2. ADSP-21160N EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
35	2 22pF 50V 5% 805 CERM	C5-6	AVX	08055A220JAT
36	4 0.01uF 100V 10% 805 CERM	C25, C30-32, C38-39, C44, C53-54, C58, C61-62, C64-65, C70, C74-75, C77-78, C82-87, C89, C91, C94, C96-97, C99-100, C103-109, C116	AVX	08051C103KAT2A
37	1 0.22uF 25V 10% 805 CERM	C3	AVX	08053C224FAT
38	2 0.1uF 50V 10% 805 CERM	C24, C26, C34, C45, C51-52, C55-57, C59-60, C63, C66-69, C71-73, C88, C90, C92-93, C95, C98	AVX	08055C104KAT
39	2 10uF 16V 10% C TANT	CT7-8	SPRAGUE	293D106X9025C2T
40	2 10K 100MW 5% 805 4	R1, R5, R37, R44-45, R47-54, R57, R59-61, R65-67, R72, R74, R76, R84		

Table A-2. ADSP-21160N EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
41	33 100MW 5% 805	R2-3, R46	AVX	CR21-330JTR
42	4.7K 100MW 5% 805	R55-56, R58, R62, R92	AVX	CR21-4701F-T
43	1M 100MW 5% 805	R41	AVX	CR21-1004F-T
44	1.5K 100MW 5% 805	R43	AVX	CR21-1501F-T
45	2.21K 1/8W 1% 1206	R29, R35, R40	AVX	CR32-2211F-T
46	10uF 16V 10% B TANT	CT1, CT9-10, CT21	AVX	TAJB106K016R
47	1A HSM160J DO-214AA SCHOTTKY	D6-7	MICRO-SEMI	HSM160J
48	22K 100MW 5% 805	R16, R24, R27, R85-87, R90-91	AVX	CR21-223J-T
49	100 100MW 5% 805	R64, R71, R75	AVX	CR21-101J-T
50	1000 100MHZ 1.5A FER002 0.06 CHOKE	FER9	MURATA	PLM250S40T1
51	2A S2A_RECT DO-214AA SILICON RECTIFIER	D1, D4-5	GENERALSEMI	S2A
52	600 100MHZ 500MA 1206 0.70 BEAD	FER1-8	DIGIKEY	240-1019-1-ND
53	0.047UF 16V 10% 1206	C11	AVX	12065C473JATME

Table A-2. ADSP-21160N EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
54	2 270PF 50V 10% 805	C12, C19	KEMET	C1206C271J5GAC210
55	9 1UF 16V 10% 805 X7R	C1-2, C4, C7, C27- 28, C37, C41, C43	MURATA	GRM40X7R105K016AL
56	6 470PF 100V 10% 1206 CERM	C13-16, C20, C23	AVX	12061A471JAT2A
57	2 30PF 100V 5% 1206	C17-18	AVX	12061A300JAT2A
58	1 10 100MW 5% 805	R83	DALE	CRCW0805-10R0FRT1
59	6 10UF 25V +80-20% 1210 Y5V	C22, C33, C46-49	MURATA	GRM235Y.5V106Z025
60	2 53.6K 1/10W 1% 805	R78, R82	PHILIPS	9C08052A5362FKRT/R
61	2 10UH 47 +/-20 IND001	L1-2	TDK	SLF7045T-100M1R1-2
62	1 10K 31MW 5% RNET8	RN1	CTS	746X101103J
63	7 0.00 100MW 5% 805	R4, R8-12, R89	PAN	ERJ-6GE10R00V
64	1 32.4K 1/10W 1% 805	R77	PHILIPS	9C08052A3242FKRT/R
65	1 102K 1/8W 1% 1206	R81	PHILIPS	9C12063A1023FKRT/R
66	1 1K 1/8W 5% 1206	R38	AVX	CR32-102J-T
67	4 10K 1/8W 5% 1206	R13-15, R21	DALE	CRCW1206-1002FRT1
68	1 100K 1/8W 5% 1206	R88		CR1206-1003FTR1
69	1 20.0K 1/8W 1% 1206	R79		

Table A-2. ADSP-21160N EZ-KIT Lite (Cont'd)

Ref. #	Description	Reference Designator	Manufacturer	Part Number
70	22 1/8W 5% 1206	R36, R39		
71	270 1/8W 5% 1206	R30-32, R34, R63, R73	AVX	CR32-271J-T
72	4.7K 1/8W 5% 1206	R22-23, R25-26,	AVX	CR32-472J-T
73	680 1/8W 5% 1206	R33	AVX	CR32-681J-T
74	RED-SMT LED001 GULL-WING	LED1, LED7	PANASONIC	LN1261C
75	GREEN-SMT LED001 GULL-WING	LED6	PANASONIC	LN1361C
76	1uF 25V 20% A TANT -55+125	CT4-6, CT11	PANASONIC	ECS-T1EY105R
77	QS3257Q QSOP16 QUICKSWITCH-257	U14-15	ANALOG DEVICES	ADG774ABRQ
78	IDC 3X2 IDC3X2	JP1	BERG	54102-T08-03
79	IDC 7X2 IDC7X2	P8	BERG	54102-T08-07
80	IDC 2PIN_JUMPER 0.1	SJ1-2	MOLEX	15-38-1024
81	2.5A RESETABLE FUS001	F1	RAYCHEM CORP.	SMD250-2
82	3.5MM STEREO_JACK CON001	P9-10		

ADSP-21160 EZ-KIT Lite

Component Population Differences		
Part Number	ADDS-21160-EZ-LITE	ADDS-21160N-EZ-LITE
Core Voltage	2.5V	1.9V
Core Clock	80MHz	95MHz
U1	ADSP-21160M	ADSP-21160N
U2	40MHz	47.5MHz
VR3	POPULATE	DNP
D2	POPULATE	DNP
VR2	DNP	POPULATE
R82	11.3K	53.6K
R81	10.5K	102K
C23	2.2nF	470PF

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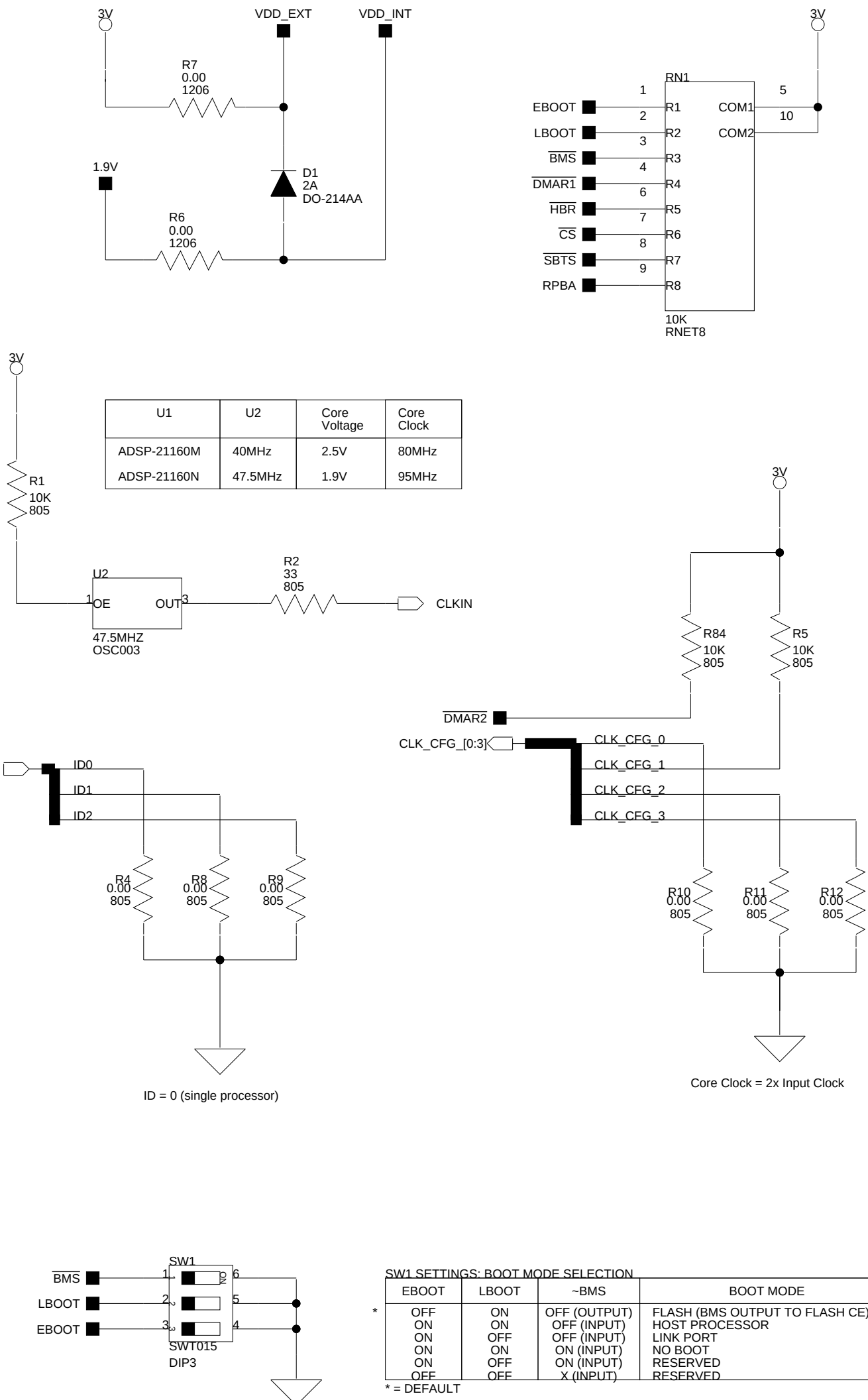
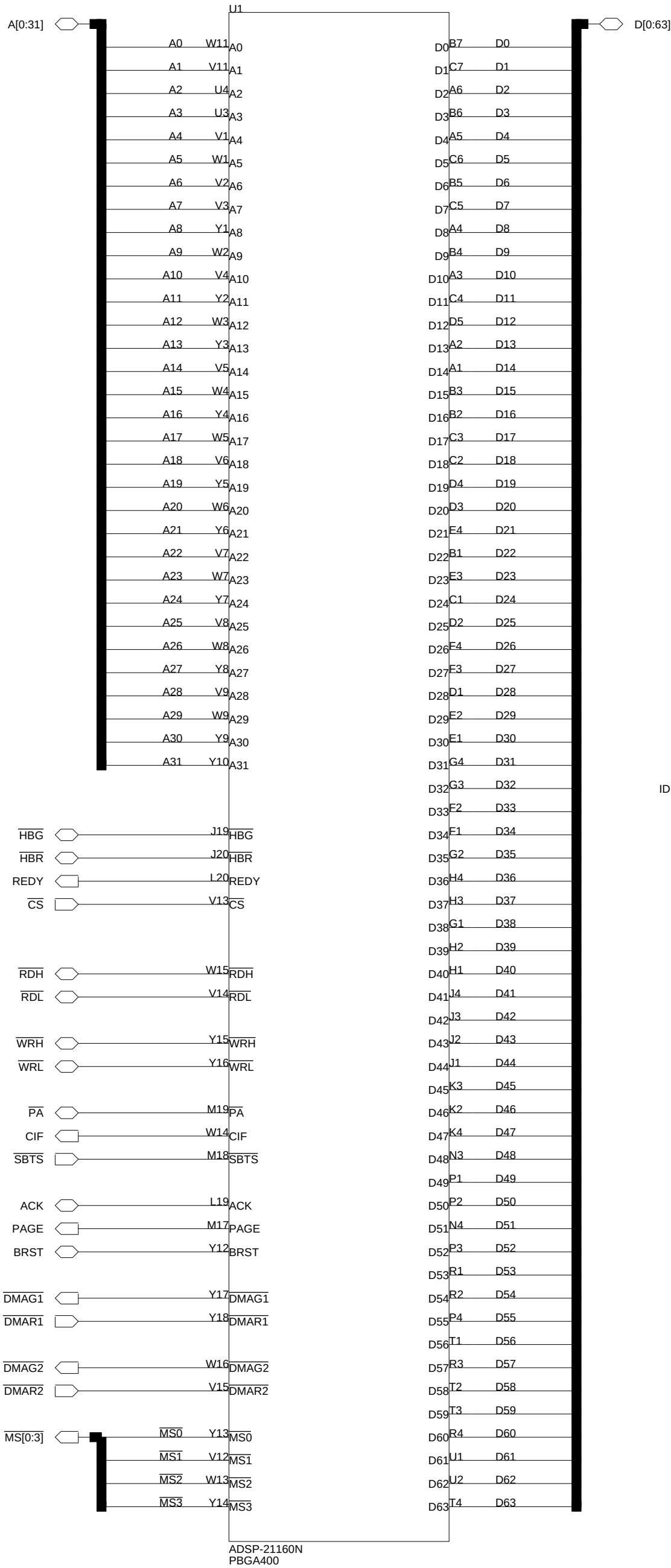
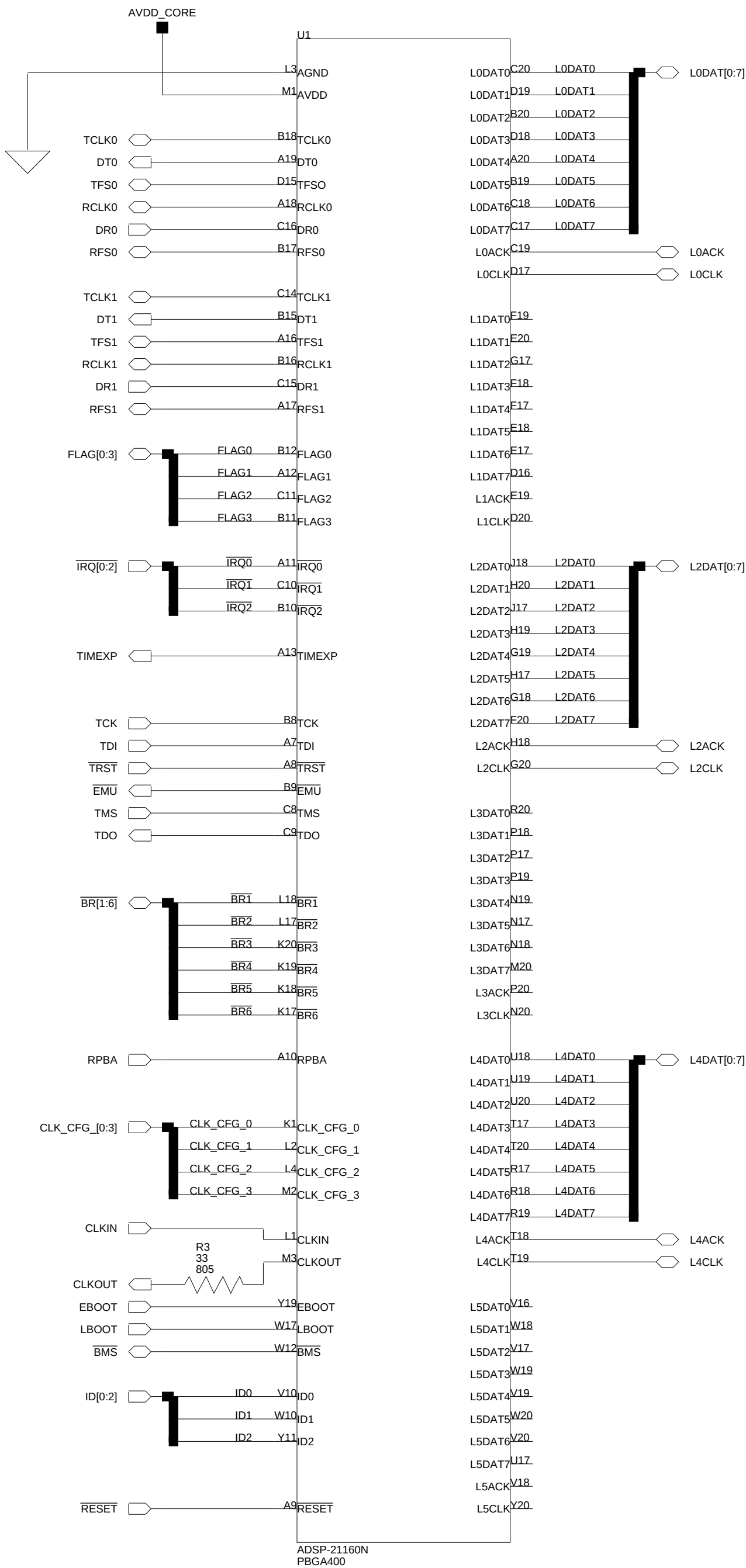
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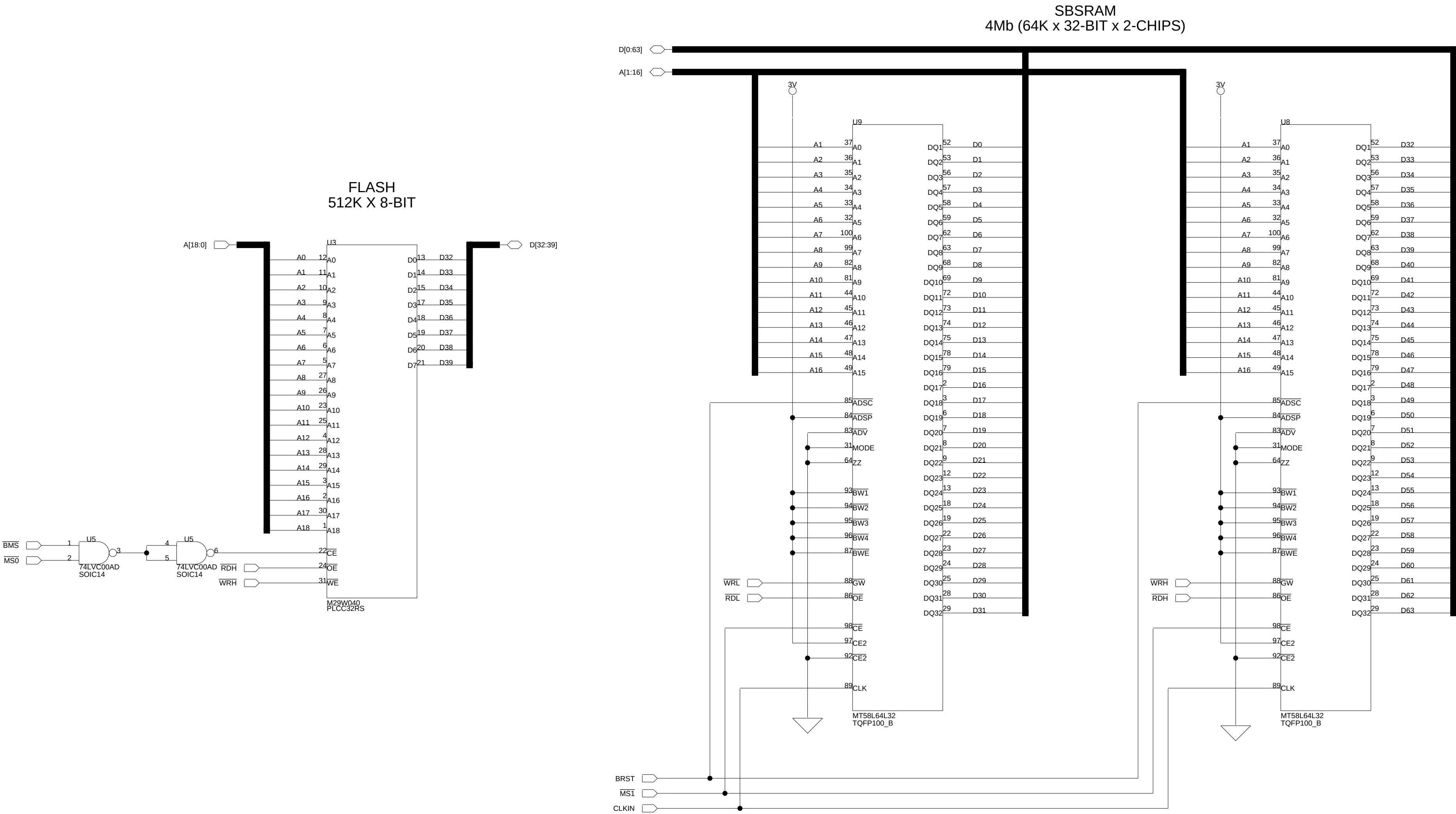
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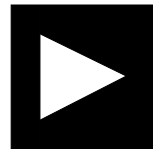
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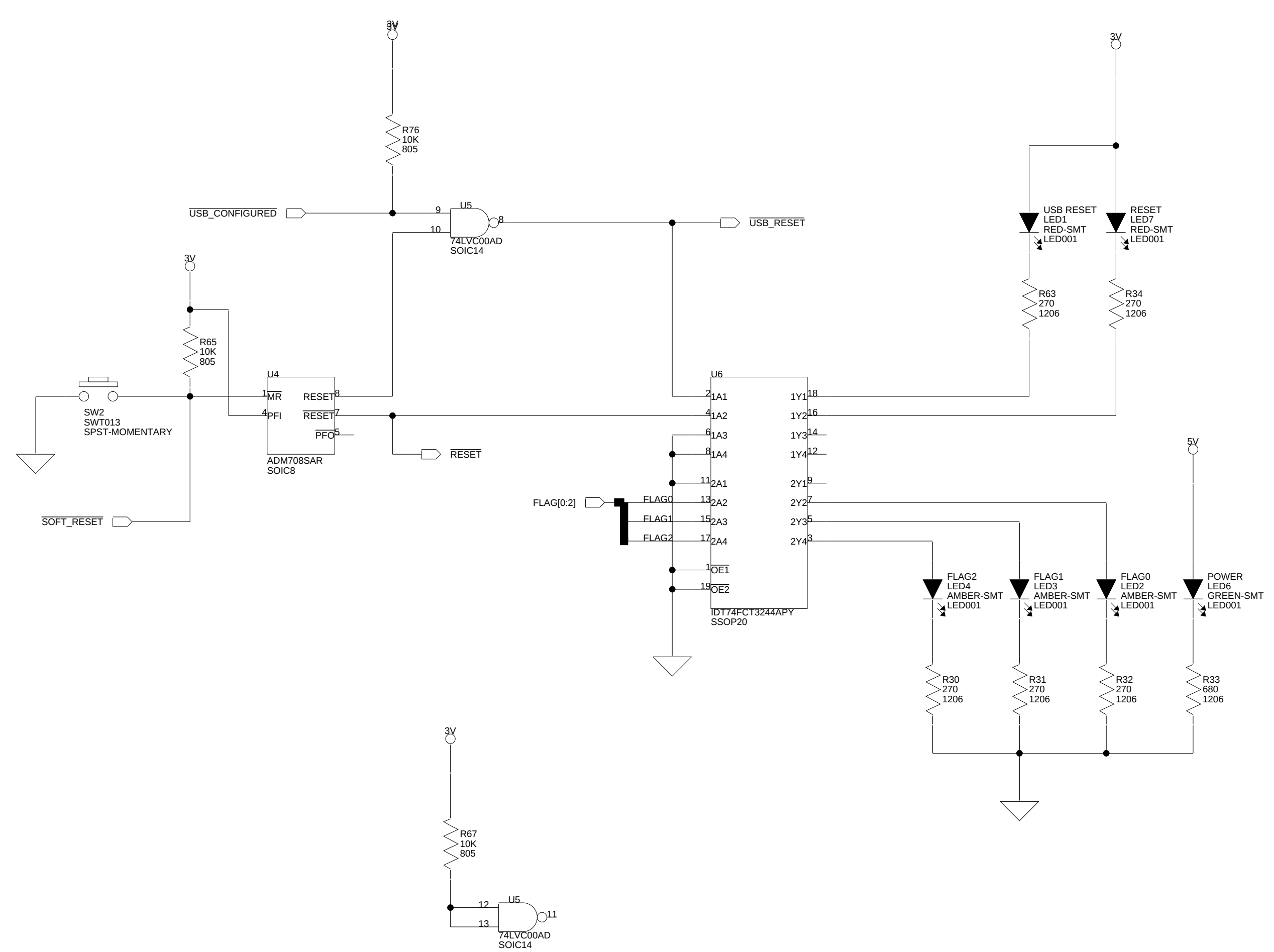
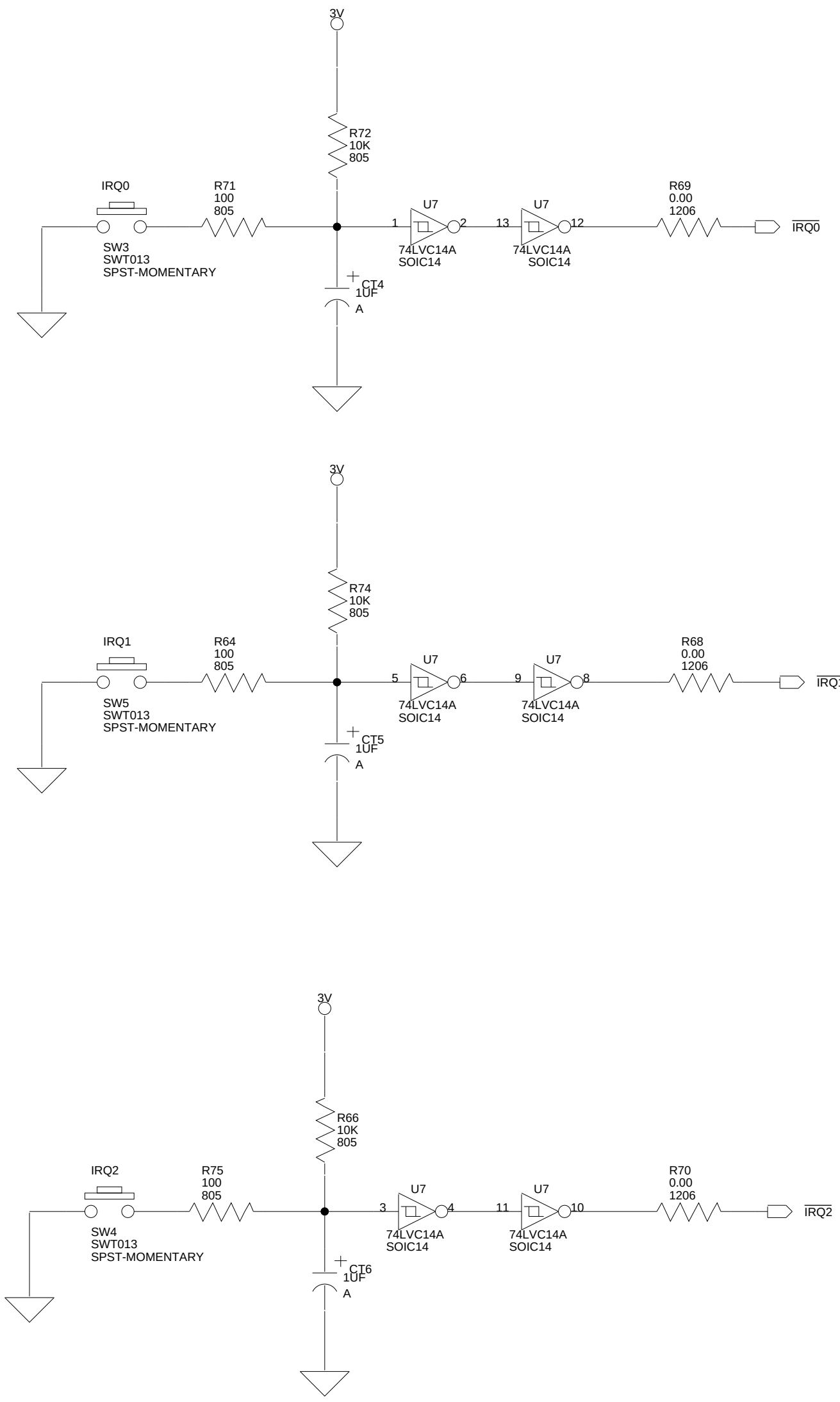
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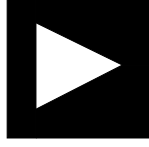


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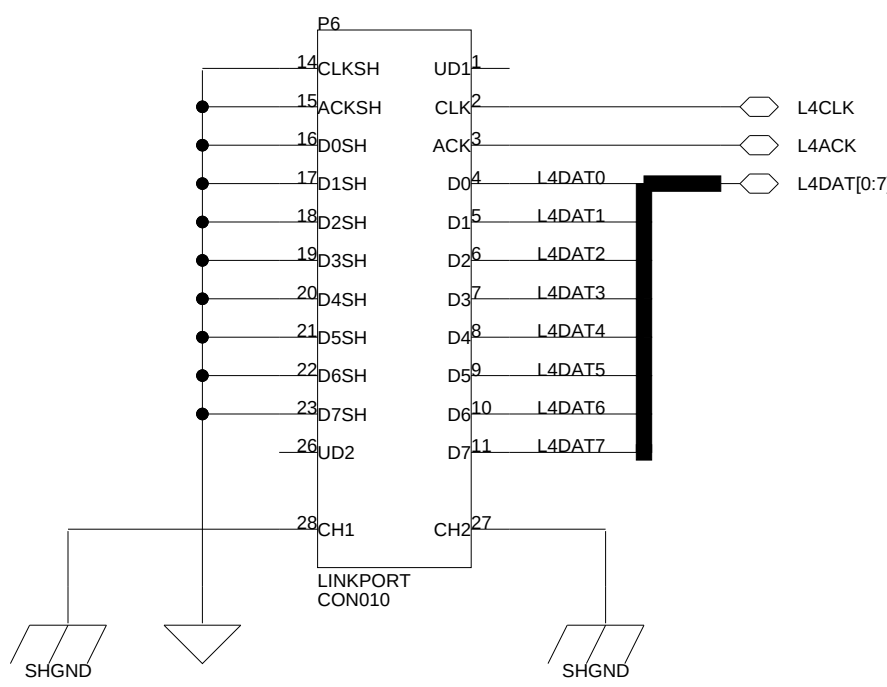
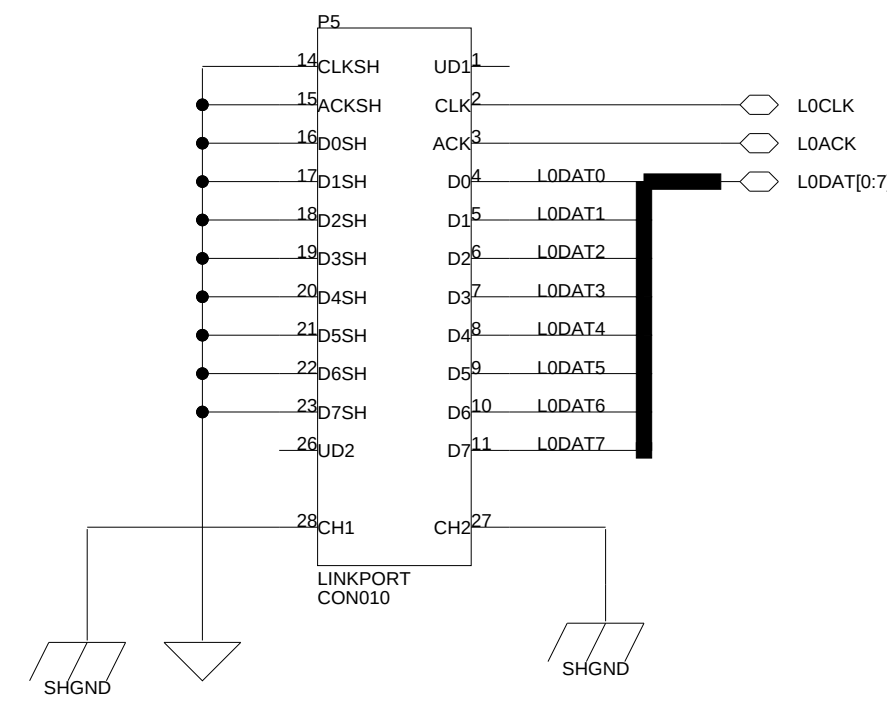
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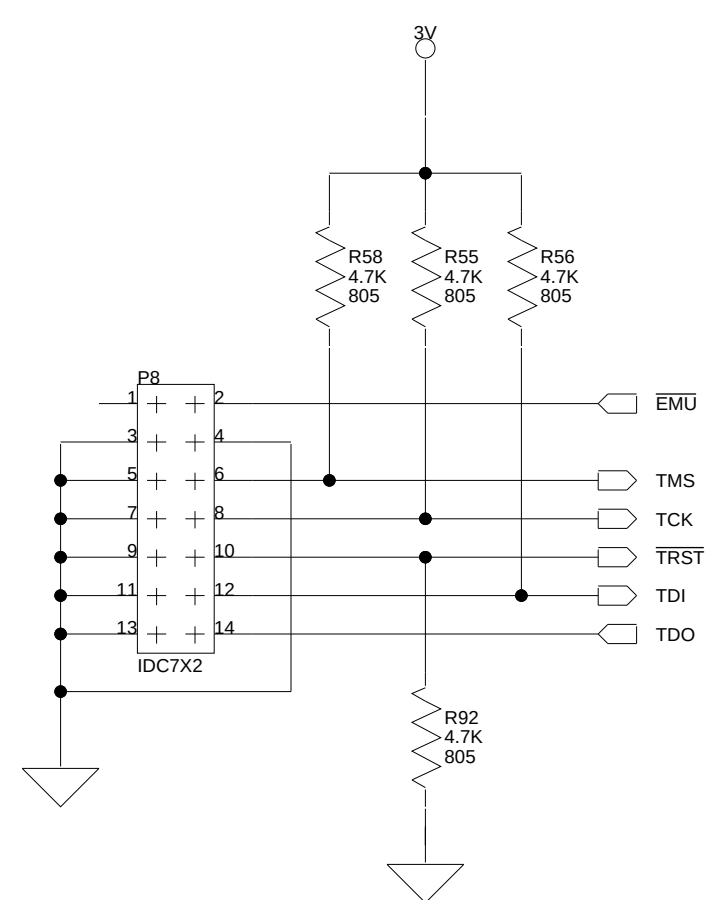
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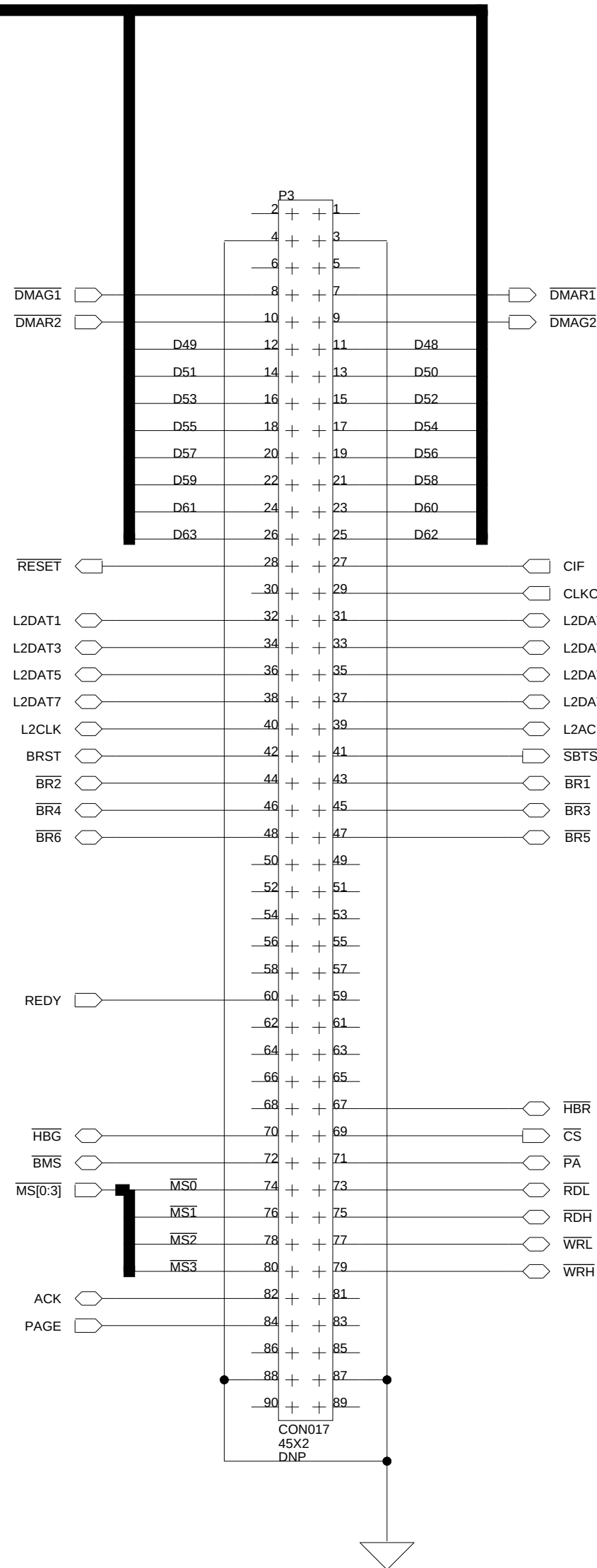
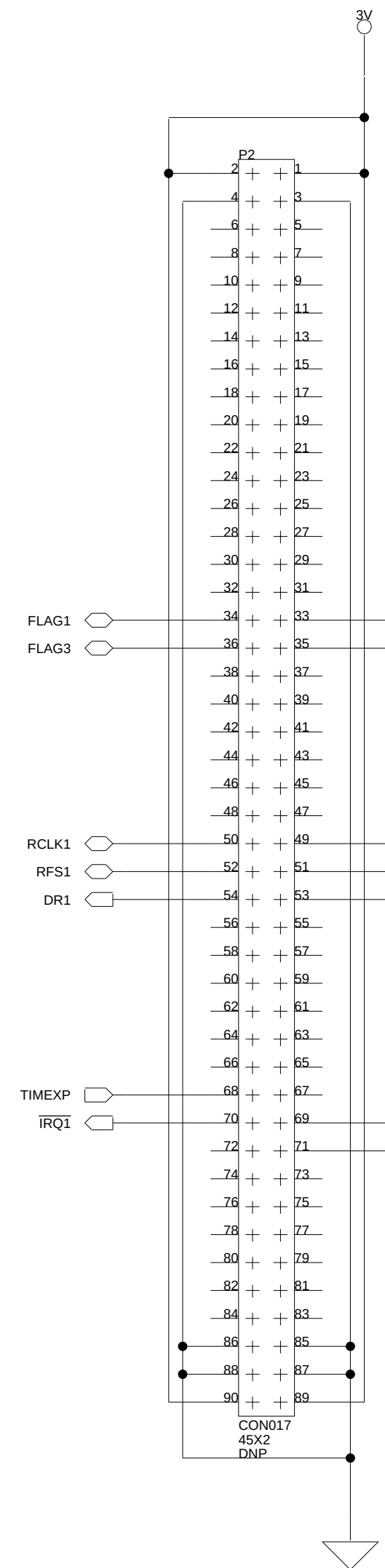
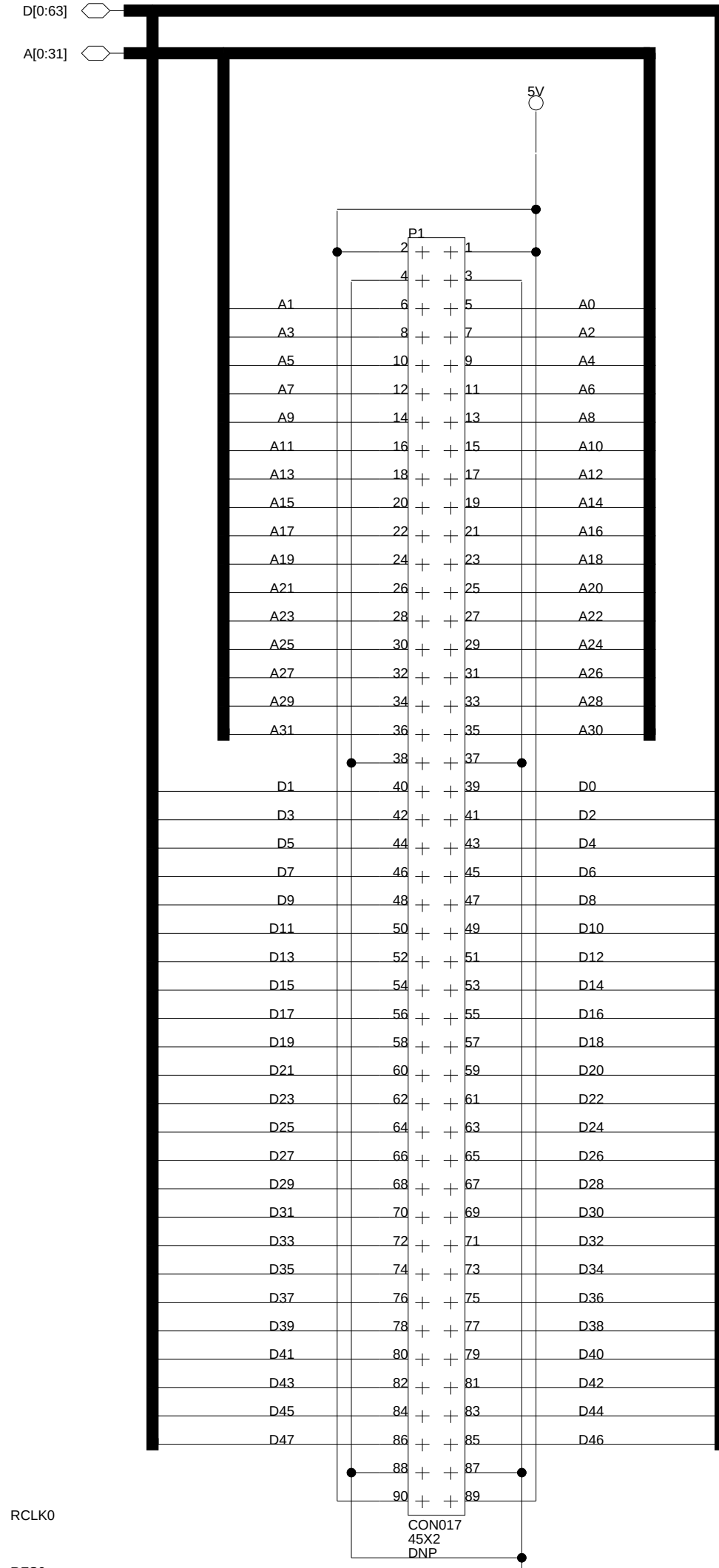
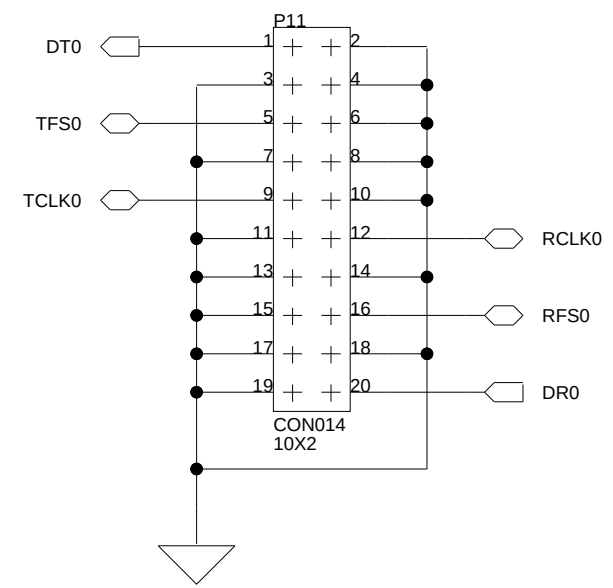
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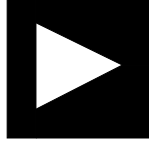


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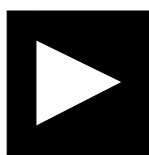
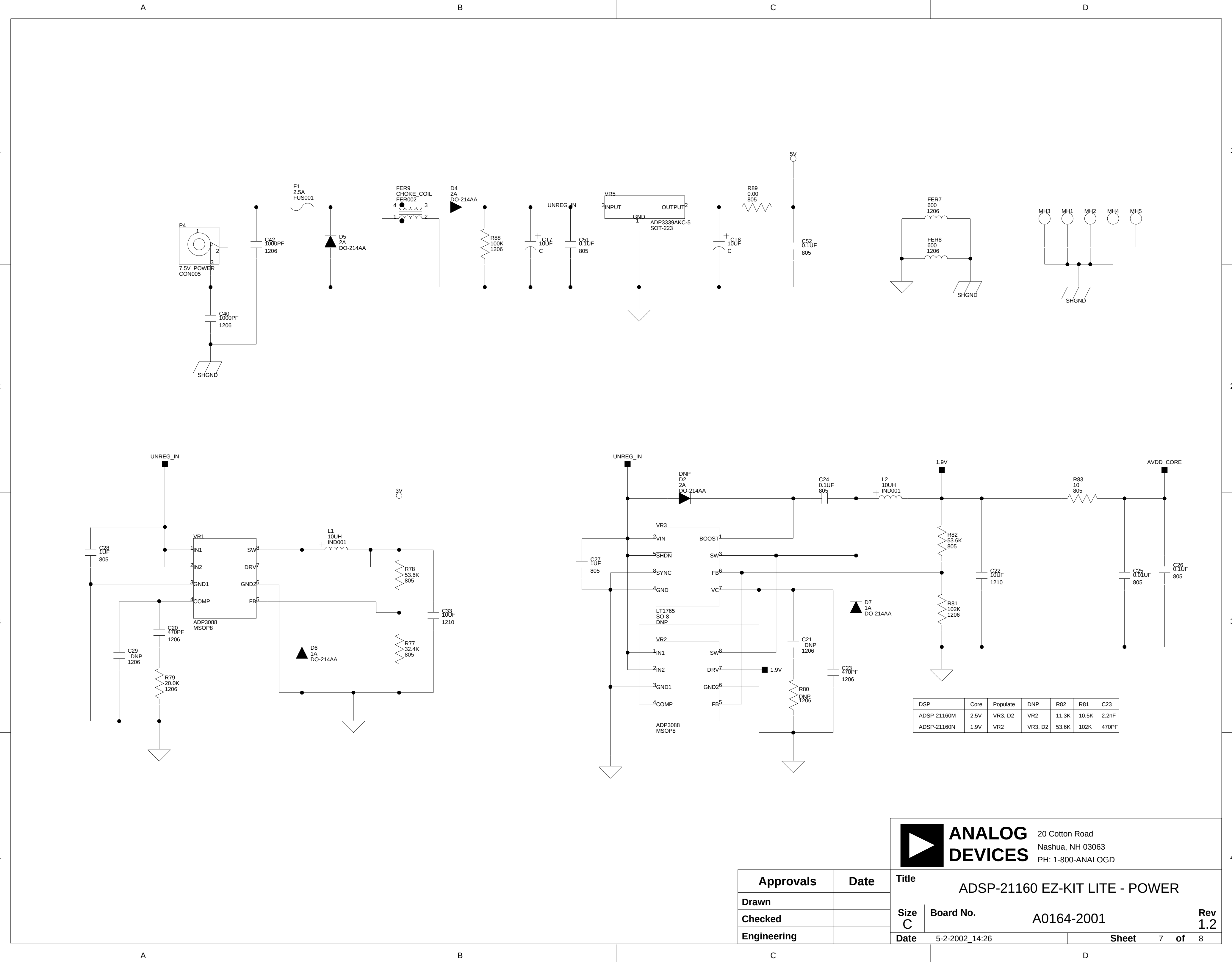


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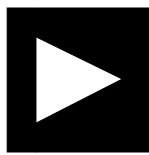
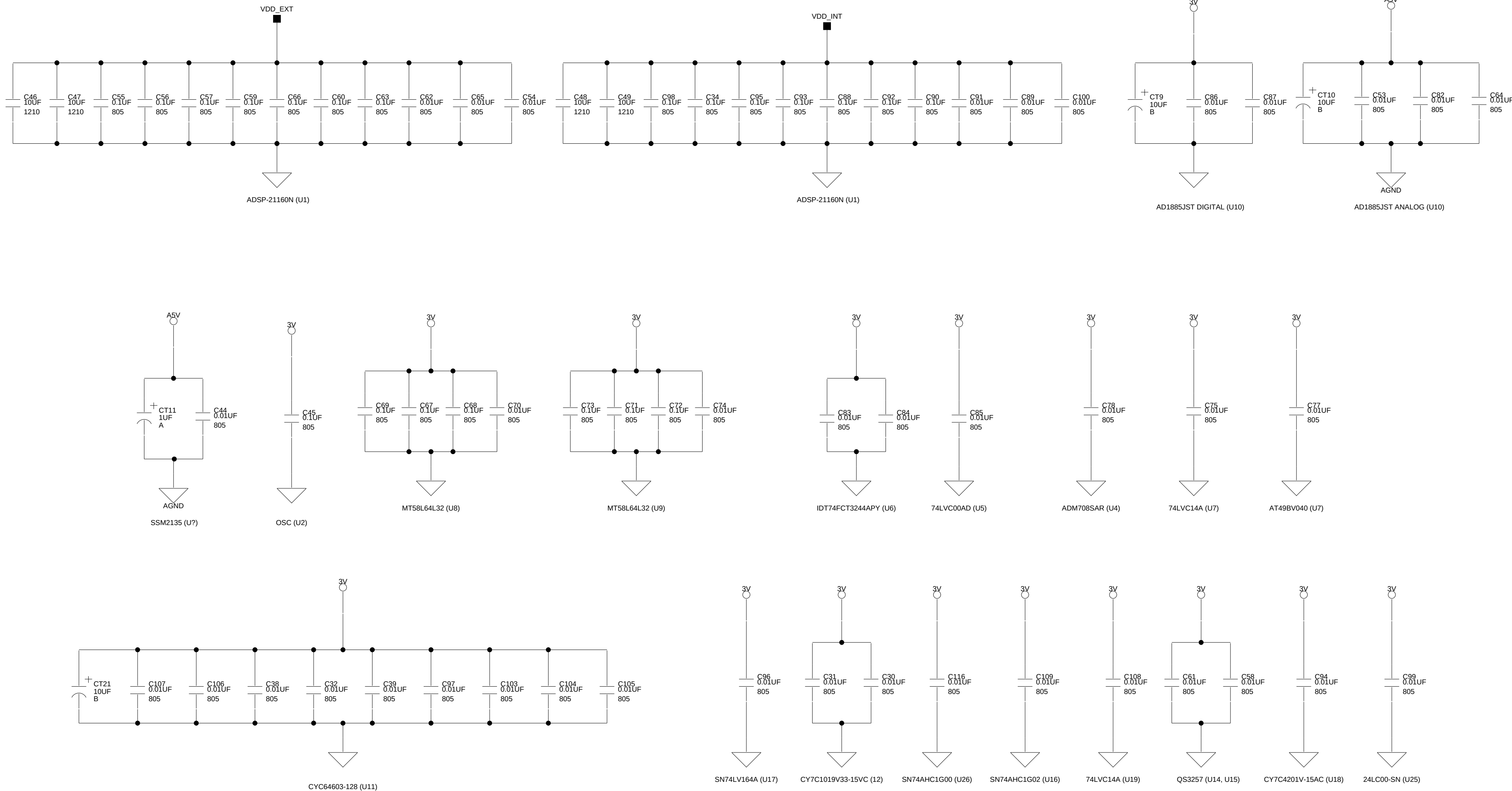


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