

# **Blackfin® A-V EZ-Extender® Manual**

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## Regulatory Compliance

The Blackfin A-V EZ-Extender is designed to be used solely in a laboratory environment. The board is not intended for use as a consumer end product or as a portion of a consumer end product. The board is an open system design which does not include a shielded enclosure and therefore may cause interference to other electrical devices in close proximity. This board should not be used in or near any medical equipment or RF devices.

The Blackfin A-V EZ-Extender has been certified to comply with the essential requirements of the European EMC directive 2004/108/EC and therefore carries the “CE” mark.

The Blackfin A-V EZ-Extender has been appended to Analog Devices, Inc. EMC Technical File (EMC TF) referenced **DSPTOOLS1**, issue 2 dated June 4, 2008 and was declared CE compliant by an appointed Notified Body (No.0673) as listed below.

Notified Body Statement of Compliance: Z600ANA1.023 dated December 2, 2004.



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





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# PREFACE

Thank you for purchasing the Blackfin<sup>®</sup> A-V EZ-Extender<sup>®</sup>, Analog Devices, Inc. daughter board to the EZ-KIT Lite<sup>®</sup> evaluation system for the ADSP-BF533, ADSP-BF537, and ADSP-BF561 Blackfin processors.

Blackfin processors are embedded processors that support a Media Instruction Set Computing (MISC) architecture. This architecture is the natural merging of RISC, media functions, and digital signal processing characteristics towards delivering signal processing performance in a microprocessor-like environment.

EZ-KIT Lites and A-V EZ-Extenders are designed to be used in conjunction with the CrossCore<sup>®</sup> Embedded Studio (CCES) and VisualDSP++<sup>®</sup> software development environments. The development environment facilitates advanced application code development and debug, such as:

- Create, compile, assemble, and link application programs written in C++, C, and A-V EZ-Extender assembly
- Load, run, step, halt, and set breakpoints in application programs
- Read and write data and program memory
- Read and write core and peripheral registers
- Plot memory

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

# Product Overview

The Blackfin A-V EZ-Extender is a separately sold daughter board that plugs onto the expansion interface of the ADSP-BF533, ADSP-BF537, or ADSP-BF561 EZ-KIT Lite evaluation system. The extender board aids the design and prototyping phases of the ADSP-BF533, ADSP-BF537, or ADSP-BF561 processor targeted applications.

The board extends the evaluation system capabilities by providing a connection to a video decoder; video encoder; multiple camera evaluation boards; flat panel display; and 3-stereo input channel, 2-stereo output channel audio codec.

Please visit [www.analog.com/EX1-AV](http://www.analog.com/EX1-AV) for additional information, including CCES support.

The board features:

- Analog audio interface
  - AD1836A Analog Devices 96 kHz audio codec
  - Five 3.5 mm audio jacks, stacked in one connector
- Analog video interface
  - ADV7183B video decoder with three input RCA phono jacks
  - ADV7179 video encoder with three output RCA phono jacks
- OmniVision camera module interface
  - Connection to OmniVision camera evaluation modules; for example, OV6630AA (this part is no longer available)
  - 32-pin, right-angle, 0.1 in. spacing, female socket

- Micron camera module interface
  - Connection to Micron camera evaluation modules; for example, MT9V022 (this part is no longer available)
  - 26-pin, right-angle, 0.1 in. spacing, female socket
- Kodak camera module interface
  - Connection to Kodak camera evaluation modules; for example, KAC-9628 (this part is no longer available)
  - 28-pin, right-angle, 0.1 in. spacing, female socket
- Flat panel display interface (FPDI)
  - Connection to flat panel displays; for example, NL6448BC20-08E
  - DF9B-31S-1V connector

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

Example programs are available to demonstrate the Blackfin A-V EZ-Extender capabilities.

## Purpose of This Manual

The *Blackfin A-V EZ-Extender Manual* provides instructions for installing the product hardware (board). The text describes operation and configuration of the board components and provides guidelines for running your own code on the A-V EZ-Extender. Finally, a schematic and a bill of materials are provided for reference.

# 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 that describe your target architecture. For the locations of these documents, see [“Related Documents”](#).

Programmers who are unfamiliar with CCES or VisualDSP++ should refer to the online help and user’s manuals.

## Manual Contents

The manual consists of:

- Chapter 1, [“A-V EZ-Extender Interfaces”](#) on page 1-1  
Provides basic board information.
- Chapter 2, [“A-V EZ-Extender Hardware Reference”](#) on page 2-1  
Provides information on the hardware aspects of the board.
- Appendix A, [“A-V EZ-Extender Bill of Materials”](#) on page A-1  
Provides a list of components used to manufacture the board.
- Appendix B, [“A-V EZ-Extender Schematic”](#) on page B-1  
Provides the resources to allow EZ-KIT Lite board-level debugging or to use as a reference design. Appendix B is part of the online help.

## What's New in This Manual

This is revision 2.1 of the *Blackfin A-V EZ-Extender Manual*. The manual has been updated to include CCES information. In addition, modifications and corrections based on errata reports against the previous manual revision have been made.

For the latest version of this manual, please refer to the Analog Devices Web site.

## Technical Support

You can reach Analog Devices processors and DSP technical support in the following ways:

- Post your questions in the processors and DSP support community at EngineerZone<sup>®</sup>:  
<http://ez.analog.com/community/dsp>
- Submit your questions to technical support directly at:  
<http://www.analog.com/support>
- E-mail your questions about processors, DSPs, and tools development software from **CrossCore Embedded Studio** or **VisualDSP++**:

Choose **Help > Email Support**. This creates an e-mail to [processor.tools.support@analog.com](mailto:processor.tools.support@analog.com) and automatically attaches your **CrossCore Embedded Studio** or **VisualDSP++** version information and `license.dat` file.

- E-mail your questions about processors and processor applications to:  
[processor.support@analog.com](mailto:processor.support@analog.com) or  
[processor.china@analog.com](mailto:processor.china@analog.com) (Greater China support)

## Supported Processors

- In the **USA only**, call 1-800-ANALOGD (1-800-262-5643)
- Contact your Analog Devices sales office or authorized distributor.  
Locate one at:  
[www.analog.com/adi-sales](http://www.analog.com/adi-sales)
- Send questions by mail to:  
Processors and DSP Technical Support  
Analog Devices, Inc.  
Three Technology Way  
P.O. Box 9106  
Norwood, MA 02062-9106  
USA

## Supported Processors

This extender board supports Analog Devices ADSP-BF533, ADSP-BF537, and ADSP-BF561 Blackfin embedded processors.

## Product Information

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

## Analog Devices Web Site

The Analog Devices Web site, [www.analog.com](http://www.analog.com), provides information about a broad range of products—analog integrated circuits, amplifiers, converters, and digital signal processors.

To access a complete technical library for each processor family, go to [http://www.analog.com/processors/technical\\_library](http://www.analog.com/processors/technical_library). The manuals selection opens a list of current manuals related to the product as well as a

link to the previous revisions of the manuals. When locating your manual title, note a possible errata check mark next to the title that leads to the current correction report against the manual.

Also note, [MyAnalog](#) is a free feature of the Analog Devices Web site that allows customization of a Web page to display only the latest information about products you are interested in. You can choose to receive weekly e-mail notifications containing updates to the Web pages that meet your interests, including documentation errata against all manuals. [MyAnalog](#) provides access to books, application notes, data sheets, code examples, and more.

Visit [MyAnalog](#) to sign up. If you are a registered user, just log on. Your user name is your e-mail address.

## EngineerZone

EngineerZone is a technical support forum from Analog Devices. It allows you direct access to ADI technical support engineers. You can search FAQs and technical information to get quick answers to your embedded processing and DSP design questions.

Use EngineerZone to connect with other DSP developers who face similar design challenges. You can also use this open forum to share knowledge and collaborate with the ADI support team and your peers. Visit <http://ez.analog.com> to sign up.

# Related Documents

For additional information about the product, refer to the following publications.

Table 1. Related Processor Publications

| Title                                                                                                                                                                                                                                                                                                       | Description                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• <i>ADSP-BF531/ADSP-BF532/ADSP-BF533 Blackfin Embedded Processor Data Sheet</i></li><li>• <i>ADSP-BF534/ADSP-BF536/ADSP-BF537 Blackfin Embedded Processor Data Sheet</i></li><li>• <i>ADSP-BF561 Blackfin Embedded Symmetric Multiprocessor Data Sheet</i></li></ul> | General functional description, pinout, and timing of the processor           |
| <ul style="list-style-type: none"><li>• <i>ADSP-BF533 Blackfin Processor Hardware Reference</i></li><li>• <i>ADSP-BF537 Blackfin Processor Hardware Reference</i></li><li>• <i>ADSP-BF561 Blackfin Processor Hardware Reference</i></li></ul>                                                               | Description of the internal processor architecture and all register functions |
| <i>Blackfin Processor Programming Reference</i>                                                                                                                                                                                                                                                             | Description of all allowed processor assembly instructions                    |

# 1 A-V EZ-EXTENDER INTERFACES

This chapter provides a setup procedure for the Blackfin A-V EZ-Extender and EZ-KIT Lite (ADSP-BF533, ADSP-BF537, or ADSP-BF561). The chapter also describes each evaluation interface the extender supports.

The information is presented in the following order.

- [“A-V EZ-Extender Setup” on page 1-2](#)
- [“Analog Audio Interface” on page 1-3](#)
- [“Analog Video Interface” on page 1-4](#)
- [“Camera Module Interfaces” on page 1-4](#)
- [“Flat Panel Display Interface” on page 1-6](#)
- [“Example Programs” on page 1-7](#)

# A-V EZ-Extender Setup

It is very important to set up all components of the system containing the Blackfin A-V EZ-Extender, then apply power to the system.

Power your system after these steps are completed:

1. Read the applicable design interface section in this chapter—the text provides an overview of the interface capabilities.
2. Read [“System Architecture” on page 2-2](#) to understand the physical connections of the extender board. For more detailed information, refer to [“A-V EZ-Extender Schematic” on page B-1](#).
3. Set the jumpers on the extender board. Use the block diagram in [Figure 2-1 on page 2-3](#) in conjunction with [“Jumpers” on page 2-7](#).
4. Set the switches and jumpers on the EZ-KIT Lite board. If not already, familiarize yourself with the documentation and schematic drawing of the EZ-KIT Lite (see [“Related Documents”](#)). Compare the expansion interface signals of the extender with the EZ-KIT Lite signals to ensure there is no contention. For example, it may be necessary to disable other devices connected to the parallel peripheral interface (PPI) of the processor, change the routing of the PPI clocks, and disable the push buttons.
5. Configure any other interfacing boards; for example, another EZ-Extender or a camera evaluation board.

## Analog Audio Interface

The Blackfin A-V EZ-Extender supports audio applications with the on-board AD1836A multichannel 96 kHz audio codec. The AD1836A codec is a high-performance single-chip device that provides three stereo digital-to-analog converters (outputs) and two stereo analog-to-digital converters (inputs), using Analog Devices patented multibit sigma-delta architecture. The board includes a serial peripheral interface (SPI) port, enabling the processor to adjust volume and other parameters. For a general overview of the audio interface connections, see [Figure 2-1 on page 2-3](#); for details, see [“A-V EZ-Extender Schematic” on page B-1](#).

SPORT0 of the expansion interface connects to the serial port of the AD1836A codec. The processor is capable of transferring data to the audio codec in time-division multiplexed (TDM) mode or I<sup>2</sup>S mode. In I<sup>2</sup>S mode, the codec can operate at a 96 kHz sample rate and allows two channels of output. In TDM mode, the codec can operate at a maximum of 48 kHz sample rate and allows simultaneous use of all input and output channels. To operate in I<sup>2</sup>S mode, install the JP7.1/2 jumper. For more information, see [“I2S Enable Jumper \(JP7.1/2\)” on page 2-13](#).

Internal registers of the AD1836A audio codec can be programmed via the SPI port of the processor. (For information on how to program the configuration registers, refer to the AD1836A data sheet.) The AD1836A codec reset comes from a flag pin located at PPI1\_D11 of the expansion interface or from the reset signal on the EZ-KIT Lite. For information on how to configure the reset, see [“AV\\_RESET Source Jumper \(JP9.1/3/5\)” on page 2-14](#).

Before using the interface, follow the procedure in [“A-V EZ-Extender Setup” on page 1-2](#).

For more information about the codec, go to [www.analog.com/AD1836A](http://www.analog.com/AD1836A).

# Analog Video Interface

The Blackfin A-V EZ-Extender supports video input and output applications with an on-board video encoder and decoder. The ADV7179 video encoder provides up to three output channels of analog video, while the ADV7183B video decoder provides up to three input channels of analog video. Both the encoder and decoder connect to PPI0 of the expansion interface, while the encoder also can connect to PPI1 (if the processor has two PPI ports). For a general overview of the analog video interface connectors, see [Figure 2-1 on page 2-3](#); for details, see “[AV\\_RESET Source Jumper \(JP9.1/3/5\)](#)” on page 2-14.

To use ADV7179 and ADV7183B, set up all of the jumpers related to the PPI data signals, frame sync signals, and clock signal. To program the internal register of video devices, configure the 2-wire interface signals (see “[TWI Source Selection Jumpers \(JP3.3/5/7, JP3.4/6/8\)](#)” on page 2-8). Finally, determine the source of encoder or decoder reset, as described in “[AV\\_RESET Source Jumper \(JP9.1/3/5\)](#)” on page 2-14.

Before using the interface, follow the procedure in “[A-V EZ-Extender Setup](#)” on page 1-2.

For more information about ADV7179 and ADV7183B, go to [www.analog.com/ADV7179](http://www.analog.com/ADV7179) and [www.analog.com/ADV7183B](http://www.analog.com/ADV7183B).

## Camera Module Interfaces

The Blackfin A-V EZ-Extender has three right-angle connectors (J4, J6, and P4) with control signals necessary to interface with three camera evaluation modules from different manufactures. For a general overview of the camera interface connections, see [Figure 2-1 on page 2-3](#); for details, see “[A-V EZ-Extender Schematic](#)” on page B-1. [Figure 1-1](#) shows the orientation of the camera modules as each camera connects to the board.

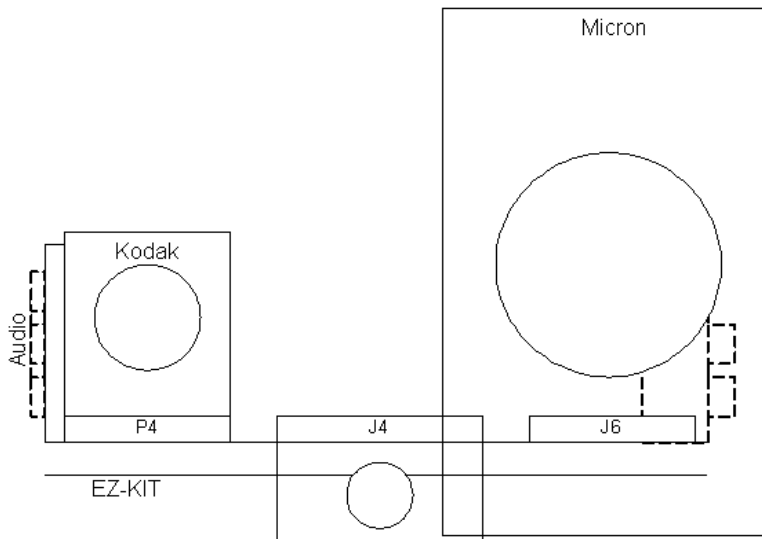


Figure 1-1. Camera Orientation

J6 is a connector designated for a Micron camera sensor evaluation module. The interface has been tested with the Micron MT9V022 camera. For information about Micron camera sensors and evaluation boards, go to <http://www.micron.com>.

J4 is a connector designated for an OmniVision camera sensor evaluation module. The interface has been tested with the OmniVision OV6630AA camera. For information about OmniVision camera sensors and evaluation boards, go to <http://www.ovt.com>.

P4 is a connector designated for a Kodak camera sensor evaluation module. The interface has been tested with the Kodak KAC-9628 camera. For information about Kodak camera sensors and evaluation boards, go to <http://www.kodak.com>.

To connect the Blackfin A-V EZ-Extender to a camera module, first determine the source of the PPI clock. To learn about possible clock settings, refer to “PPI Clock Setup Jumpers (JP4.1/2, JP4.3/4, JP4.5/6,

## Flat Panel Display Interface

JP4.7/8)” on page 2-11. Then set the direction of the data and frame sync signals, which depend on the camera’s configuration. The data must be set as input to the PPI port; refer to “System Architecture” on page 2-2 and “Jumpers” on page 2-7 for details.

Before using the camera interfaces, follow the procedure in “A-V EZ-Extender Setup” on page 1-2.

## Flat Panel Display Interface

The flat panel display interface (FPDI) consists of a 31-pin DB9 connector linked to the PPI port and frame sync signals of the processor. For a general overview of the display interface connections, see [Figure 2-1 on page 2-3](#); for details, see the “A-V EZ-Extender Schematic” on page B-1.

A timing and functional analysis is required to determine whether a specific LCD module can connect to the Blackfin A-V EZ-Extender. An example of display that can connect to the extender is the NEC NL6448BC20-08 display.

 The power for the backlight feature of the LCD module must be provided by the customer (use the backlight inverter recommended by the manufacturer). In addition, it is necessary to purchase a cable to connect the Blackfin A-V EZ-Extender to the display; for example, FDC31/xxxxAFF03 from Axon Cable ([www.axon-cable.com](http://www.axon-cable.com), part number FDC31/xxxxAFF03). Different length cables are available.

Before using the interface, follow the procedure in “A-V EZ-Extender Setup” on page 1-2.

# Example Programs

Example programs are provided with the A-V EZ-Extender EZ-KIT Lite to demonstrate various capabilities of the product. The programs are included in the product installation kit and can be found in the `Examples` folder of the installation. Refer to a readme file provided with each example for more information.

CCES users are encouraged to use the example browser to find examples included with the EZ-KIT Lite Board Support Package.

## Example Programs

# 2 A-V EZ-EXTENDER

## HARDWARE REFERENCE

This chapter describes the hardware design of the Blackfin A-V EZ-Extender.

The following topics are covered.

- [“System Architecture” on page 2-2](#)  
Describes the extender board configuration and explains how the board components interface with the processor and EZ-KIT Lite.
- [“Jumpers” on page 2-7](#)  
Describes the configuration jumpers.

# System Architecture

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

Not shown in the diagram is the analog audio interface, which is a simple connection between the serial port of the processor and AD1836A audio codec. The audio interface connects directly to `SPORT0` of the expansion interface.

In [Figure 2-1](#), unidirectional buffers are shown as triangle symbols, while bidirectional buffers are shown as two overlapping triangles. For both types of buffers, an output-enable signal comes out of the top and is active `LOW`. For bidirectional buffers, a second signal for the direction is shown. When this net is pulled `HIGH`, the buffer is driving in the direction of the arrow in the center; when `LOW`, the buffer is driving in the opposite direction.

 Before applying power to the system, follow the procedure in “[A-V EZ-Extender Setup](#)” on page 1-2.

The video interface can be split into two main signal sets: `VID_IN` and `VID_OUT`. Both signal sets consist of a 16-bit data bus, two frame sync signals, and a data clock. `VID_IN` connects to the video decoder and all camera interfaces. `VID_IN` connects only to the `PPIO` of the EZ-KIT Lite. `VID_OUT` connects to the video encoder and flat panel display interface. On the expansion interface, `VID_OUT` connects to either `PPIO` or `PPI1` of the EZ-KIT Lite.

# A-V EZ-Extender Hardware Reference

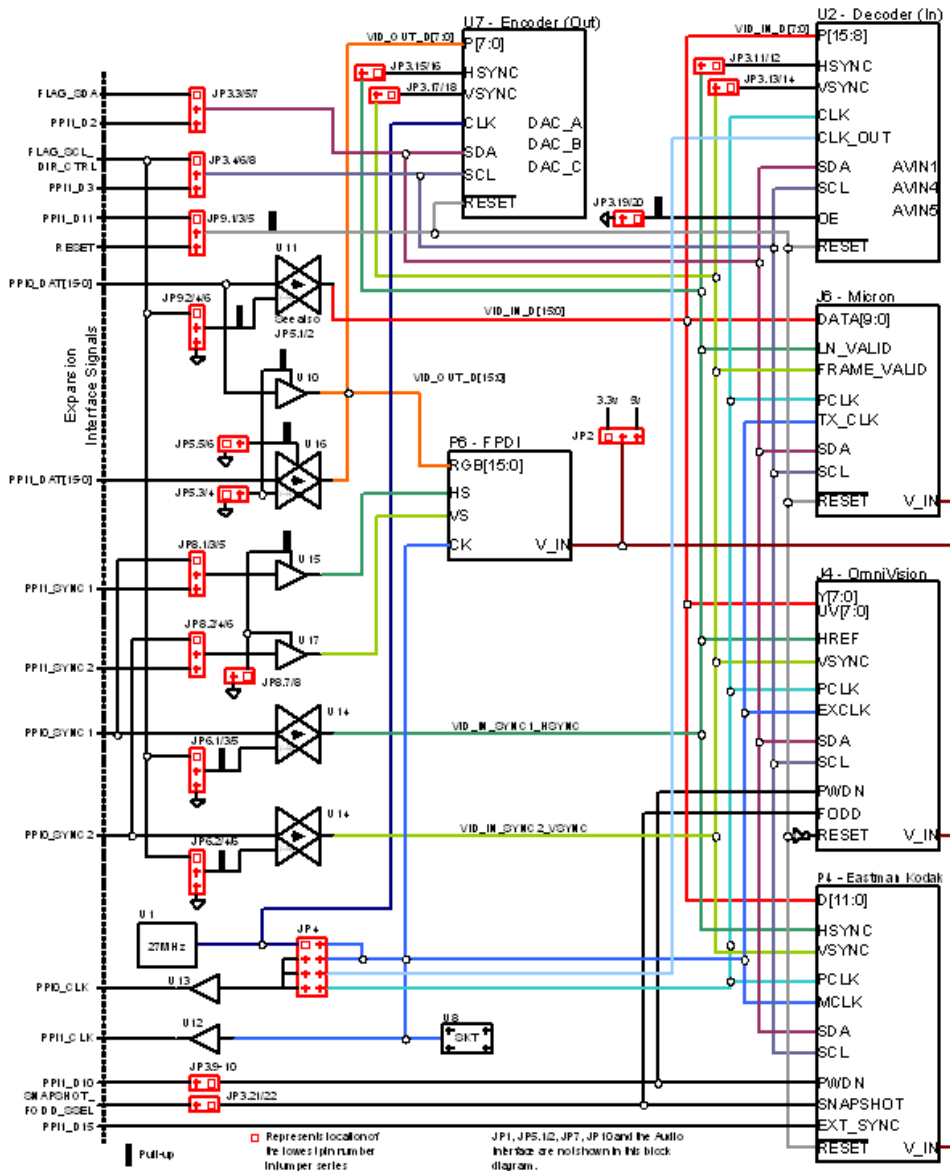


Figure 2-1. A-V EZ-Extender Block Diagram

Table 2-1 summarizes the signals coming and going on the expansion interface connectors.

Table 2-1. Signals of Expansion Interface Connectors

| Net/Bus Name<br>(Direction) | Blackfin A-V EZ-Extender Function                                                                                                                                                                                                                                                                                                                                                             | Relevant<br>Configuration<br>Jumpers                        |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| PPIO_D[0:15]<br>(Bi)        | Connects the processor's PPIO data pins to the VID_IN_D[0:15] or VID_OUT_D[0:15] buses, depending on the jumper settings. This allows PPIO to interface with all video interfaces on the board. The bus can be bidirectional, where the direction is fixed with a jumper or controlled by a flag pin.                                                                                         | JP5.3/4,<br>JP9.2/4/6                                       |
| PPIO_CLK<br>(Output)        | The clock related to the data on PPIO. This can come from an on-board oscillator, one of the video interfaces, or a socket that allows a user-supplied oscillator.                                                                                                                                                                                                                            | JP4.1/2,<br>JP4.3/4,<br>JP4.5/6,<br>JP4.7/8                 |
| PPIO_SYNC1<br>(Bi)          | The frame sync signal going to the processor's PPIO_SYNC1 pin. The signal behaves as HSYNC or HREF for the video interfaces. The signal also can be used to drive the FPDI's HS signal. The signal can be bidirectional, where the direction is fixed with a jumper or controlled by a flag pin.                                                                                              | JP6.1/3/5,<br>JP8.1/3/5,<br>JP8.7/8                         |
| PPIO_SYNC2<br>(Bi)          | The frame sync signal going to the processor's PPIO_SYNC2 pin. The signal behaves as VSYNC or VREF for the video interfaces. In addition, the signal can drive the FPDI's VS signal. The signal can be bidirectional, where the direction is fixed with a jumper or controlled by a flag pin.                                                                                                 | JP6.2/4/6,<br>JP8.2/4/6,<br>JP8.7/8                         |
| PPI1_D[0:15]<br>(Bi)        | Connects the processor's PPI1 data pins to the VID_OUT_D[0:15] bus. The VID_OUT_D[0:15] bus interfaces with the output video interfaces (FPDI and video encoder). The bus can be bidirectional but intended to be an input. Changing the direction is necessary only for test purposes and allows PPIO to loop-back to PPI1. Note: D2, D3, and D10 of the bus have other functions (follows). | JP5.3/4,<br>JP5.5/6,<br>JP3.9/10,<br>JP3.3/5/7<br>JP3.4/6/8 |

Table 2-1. Signals of Expansion Interface Connectors (Cont'd)

| Net/Bus Name<br>(Direction)   | Blackfin A-V EZ-Extender Function                                                                                                                                                                                                   | Relevant<br>Configuration<br>Jumpers        |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| PPI1_D10<br>(Bi)              | The multifunction net that typically functions as the D10 pin of PPI1 but, with a jumper, also can connect to the PDWN input of the OmniVision and Kodak camera interfaces.                                                         | JP3.9/10,<br>JP5.3/4,<br>JP5.5/6            |
| PPI1_D2<br>(Bi)               | The multifunction net typically functions as the D2 pin of PPI1 but also can function as the data signal for the processor's 2-wire interface (TWI). Used to program the internal configuration registers of most video interfaces. | JP3.3/5/7,<br>JP5.3/4,<br>JP5.5/6           |
| PPI1_D3<br>(Bi)               | The multifunction net typically functions as the D2 pin of PPI1 but also can function as the data signal for the processor's TWI. Used to program the internal configuration registers of most video interfaces.                    | JP3.4/6/8,<br>JP5.3/4,<br>JP5.5/6           |
| FLAG_SDA<br>(Bi)              | In systems whose processor does not have a TWI, the signal connects to one of the processor's flag pins to emulate the TWI data pin and configure the internal registers of most video interfaces.                                  | JP3.3/5/7                                   |
| FLAG_SCL_DIR_ CTRL<br>(Input) | In systems whose processor does not have a TWI, the signal connects to one of the processor's flag pins to emulate the TWI clock signal and configure the internal registers of most video interfaces.                              | JP3.4/6/8                                   |
| PPI1_CLK<br>(Output)          | The clock driving the EZ-KIT Lite's PPI1 clock input. The source of this clock can be PPI0_CLK, the on-board 27 MHz oscillator, or a socket accepting oscillators of other frequencies.                                             | JP4.1/2,<br>JP4.3/4,<br>JP4.5/6,<br>JP4.7/8 |
| PPI1_FS1<br>(Input)           | The signal driven to the HS signal of the FPDI. The output going to the FPDI can be disabled by a jumper.                                                                                                                           | JP8.1/3/5,<br>JP8.7/8                       |
| PPI1_FS2<br>(Input)           | The signal driven to the VS signal of the FPDI. The output going to the FPDI can be disabled by a jumper.                                                                                                                           | JP8.2/4/6,<br>JP8.7/8                       |
| SNAPSHOT_FODD_ SSEL<br>(Bi)   | The audio codec's SPI slave select signal; also can connect to the SNAPSHOT input of the Kodak interface or the FODD output of the OmniVision interface.                                                                            | JP3.21/22                                   |
| SCK<br>(Input)                | The SPI serial clock used to program the control register of the AD1836A audio codec.                                                                                                                                               |                                             |

Table 2-1. Signals of Expansion Interface Connectors (Cont'd)

| Net/Bus Name<br>(Direction) | Blackfin A-V EZ-Extender Function                                                                                                                                                                       | Relevant<br>Configuration<br>Jumpers |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MOSI<br>(Output)            | The SPI serial output data signal used to program the control register of the AD1836A audio codec.                                                                                                      |                                      |
| MISO<br>(Output)            | The SPI serial input data signal used to read the control register of the AD1836A audio codec.                                                                                                          |                                      |
| RSCLK0<br>(Bi)              | The processor's SPORT0 receive clock signal connected to the serial clock on the digital side of the audio codec's analog input. In I <sup>2</sup> S mode, the signal can connect to the TSCLK0 net.    | JP7.1/2                              |
| RFS0<br>(Bi)                | The processor's SPORT0 receive frame sync signal connected to the frame sync on the digital side of the audio codec's analog input. In I <sup>2</sup> S mode, the signal can connect to the TFS0 net.   | JP7.1/2                              |
| DROPRI<br>(Output)          | A connection to the data output of the audio codec; can be disconnected with a jumper if needed for another purpose.                                                                                    | JP7.3/4                              |
| DROSEC<br>(Output)          | A secondary connection to the data output of the audio codec. Can be disconnected with a jumper if needed for another purpose.                                                                          | JP7.5/6                              |
| TSCLK0<br>(Bi)              | The processor's SPORT0 transmit clock signal, connects to the serial clock on the digital side of the audio codec's analog output. In I <sup>2</sup> S mode, the signal can connect to the RSCLK0 net.  | JP7.1/2                              |
| TFS0<br>(Bi)                | The processor's SPORT0 transmit frame sync signal. Connects to the frame sync on the digital side of the audio codec's analog output. In I <sup>2</sup> S mode, the signal can connect to the RFS0 net. | JP7.1/2                              |
| DTOPRI<br>(Input)           | A connection to the data input of the audio codec.                                                                                                                                                      |                                      |
| DTOSEC<br>(Input)           | A secondary connection to the data input of the audio codec.                                                                                                                                            |                                      |

## Jumpers

Before using the Blackfin A-V EZ-Extender, follow the procedure in “A-V EZ-Extender Setup” on page 1-2.

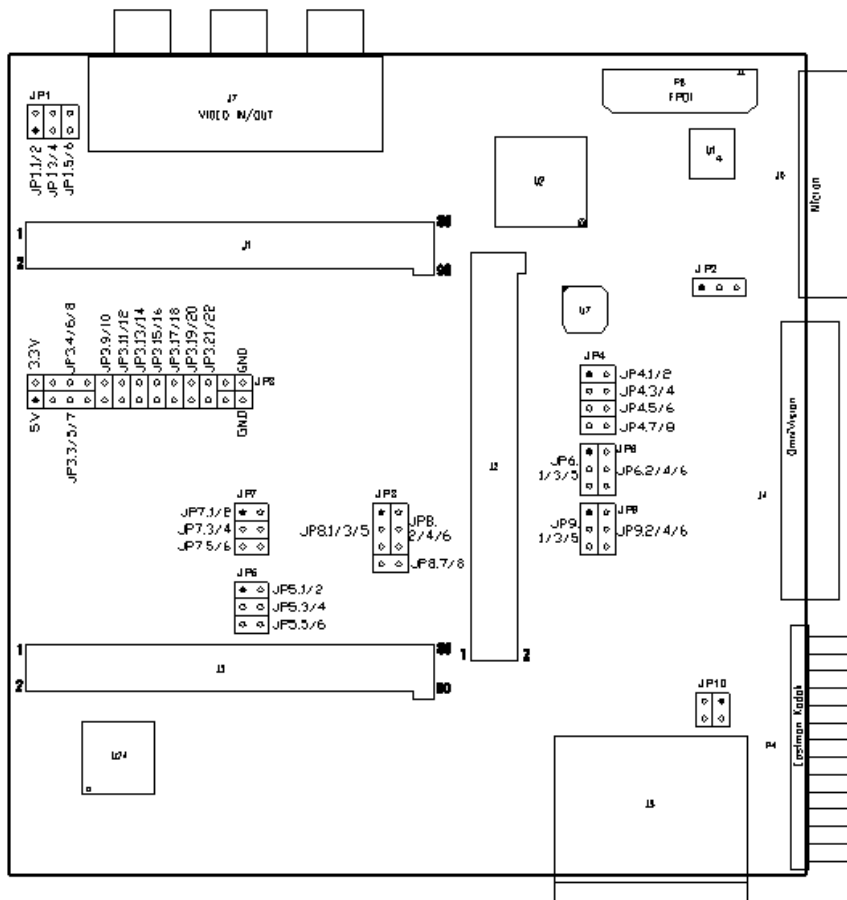


Figure 2-2. Jumper Locations

Figure 2-2 shows the jumper header locations. The jumper headers are divided to show each jumper's placement and rotation. The jumpers are described by the pins of the header on which the jumpers can be placed.

## Jumpers

For example, JP3.4/6/8 refers to a single jumper that can be placed across pins 4 and 6 (or pins 6 and 8) of JP3. The dark pin indicates pin 1 of each header.

### Video Test Loopback Jumpers (JP1.1/2, JP1.3/4, JP1.5/6)

For test purposes only, the video test jumpers loop-back the video encoder's output signals to the video decoder's input signals. By default, none of the video test loopback jumpers are installed.

### Connector Voltage Selection Jumper (JP2)

The camera module and LCD display interfaces can be powered via the extender. The actual voltage of the interfaces, 3.3V or 5V, is determined by the JP2 jumper's placement (see [Table 2-2](#)).

Table 2-2. Jumper Locations and Connector Voltages

| Jumper Location | Connector Voltage |
|-----------------|-------------------|
| JP2.1/2         | 3.3V              |
| JP2.2/3         | 5V                |
| Not installed   | No power          |

### TWI Source Selection Jumpers (JP3.3/5/7, JP3.4/6/8)

Due to the fact that some Blackfin processors feature a built-in 2-wire interface (TWI), while others need to emulate the interface with programmable flags, two jumpers are provided to plug the A-V EZ-Extender to both TWI sources (see [Table 2-3](#)).

Table 2-3. Jumper Locations and TWI Interface Sources

| Jumper Location     | TWI Interface Source              |
|---------------------|-----------------------------------|
| JP3.3/5 and JP3.4/6 | Programmable flags                |
| JP3.5/7 and JP3.6/8 | 2-wire interface of the processor |

## PDWN Connect Jumper (JP3.9/10)

Depending on the application, the PDWN pin of the OmniVision and Kodak cameras can be left floating or controlled by a flag pin (see [Table 2-4](#)).

Table 2-4. PWDN Pin Connections

| JP3.9/10 Jumper | PDWN Connection                                                                     |
|-----------------|-------------------------------------------------------------------------------------|
| Uninstalled     | PDWN is not used and, by default, the cameras function in standard mode             |
| Installed       | The PDWN functionality of the cameras is controlled by a flag pin of the processor. |

## Decoder HSYNC Disconnect Jumper (JP3.11/12)

To connect the horizontal sync signal of the video decoder to the PPI0 frame sync signal of the processor, install jumper JP3.11/12; otherwise, the decoder's horizontal sync is disconnected.

## Decoder VSYNC Connect Jumper (JP3.13/14)

To connect the vertical sync signal of the video decoder to the PPI0 frame sync signal of the processor, install jumper JP3.13/14; otherwise, the decoder's vertical sync is disconnected.

### Encoder HREF Connect Jumper (JP3.15/16)

To connect the horizontal sync signal of the video encoder to the PPI0 frame sync signal of the processor, install jumper JP3.15/16; otherwise, the encoder's horizontal reference is disconnected.

### Encoder VSYNC Connect Jumper (JP3.17/18)

To connect the vertical sync signal of the video encoder to the PPI0 frame sync signal of the processor, install jumper JP3.17/18; otherwise, the encoder's vertical sync is disconnected.

### Decoder Output Enable Jumper (JP3.19/20)

When installed, jumper JP3.19/20 enables the video decoder's data output signals on the VID\_IN bus.

### SNAPSHOT\_FODD Disconnect Jumper (JP3.21/22)

The SNAPSHOT\_FODD net of the Blackfin A-V EZ-Extender is a general-purpose flag pin. The flag pin connects to SNAPSHOT (the Kodak camera evaluation board's signal) and FODD (the OmniVision camera evaluation board's control signal). Do not install the jumper unless the processor needs to control these signals. The flag pin also connects to the SPI select pin of the AD1836A audio codec—do not install JP3.21/22 when using the audio interfaces.

## PPI Clock Setup Jumpers (JP4.1/2, JP4.3/4, JP4.5/6, JP4.7/8)

The PPI\_CLK signals of PPI0 and PPI1 are configured by the clock setup jumpers (see [Table 2-5](#)). For more information, refer to [Figure 2-1 on page 2-4](#).

Table 2-5. PPI Clock Setup Jumper Results

| Jumper Location | Result                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| JP4.1/2         | Connects EXT_VID_CLK to the on-board 27 MHz oscillator. For more information about the EXT_VID_CLK signal, see the JP4.3/4 description.                                                                                                                                                                                                                             |
| JP4.3/4         | Connects PPI0_CLK to the EXT_VID_CLK net. The EXT_VID_CLK net is the external clock, which drives the input clock of all three camera module connectors, plus the flat panel display connector. Depending on the JP4 jumper installation, EXT_VID_CLK can be generated by the PIXEL_CLK net, the VDEC_CLKOUT net, a socket (U8), or the on-board 27 MHz oscillator. |
| JP4.5/6         | Connects VDEC_CLKOUT to PPI0_CLK; VDEC_CLKOUT drives the PPI0 clock when the video decoder is used.                                                                                                                                                                                                                                                                 |
| JP4.7/8         | Connects the PIXEL_CLK net, which is an output from the three camera interfaces, to PPI0_CLK.                                                                                                                                                                                                                                                                       |

## PPI0 D8–15 Enable Jumper (JP5.1/2)

The JP5.1/2 jumper, when is not installed, disables the upper eight bits of the PPI0 data bus. This allows the signals connected to the upper eight bits of the PPI data bus of the EZ-KIT Lite to be used elsewhere on the board.

To disable and re-use the upper eight bits of the VID\_IN and PPI0 data busses, install JP5.1/2.

### VID\_OUT Data Bus Control Jumpers (JP5.3/4, JP5.5/6)

The JP5.3/4 and JP5.5/6 jumpers are used together to set up the direction of and enable/disable the VID\_OUT data bus drivers. [Table 2-6](#) shows different combinations of JP5.3/4 and JP5.5/6.

Table 2-6. Video Out Data Bus Control Jumper Combinations

| JP5.3/4     | JP5.5/6     | VID_OUT Status                                                           |
|-------------|-------------|--------------------------------------------------------------------------|
| Uninstalled | Uninstalled | VID_OUT, PPI1 are all not driven; PPI0 depends on the state of JP9.2/4/6 |
| Uninstalled | Installed   | PPI1 drives VID_OUT                                                      |
| Installed   | Uninstalled | PPI0 drives VID_OUT                                                      |
| Installed   | Installed   | PPI0 drives VID_OUT, and VID_OUT drives PPI1 (loop-back mode)            |

### PPI0\_SYNC1 Direction Setup Jumper (JP6.1/3/5)

The direction of the PPI0\_SYNC1 signal can be either fixed or programmed, depending on the state of a general-purpose flag. [Table 2-7](#) shows how to set up the PPI0\_SYNC1 direction.

Table 2-7. Setting Direction of PPI0\_SYNC1 (JP6.1/3/5)

| Jumper Location | PPI0_SYNC1 Direction      |
|-----------------|---------------------------|
| JP6.1/3         | Controlled by a flag pin  |
| JP6.3/5         | Input to the processor    |
| Uninstalled     | Output from the processor |

## PPIO\_SYNC2 Direction Setup Jumper (JP6.2/4/6)

The direction of the PPIO\_SYNC2 signal can be either fixed or programmed, depending on the state of a general-purpose flag. [Table 2-8](#) shows how to set the PPIO\_SYNC2 direction.

Table 2-8. Setting Direction of PPIO\_SYNC2 (JP6.2/4/6)

| Jumper Location | PPIO_SYNC2 Direction      |
|-----------------|---------------------------|
| JP6.2/4         | Controlled by a flag pin  |
| JP6.4/6         | Input to the processor    |
| Uninstalled     | Output from the processor |

## I<sup>2</sup>S Enable Jumper (JP7.1/2)

When JP7.1/2 is installed, the SPORT signals are routed for I<sup>2</sup>S SPORT communication protocol mode. To accomplish this, the receive and transmit clocks of the processor are driven by the output clock of the AD1836A audio codec. The same is done for the frame sync signals.

## SPORT Data Connect Jumpers (JP7.3/4, JP7.5/6)

The JP7.3/4 and JP7.5/6 jumpers connect data output pins (ASDATA1 and ASDATA2) of the audio codec to the primary and secondary SPORT data input pins of the processor. The audio codec is driving these pins; with the help of the JP7.3/4 and JP7.5/6 jumpers, the processor's pins can be re-used when the codec is disabled.

### VID\_OUT Bus SYNC Source Select Jumpers (JP8.1/3/5, JP8.2/4/6)

The source of the PPI frame sync signals depends on the PPI port driving the VID\_OUT bus. When using PPI0, place the jumpers at JP8.1/3 and JP8.2/4. When using PPI1, place the jumpers at JP8.3/5 and JP8.4/6.

### VID\_OUT Bus SYNC Enable Jumper (JP8.7/8)

To enable the VID\_OUT frame sync signals, install JP8.7/8.

### AV\_RESET Source Jumper (JP9.1/3/5)

The source of ICs reset on the Blackfin A-V EZ-Extender is controlled by either a flag pin or a system reset; the latter also resets the Blackfin processor (see [Table 2-9](#)).

Table 2-9. Jumper Reset Sources

| Jumper Location | Reset Source                       |
|-----------------|------------------------------------|
| JP9.1/3         | Flag pin multiplexed with PPI1_D11 |
| JP9.3/5         | System reset generator             |
| Uninstalled     | ICs are not reset                  |

## PPI0\_D Direction Setup Jumper (JP9.2/4/6)

The direction of the PPI0\_D[15:0] signals can be a fixed direction or can be programmed, depending on the state of a general-purpose flag.

[Table 2-10](#) shows how to set up the PPI0\_D[15:0] direction.

Table 2-10. Setting Direction of PPI0\_D[15:0] (JP9.2/4/6)

| Jumper Location | PPI0_D[15:0] Direction    |
|-----------------|---------------------------|
| JP9.2/4         | Controlled by a flag pin  |
| JP9.4/6         | Input to the processor    |
| Uninstalled     | Output from the processor |

## Audio Loopback Jumpers (JP10.1/2, JP10.3/4)

The JP10.1/2 and JP10.3/4 jumpers loop-back audio input to output for test purposes and should not be installed.

## Jumpers

# A A-V EZ-EXTENDER BILL OF MATERIALS

The bill of materials corresponds to “[A-V EZ-Extender Schematic](#)” on [page B-1](#).

| Ref. | Qty. | Description                  | Reference Designator   | Manufacturer      | Part Number                   |
|------|------|------------------------------|------------------------|-------------------|-------------------------------|
| 1    | 1    | SN74AHC1G00<br>SOT23-5       | U9                     | TI                | SN74AHC1G00DBVR               |
| 2    | 1    | 12.288MHZ<br>OSC003          | U18                    | DIGI-KEY          | SG-8002CA-PCC-ND<br>(12.288M) |
| 3    | 5    | SN74LVC1G125<br>SOT23-5      | U15,U17,U19,U29-<br>30 | TI                | 74LVC1G125DBVRE4              |
| 4    | 1    | 27MHZ OSC003                 | U1                     | DIGI-KEY          | SG-8002CA-PCC-ND<br>(27.00M)  |
| 5    | 1    | SN74LVC1G32<br>SOT23-5       | U6                     | TI                | SN74LVC1G32DBVRE4             |
| 6    | 1    | 74LVTH16244MT<br>D TSSOP48   | U10                    | FAIRCHILD         | 74LVTH16244MTD                |
| 7    | 3    | 74LVTH16245MT<br>D TSSOP48   | U11,U14,U16            | FAIRCHILD         | 74LVTH16245MTD                |
| 8    | 1    | ADP3336ARMZ<br>MSOP8         | VR1                    | ANALOG<br>DEVICES | ADP3336ARMZ-REE               |
| 9    | 1    | 10MA<br>AD1580BRTZ<br>SOT23D | D1                     | ANALOG<br>DEVICES | AD1580BRTZ-REEL7              |
| 10   | 3    | AD8061ARTZ<br>SOT23-5        | U3-5                   | ANALOG<br>DEVICES | AD8061ARTZ-REEL               |

| Ref. | Qty. | Description                | Reference Designator                         | Manufacturer      | Part Number          |
|------|------|----------------------------|----------------------------------------------|-------------------|----------------------|
| 11   | 8    | AD8606ARZ SOIC8            | U20-23,U25-28                                | ANALOG<br>DEVICES | AD8606ARZ            |
| 12   | 1    | AD1836AASZ<br>MQFP52       | U24                                          | ANALOG<br>DEVICES | AD1836AASZ           |
| 13   | 1    | ADV7179KCPZ<br>LFCSP40     | U7                                           | ANALOG<br>DEVICES | ADV7179KCPZ          |
| 14   | 1    | ADV7183BKSTZ<br>LQFP80     | U2                                           | ANALOG<br>DEVICES | ADV7183BKSTZ         |
| 15   | 1    | DIP 8 DIP8SOC              | U8                                           | MILL-MAX          | 614-43-308-31-007000 |
| 16   | 3    | 0.05 45x2 CON018           | P1-3                                         | SAMTEC            | TFC-145-32-F-D       |
| 17   | 3    | .05 45X2 CON019            | J1-3                                         | SAMTEC            | SFC-145-T2-F-D-A     |
| 18   | 1    | RCA 3X2 CON024             | J7                                           | SWITCH-<br>CRAFT  | PJRS3X2S01X          |
| 19   | 5    | IDC 3X2<br>IDC3X2_SMT      | JP1,JP5-7,JP9                                | SAMTEC            | TSM-103-01-T-DV      |
| 20   | 1    | IDC 16X2<br>IDC16X2RASOC   | J4                                           | SAMTEC            | SSW-116-02-F-D-RA    |
| 21   | 1    | IDC 13X2<br>IDC13X2_M_SMT  | JP3                                          | SAMTEC            | TSM-113-01-T-DV      |
| 22   | 2    | IDC 4X2<br>IDC4X2_M_SMT    | JP4,JP8                                      | SAMTEC            | TSM-104-01-T-DV      |
| 23   | 1    | FPDI 31PIN<br>CON034       | P6                                           | FCI               | 68737-428HLF         |
| 24   | 1    | IDC 13x2RA<br>IDC13x2_F_RA | J6                                           | SAMTEC            | SSW-113-02-F-D-RA    |
| 25   | 1    | IDC 3X1 IDC3X1             | JP2                                          | FCI               | 90726-403HLF         |
| 26   | 1    | IDC 2X2 IDC2X2             | JP10                                         | SULLINS           | PBC02DAAN            |
| 27   | 8    | 0.22UF 25V 10%<br>0805     | C73,C85,C101,<br>C112,C120-121,<br>C135,C138 | AVX               | 08053C224FAT         |
| 28   | 1    | 33 1/10W 5% 0805           | R49                                          | VISHAY            | CRCW080533R0JNEA     |

## A-V EZ-Extender Bill of Materials

| Ref. | Qty. | Description           | Reference Designator                                                                                                                          | Manufacturer | Part Number      |
|------|------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------|
| 29   | 1    | 1.5K 1/10W 5% 0805    | R1                                                                                                                                            | VISHAY       | CRCW08051K50FKEA |
| 30   | 6    | 10UF 16V 10% B        | CT1-4,CT12-13                                                                                                                                 | AVX          | TAJB106K016R     |
| 31   | 5    | 600 100MHZ 200MA 0603 | FER4-8                                                                                                                                        | DIGI-KEY     | 490-1014-2-ND    |
| 32   | 4    | 600 100MHZ 500MA 1206 | FER1-3,FER9                                                                                                                                   | STEWART      | HZ1206B601R-10   |
| 33   | 10   | 10UF 16V 20% CAP002   | CT5-11,CT14-16                                                                                                                                | PANASONIC    | EEE1CA100SR      |
| 34   | 2    | 22 1/10W 5% 0805      | R53,R55                                                                                                                                       | VISHAY       | CRCW080522R0JNEA |
| 35   | 6    | 0.68UH 10% 0805       | L1-3,L7-9                                                                                                                                     | MURATA       | LQM21NNR68K10D   |
| 36   | 1    | .082UF 50V 5% 0805    | C5                                                                                                                                            | AVX          | 08055C823JAT2A   |
| 37   | 3    | 2.2UH 10% 0805        | L4-6                                                                                                                                          | DIGI-KEY     | 490-1119-2-ND    |
| 38   | 4    | 22 125MW 5% RNS001    | RN1-4                                                                                                                                         | CTS          | 744C083220JP     |
| 39   | 1    | 147.0K 1/10W 1% 0805  | R36                                                                                                                                           | DIGI-KEY     | 311-147KCRTR-ND  |
| 40   | 1    | 76.8K 1/10W 1% 0805   | R38                                                                                                                                           | DIGI-KEY     | 311-76.8KCRTR-ND |
| 41   | 1    | 1.2K 1/16W 5% 0402    | R42                                                                                                                                           | PANASONIC    | ERJ-2GEJ122X     |
| 42   | 57   | 0.1UF 16V 10% 0603    | C1,C4,C7-8,C10-15, C17,C19,C22-23, C26,C30,C32-34, C37-38,C40,C43-44, C46-49,C51-57, C60-69,C75-76,C78, C81,C99,C115, C124,C130-132, C144-145 | AVX          | 0603YC104KAT2A   |

| Ref. | Qty. | Description            | Reference Designator                                             | Manufacturer | Part Number      |
|------|------|------------------------|------------------------------------------------------------------|--------------|------------------|
| 43   | 11   | 0.01UF 16V 10% 0603    | C2-3,C6,C16,C25, C29,C36,C41,C50, C58,C110                       | AVX          | 0603YC103KAT2A   |
| 44   | 5    | 10UF 10V +80/-20% 0805 | C42,C45,C59, C79-80                                              | PANASONIC    | ECJ-2FF1A106Z    |
| 45   | 2    | 1UF 16V 10% 0603       | C27,C39                                                          | PANASONIC    | ECJ-1VB1C105K    |
| 46   | 12   | 330PF 50V 5% 0603      | C18,C20-21,C28, C31,C35,C98,C104, C107-108,C133, C137            | AVX          | 06035A331JAT2A   |
| 47   | 3    | 22 1/10W 5% 0603       | R146-148                                                         | VISHAY       | CRCW060322R0JNEA |
| 48   | 19   | 10K 1/10W 5% 0603      | R3-4,R10,R32,R37, R44-45,R47,R51, R54,R56-60,R107, R141,R149-150 | VISHAY       | CRCW060310K0JNEA |
| 49   | 2    | 100K 1/10W 5% 0603     | R39-40                                                           | VISHAY       | CRCW0603100KJNEA |
| 50   | 8    | 0 1/10W 5% 0603        | R2,R15,R20,R25, R111,R115,R130, R135                             | PHYCOMP      | 232270296001L    |
| 51   | 1    | 10 1/10W 5% 0603       | R143                                                             | VISHAY       | CRCW060310R0JNEA |
| 52   | 6    | 1K 1/10W 5% 0603       | R13-14,R18-19,R23-24                                             | DIGI-KEY     | 311-1.0KGRTR-ND  |
| 53   | 4    | 237.0 1/10W 1% 0603    | R64,R70,R106,R110                                                | DIGI-KEY     | 311-237HRTR-ND   |
| 54   | 4    | 750.0K 1/10W 1% 0603   | R65,R69,R127,R129                                                | DIGI-KEY     | 311-750KHRTR-ND  |
| 55   | 6    | 11.0K 1/10W 1% 0603    | R82,R90,R93-94, R123,R126                                        | DIGI-KEY     | 311-11.0KHRTR-ND |
| 56   | 12   | 5.49K 1/10W 1% 0603    | R75,R83,R86-87, R89,R99-101,R116, R119,R131-132                  | DIGI-KEY     | 311-5.49KHRTR-ND |

## A-V EZ-Extender Bill of Materials

| Ref. | Qty. | Description         | Reference Designator                                        | Manufacturer | Part Number      |
|------|------|---------------------|-------------------------------------------------------------|--------------|------------------|
| 57   | 6    | 3.32K 1/10W 1% 0603 | R81,R91-92,R95, R124-125                                    | DIGI-KEY     | 311-3.32KHRTR-ND |
| 58   | 6    | 1.65K 1/10W 1% 0603 | R74,R84-85,R88, R117-118                                    | DIGI-KEY     | 311-1.65KHRTR-ND |
| 59   | 6    | 49.9K 1/10W 1% 0603 | R96-97,R108-109, R137-138                                   | DIGI-KEY     | 311-49.9KHRTR-ND |
| 60   | 6    | 604.0 1/10W 1% 0603 | R98,R102-104,R133, R136                                     | DIGI-KEY     | 311-604HRTR-ND   |
| 61   | 16   | 5.76K 1/10W 1% 0603 | R61-63,R67,R72-73, R76-77,R105,R120-122,R128,R134, R139-140 | DIGI-KEY     | 311-5.76KHRTR-ND |
| 62   | 8    | 120PF 50V 5% 0603   | C71,C74,C82-83, C127-128,C141, C143                         | AVX          | 06035A121JAT2A   |
| 63   | 12   | 100PF 50V 5% 0603   | C77,C91-92,C97, C105-106,C109, C118,C129,C134, C13          | AVX          | 06035A101JAT2A   |
| 64   | 10   | 1000PF 50V 5% 0603  | C9,C24,C72,C86, C93,C100,C103, C111,C117,C119               | PANASONIC    | ECJ-1VC1H102J    |
| 65   | 6    | 220PF 50V 5% 0603   | C87,C94-96, C125-126                                        | PANASONIC    | ECJ-1VC1H221J    |
| 66   | 6    | 680PF 50V 5% 0603   | C84,C88-90, C122-123                                        | PANASONIC    | ECJ-1VC1H681J    |
| 67   | 6    | 2200PF 50V 5% 0603  | C102,C113-114, C116,C140,C142                               | PANASONIC    | ECJ-1VB1H222K    |
| 68   | 7    | 33.0 1/10W 1% 0603  | R5,R8,R33,R68, R142,R144-145                                | DIGI-KEY     | 311-33.0HRTR-ND  |
| 69   | 6    | 2.74K 1/10W 1% 0603 | R71,R78-80, R112-113                                        | DIGI-KEY     | 311-2.74KHRTR-ND |

| Ref. | Qty. | Description                             | Reference Designator        | Manufacturer     | Part Number      |
|------|------|-----------------------------------------|-----------------------------|------------------|------------------|
| 70   | 12   | 75.0 1/10W 1% 0603                      | R11-12,R16-17,R21-22,R26-31 | DALE             | CRCW060375R0FKEA |
| 71   | 1    | 680 1/8W 5% 1206                        | R114                        | VISHAY           | CRCW1206680RFNEA |
| 72   | 1    | 150.0 1/8W 1% 1206                      | R41                         | VISHAY           | CRCW1206150RFKEA |
| 73   | 1    | GREEN LED001                            | LED1                        | PANASONIC        | LN1361CTR        |
| 74   | 2    | 3.5MM<br>DUAL_STEREO<br>CON066          | J8-J9                       | SWITCH-<br>CRAFT | 35RAPC7JS        |
| 75   | 1    | 3.5MM<br>STEREO_JACK<br>CON_SJ-3523-SMT | J10                         | DIGI-KEY         | CP-3523SJCT-ND   |

A

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D

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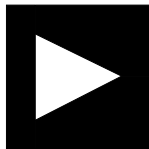
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4

# Blackfin A-V EZ-Extender Schematic



**ANALOG  
DEVICES**

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

**Title** BLACKFIN A-V EZ-EXTENDER  
TITLE

|                  |                                |                   |
|------------------|--------------------------------|-------------------|
| <b>Size</b><br>C | <b>Board No.</b><br>A0193-2004 | <b>Rev</b><br>2.1 |
|------------------|--------------------------------|-------------------|

|                                 |                         |
|---------------------------------|-------------------------|
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A

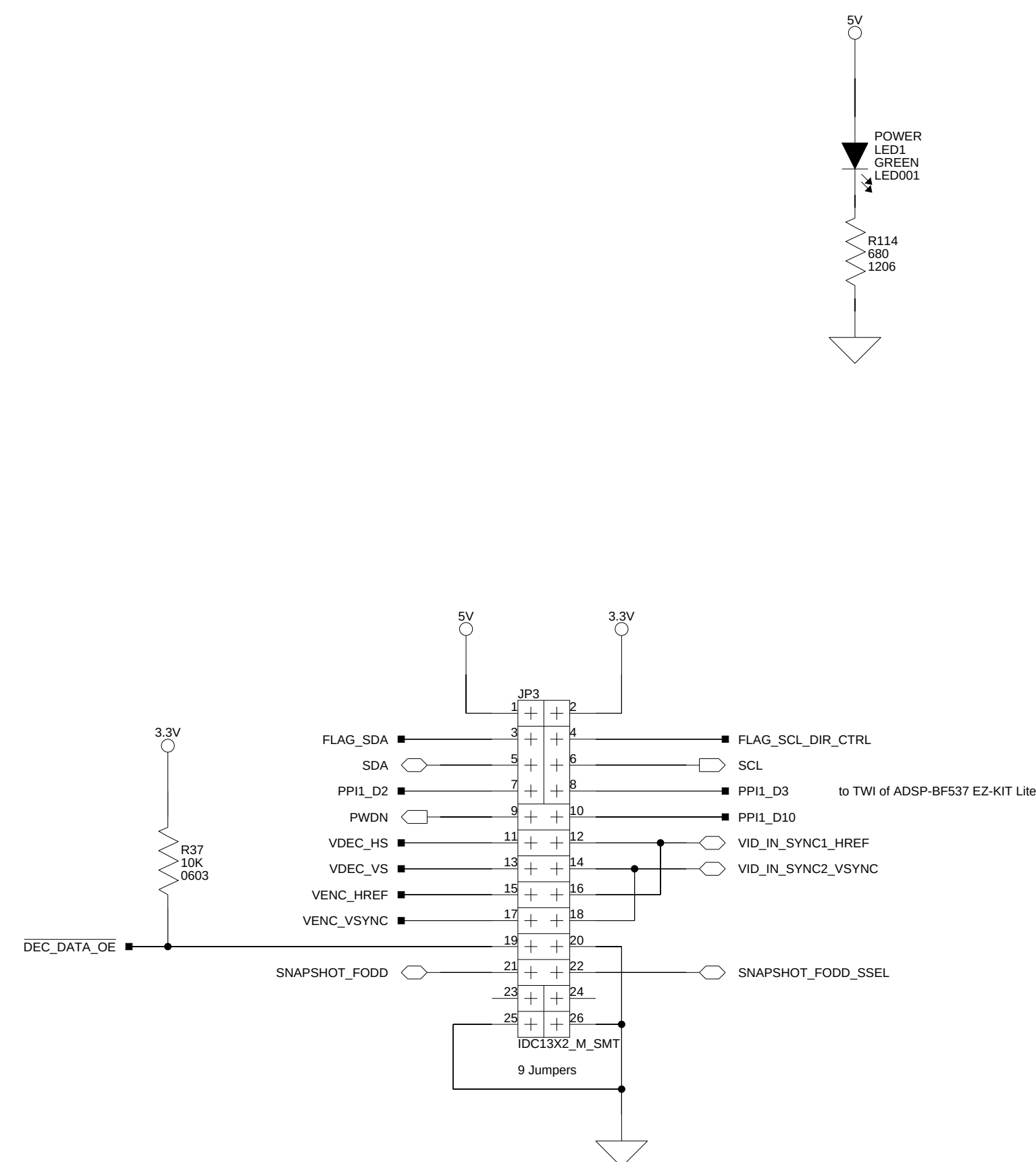
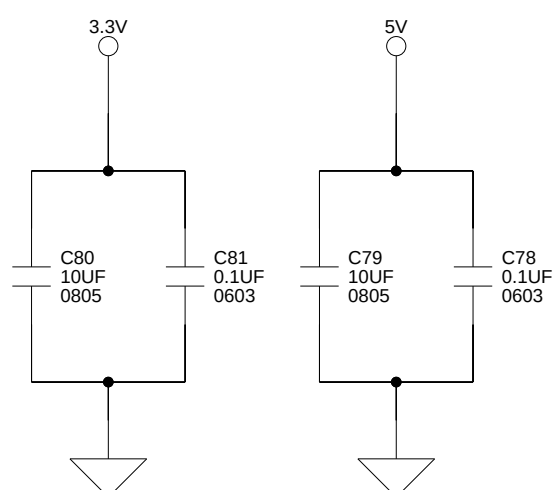
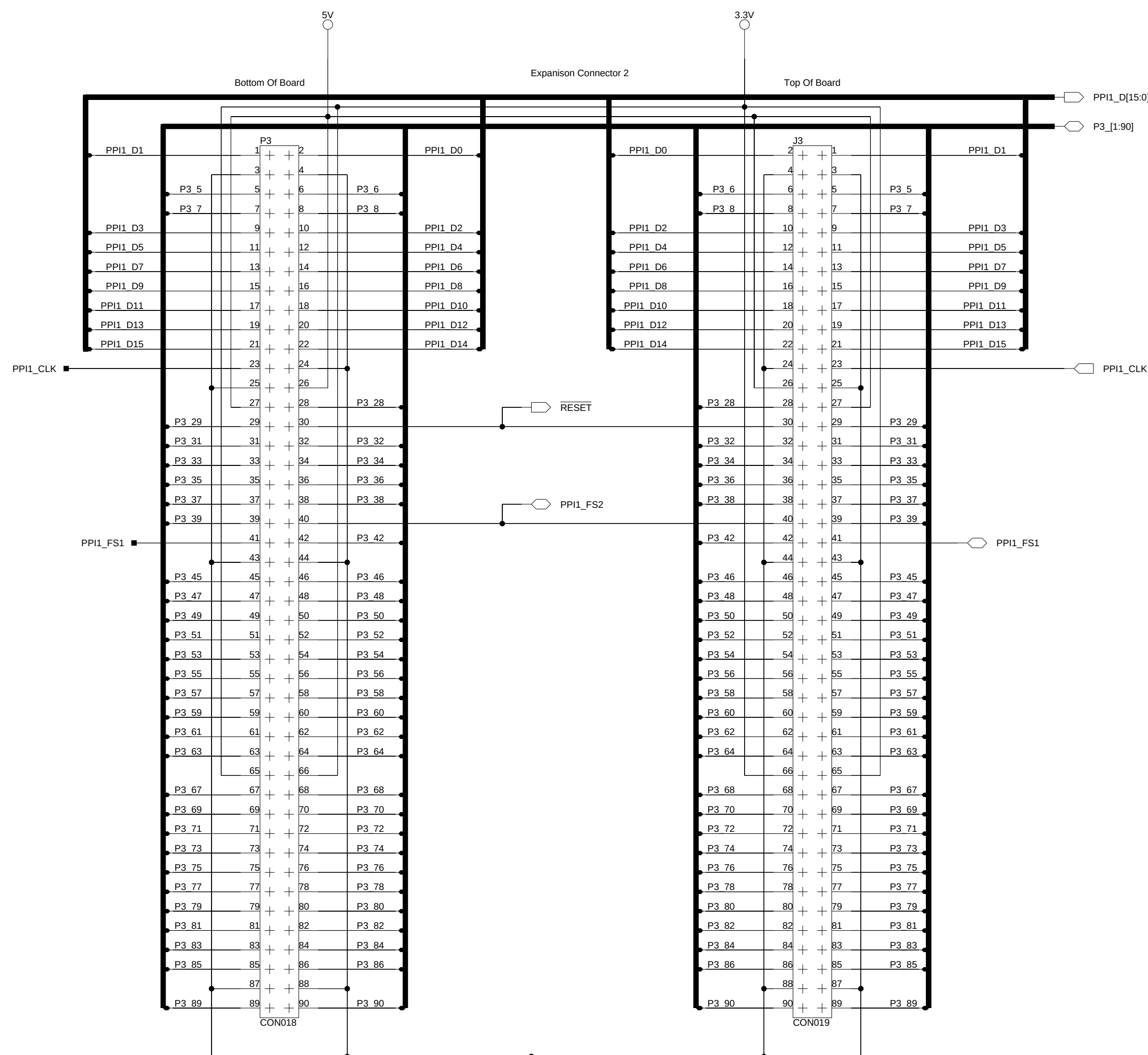
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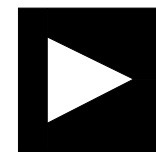
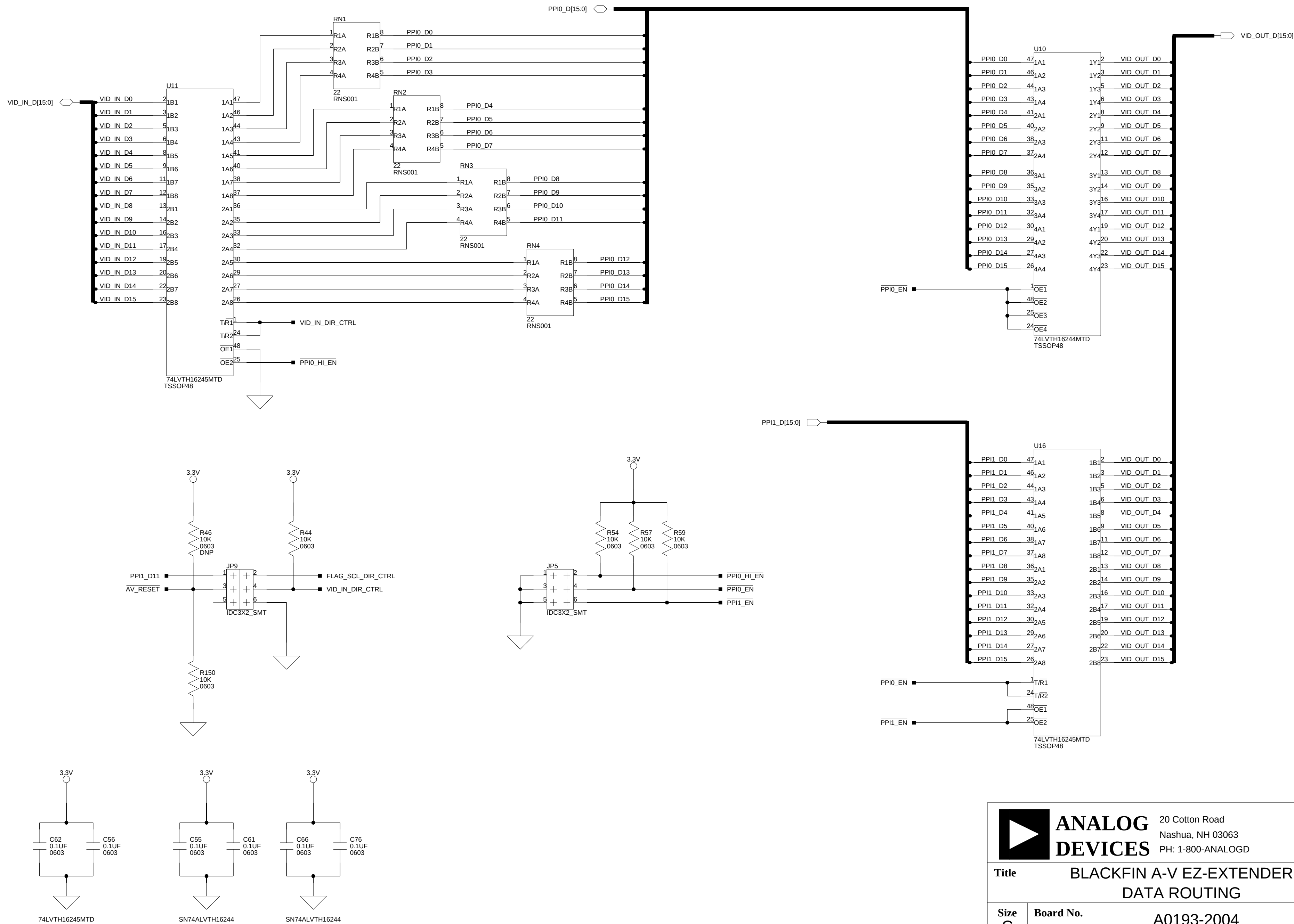
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### EXPANSION INTERFACE (TYPE B)



|                                                                                                                 |                  |                                                         |            |
|-----------------------------------------------------------------------------------------------------------------|------------------|---------------------------------------------------------|------------|
|  <b>ANALOG<br/>DEVICES</b> |                  | 20 Cotton Road<br>Nashua, NH 03063<br>PH: 1-800-ANALOGD |            |
| <b>Title</b> <b>BLACKFIN A-V EZ-EXTENDER<br/>EXPANSION INTERFACE (3)</b>                                        |                  |                                                         |            |
| <b>Size<br/>C</b>                                                                                               | <b>Board No.</b> |                                                         | <b>Rev</b> |
|                                                                                                                 | A0193-2004       |                                                         | 2.1        |
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**ANALOG  
DEVICES**

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

Title **BLACKFIN A-V EZ-EXTENDER  
DATA ROUTING**

|                          |                         |            |
|--------------------------|-------------------------|------------|
| Size<br>C                | Board No.<br>A0193-2004 | Rev<br>2.1 |
| Date<br>10-06-2011_09:57 | Sheet<br>4 of           | 12         |



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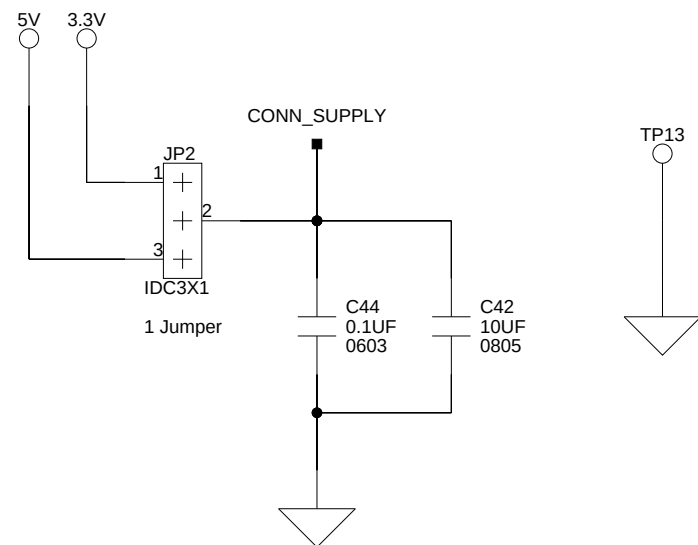
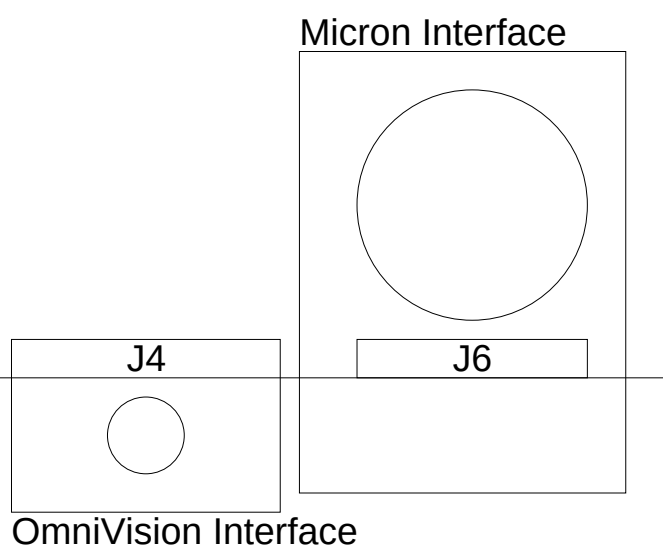
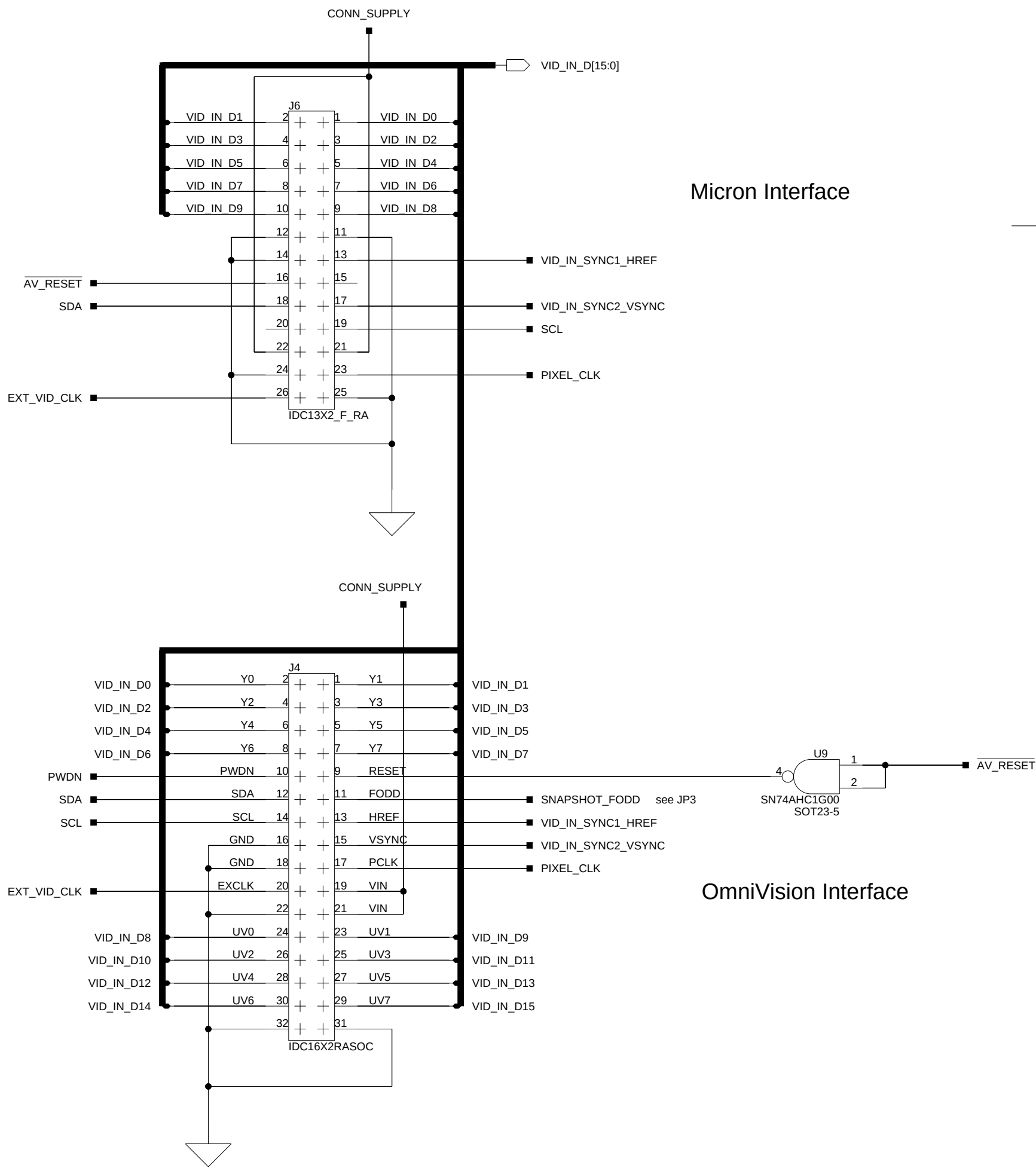
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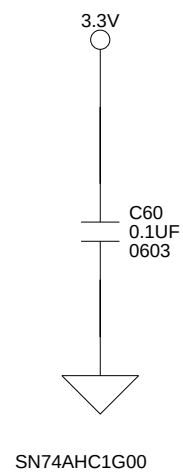
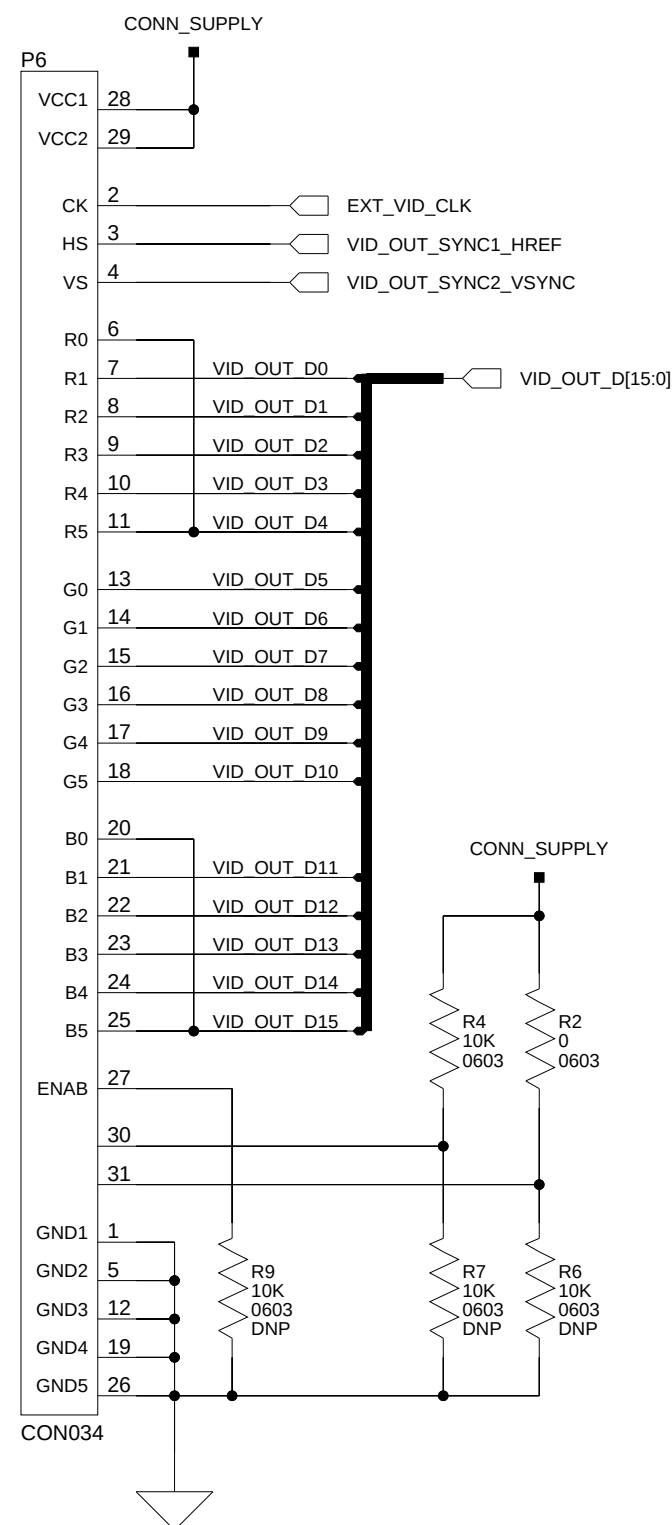
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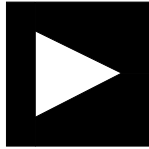
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4



### Flat Panal Display Interface



|                                                                                                                                                                                  |                             |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------------|
|  <b>ANALOG DEVICES</b> <div>20 Cotton Road<br/>Nashua, NH 03063<br/>PH: 1-800-ANALOGD</div> |                             |                |
| <b>Title</b> BLACKFIN A-V EZ-EXTENDER<br>PPIO SETUP                                                                                                                              |                             |                |
| <b>Size C</b>                                                                                                                                                                    | <b>Board No.</b> A0193-2004 | <b>Rev</b> 2.1 |
| <b>Date</b> 07-06-2011_15:16                                                                                                                                                     | <b>Sheet</b> 6 <b>of</b> 12 |                |

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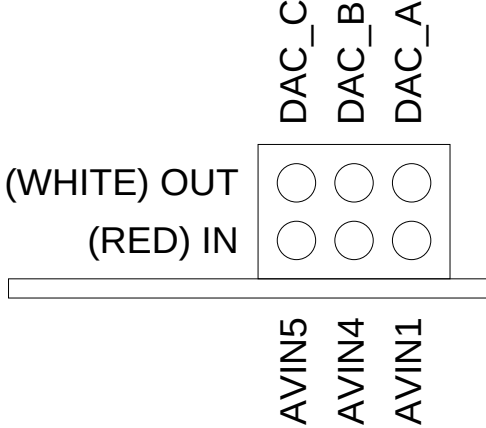
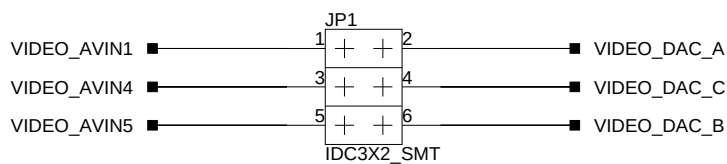
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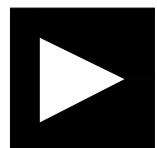
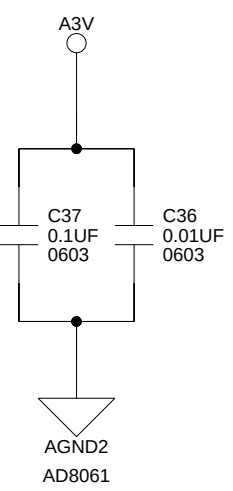
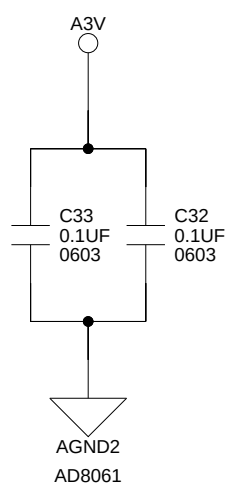
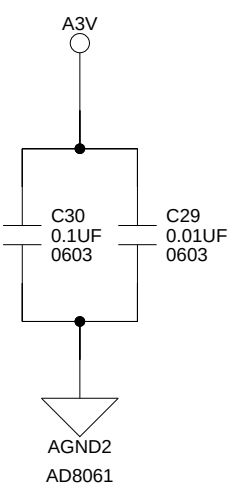
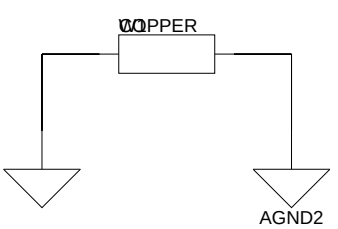
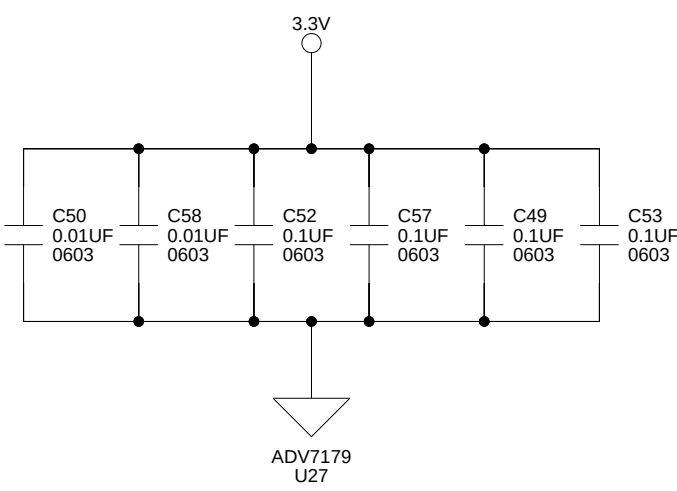
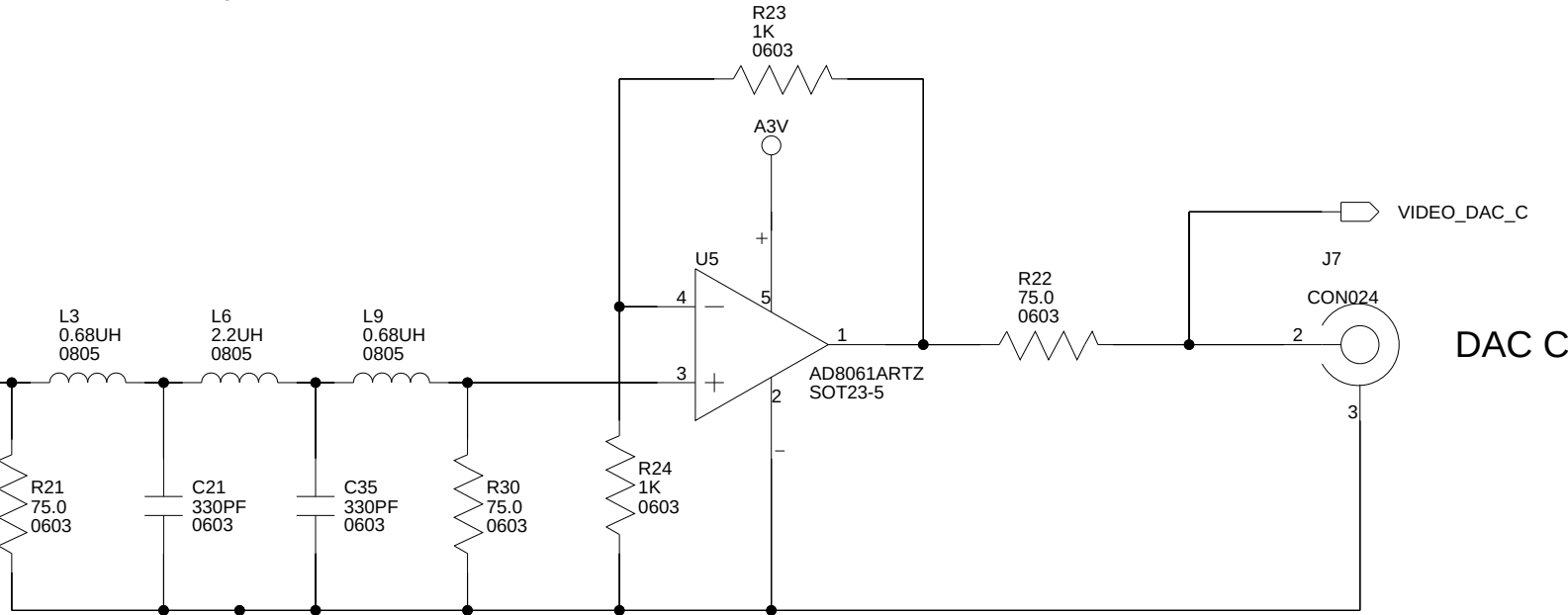
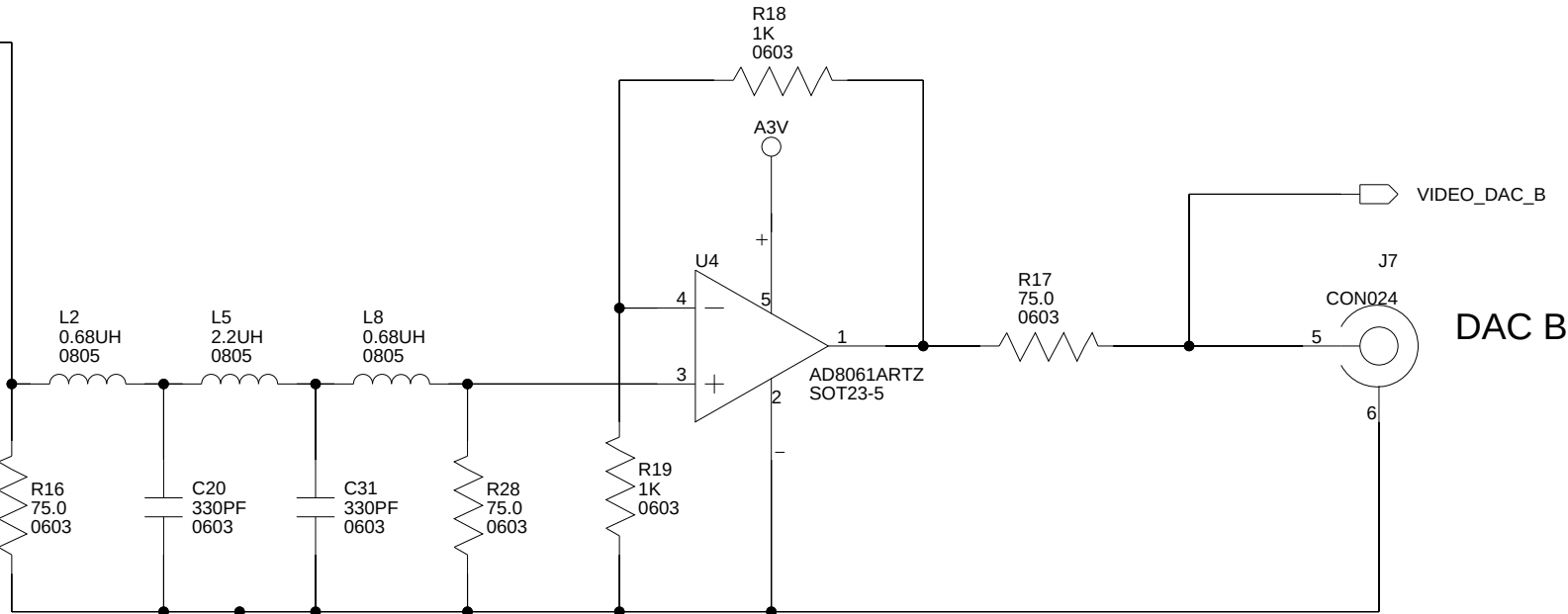
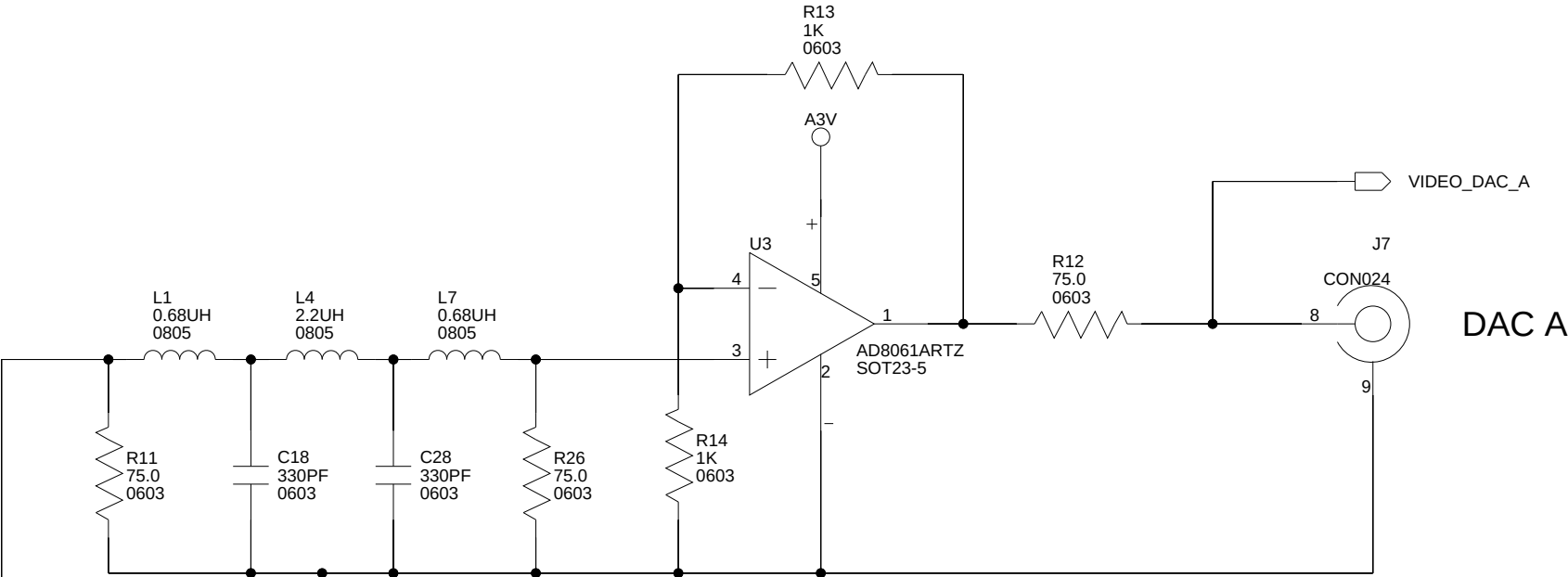
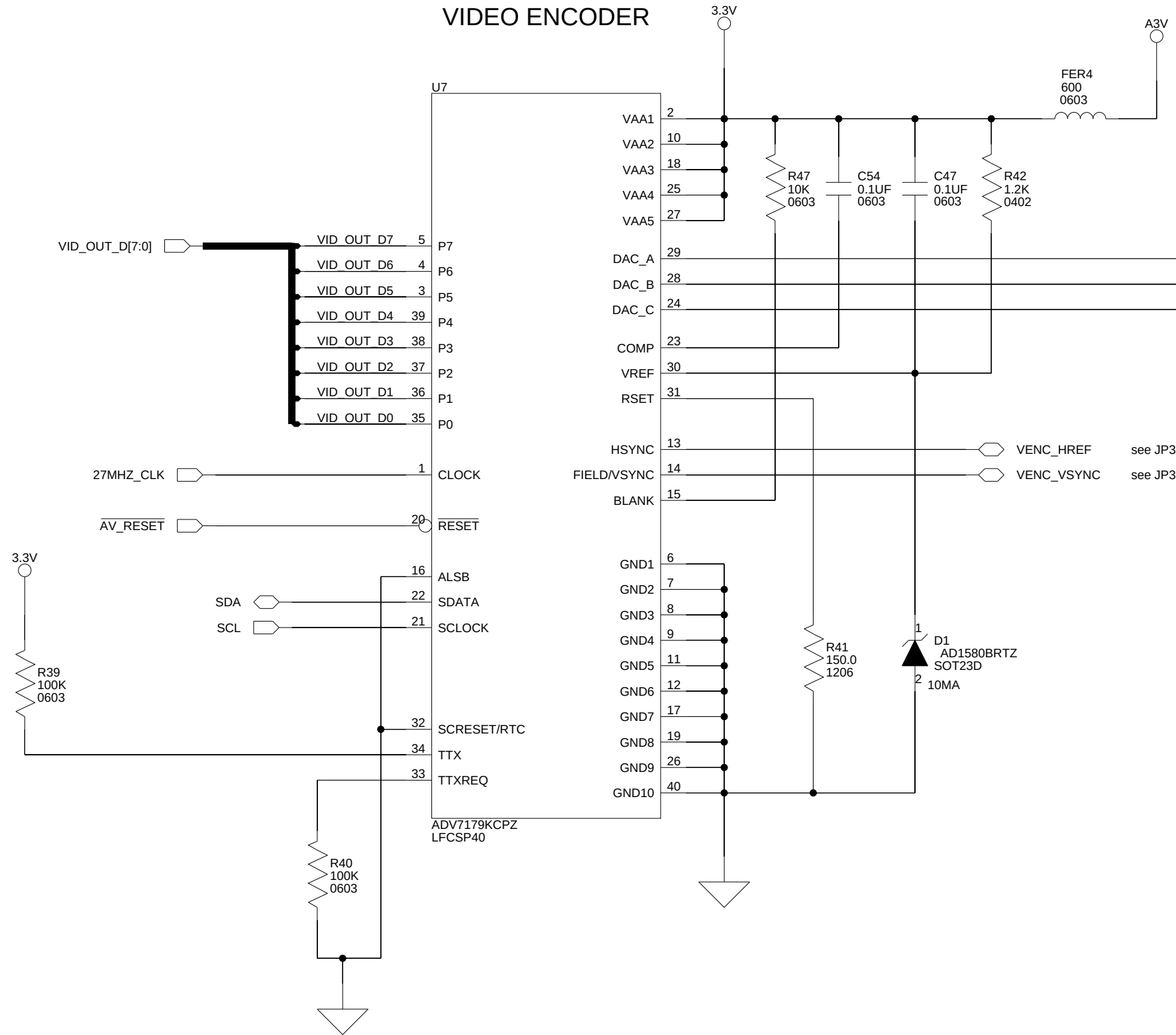
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4



|                              | DAC A | DAC B | DAC C |
|------------------------------|-------|-------|-------|
| Composite Video              | CVSB  | CVSB  | C     |
| Component Video              | G     | B     | R     |
| Differential Component Video | Y     | U     | V     |
| S Video                      | Y     |       | C     |

VIDEO ENCODER



**ANALOG  
DEVICES**

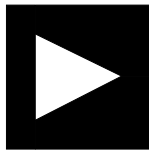
20 Cotton Road  
Nashua, NH 03063  
PH: 1-800-ANALOGD

Title **BLACKFIN A-V EZ-EXTENDER  
VIDEO ENCODER (OUT)**

|                          |                         |            |
|--------------------------|-------------------------|------------|
| Size<br>C                | Board No.<br>A0193-2004 | Rev<br>2.1 |
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|                              | AVIN1 | AVIN4 | AVIN5 |
|------------------------------|-------|-------|-------|
| Composite Video              | CVBS  | CVBS  | CVBS  |
| Differential Component Video | Y     | V     | U     |
| S Video                      | Y     | C     |       |

VIDEO DECODER



**ANALOG  
DEVICES**

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

Title      **BLACKFIN A-V EZ-EXTENDER  
VIDEO DECODER (IN)**

|           |                                |                   |
|-----------|--------------------------------|-------------------|
| Size<br>C | Board No.<br><b>A0193-2004</b> | Rev<br><b>2.1</b> |
|-----------|--------------------------------|-------------------|

|      |                  |       |   |    |    |
|------|------------------|-------|---|----|----|
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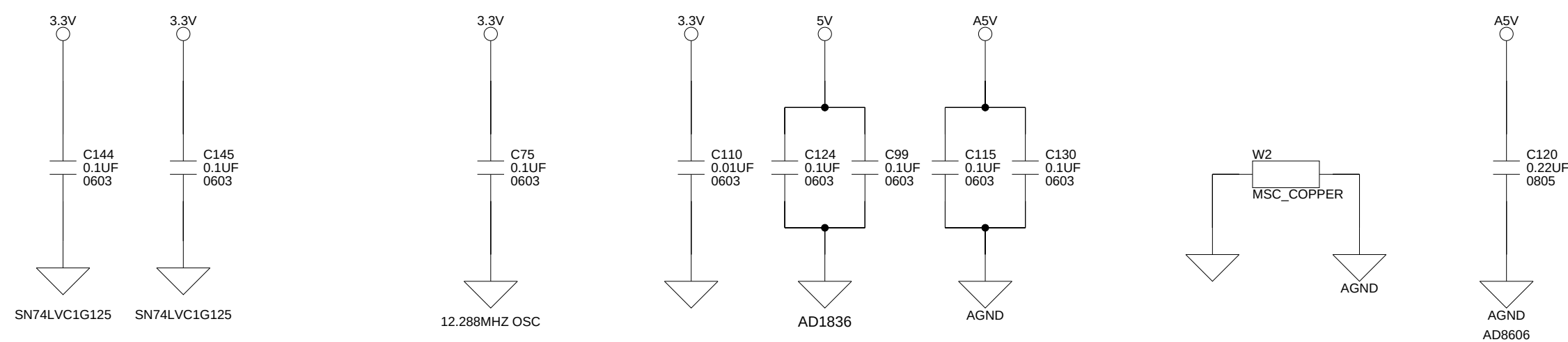
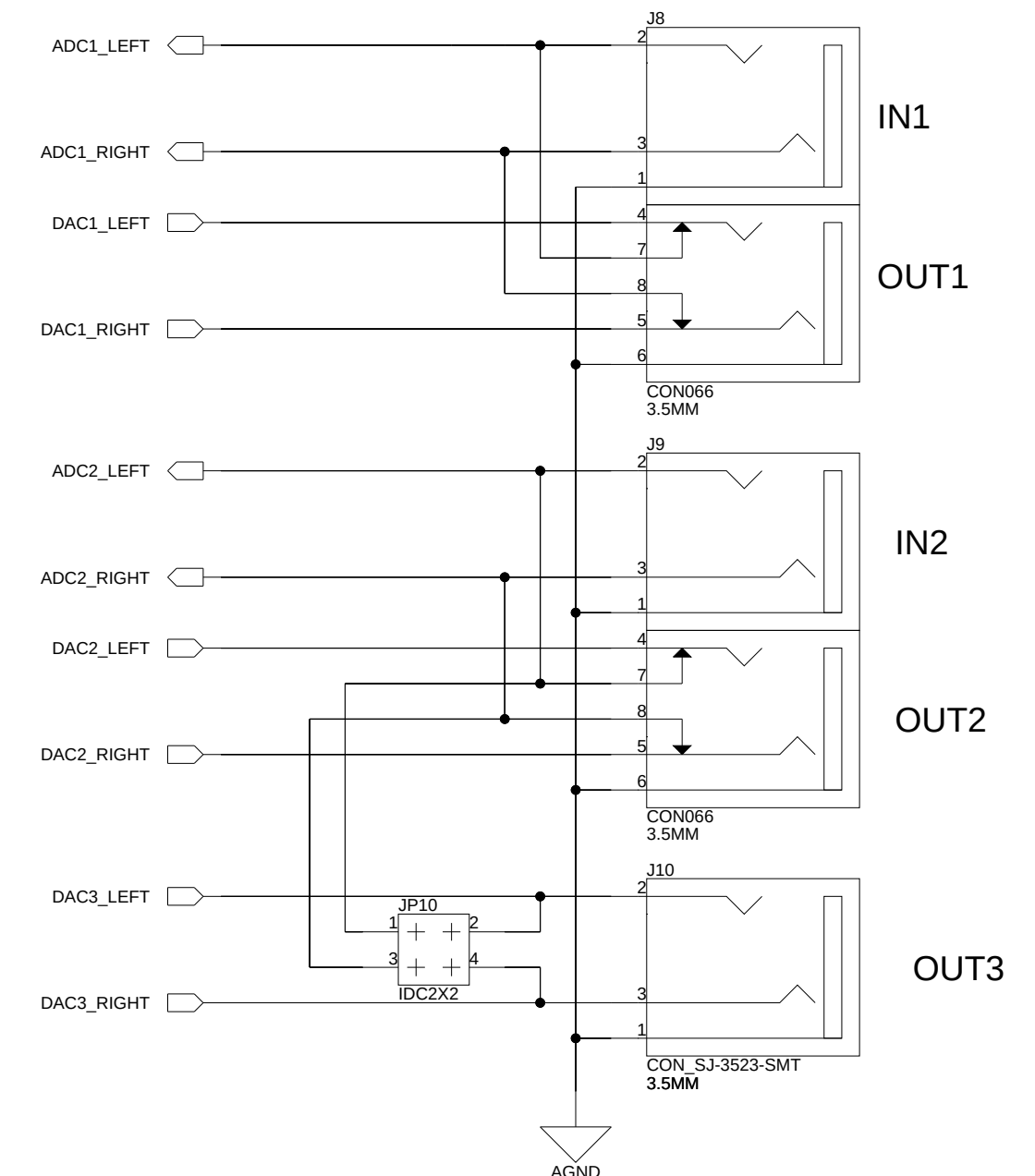
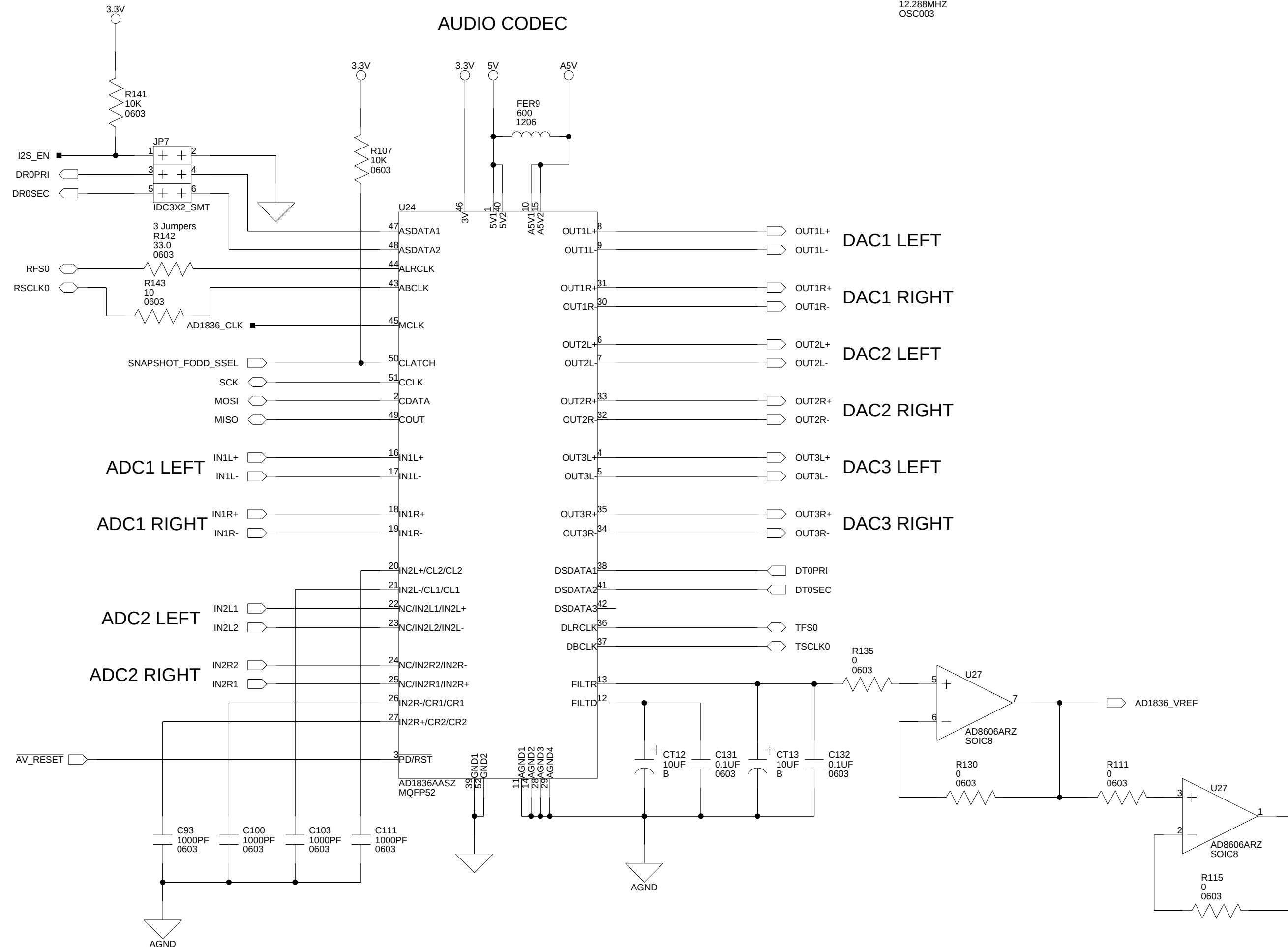
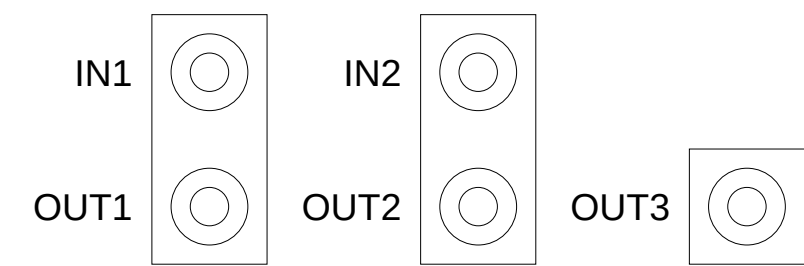
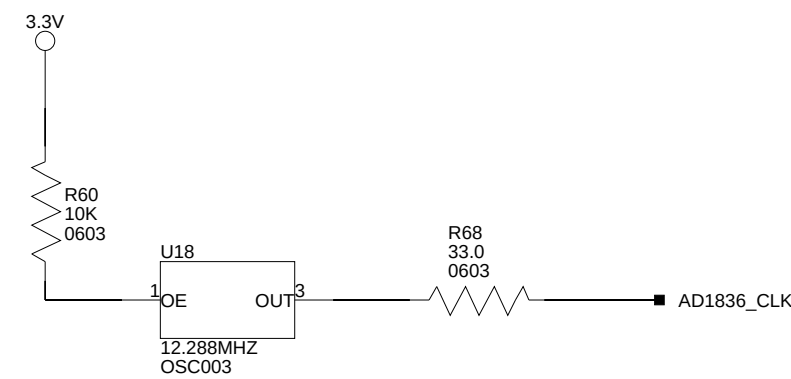
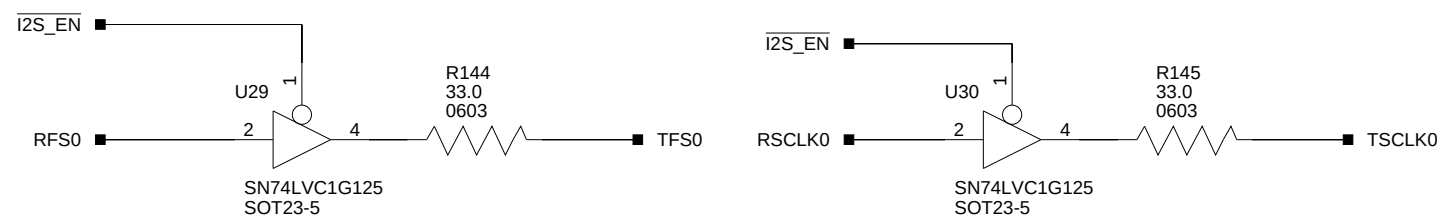
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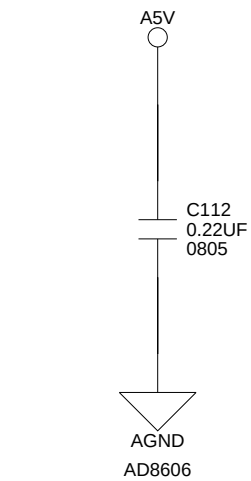
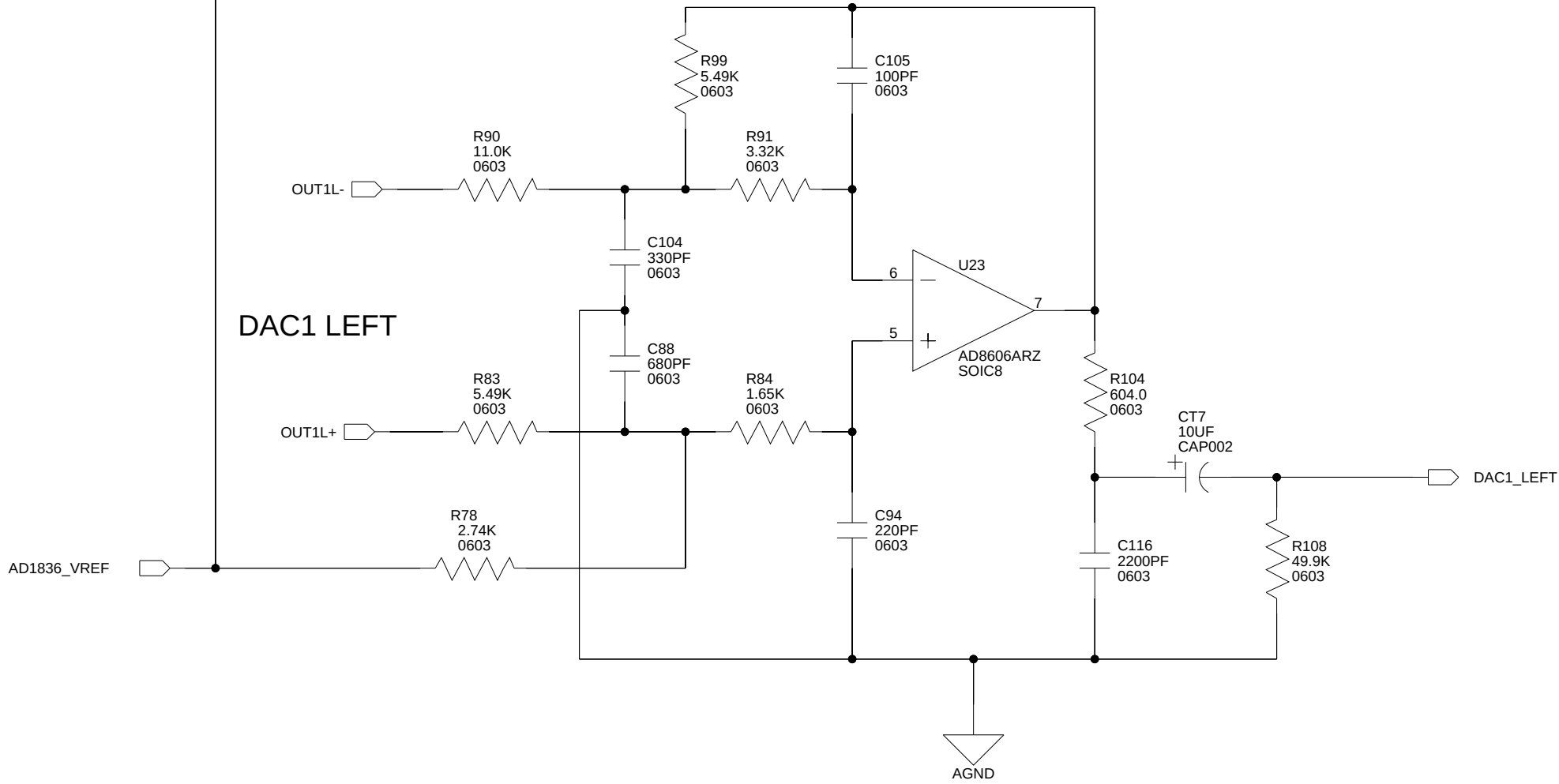
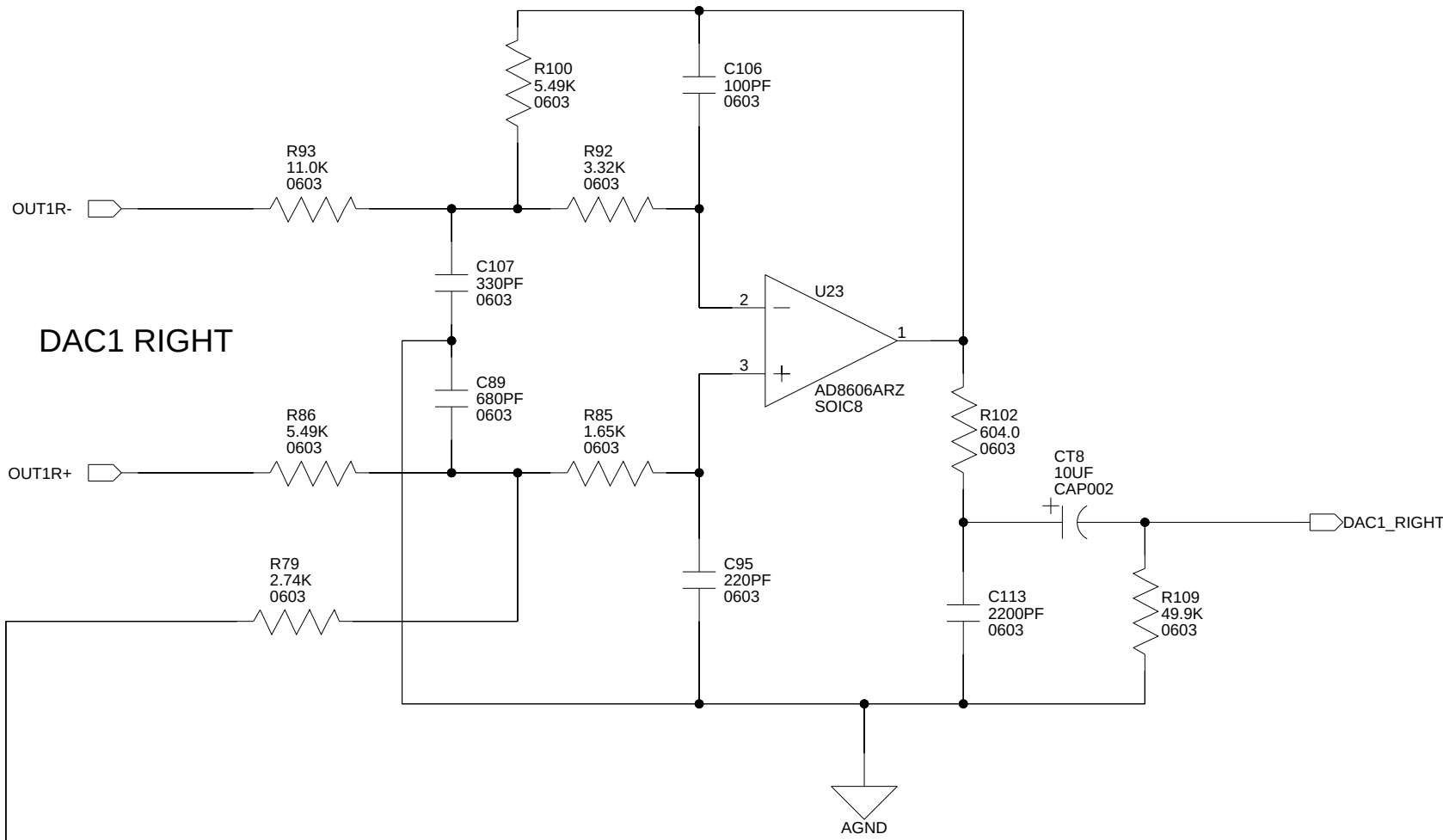
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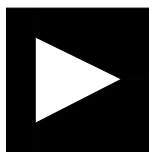
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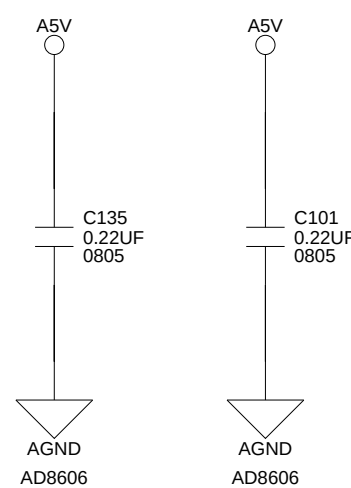
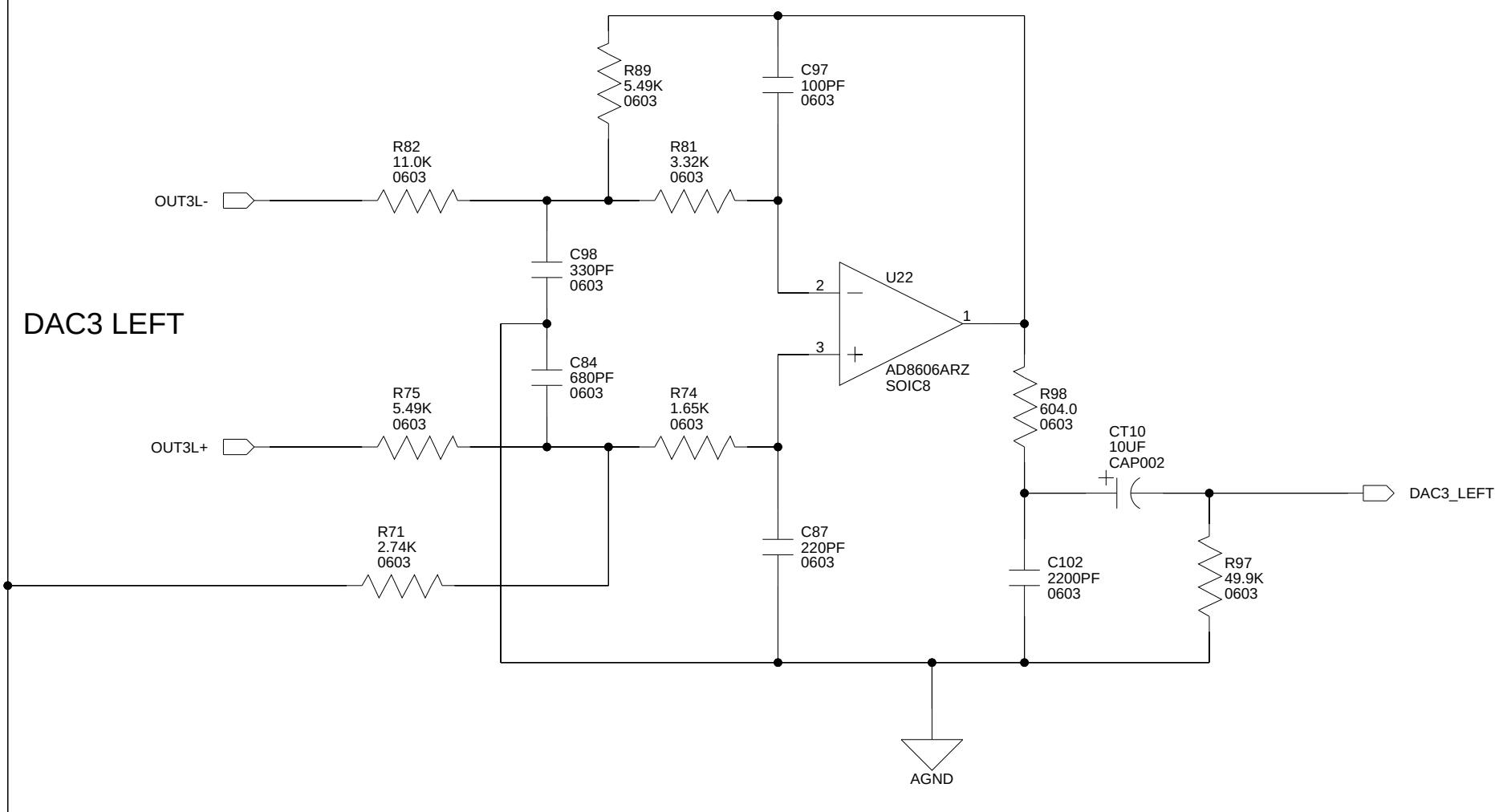
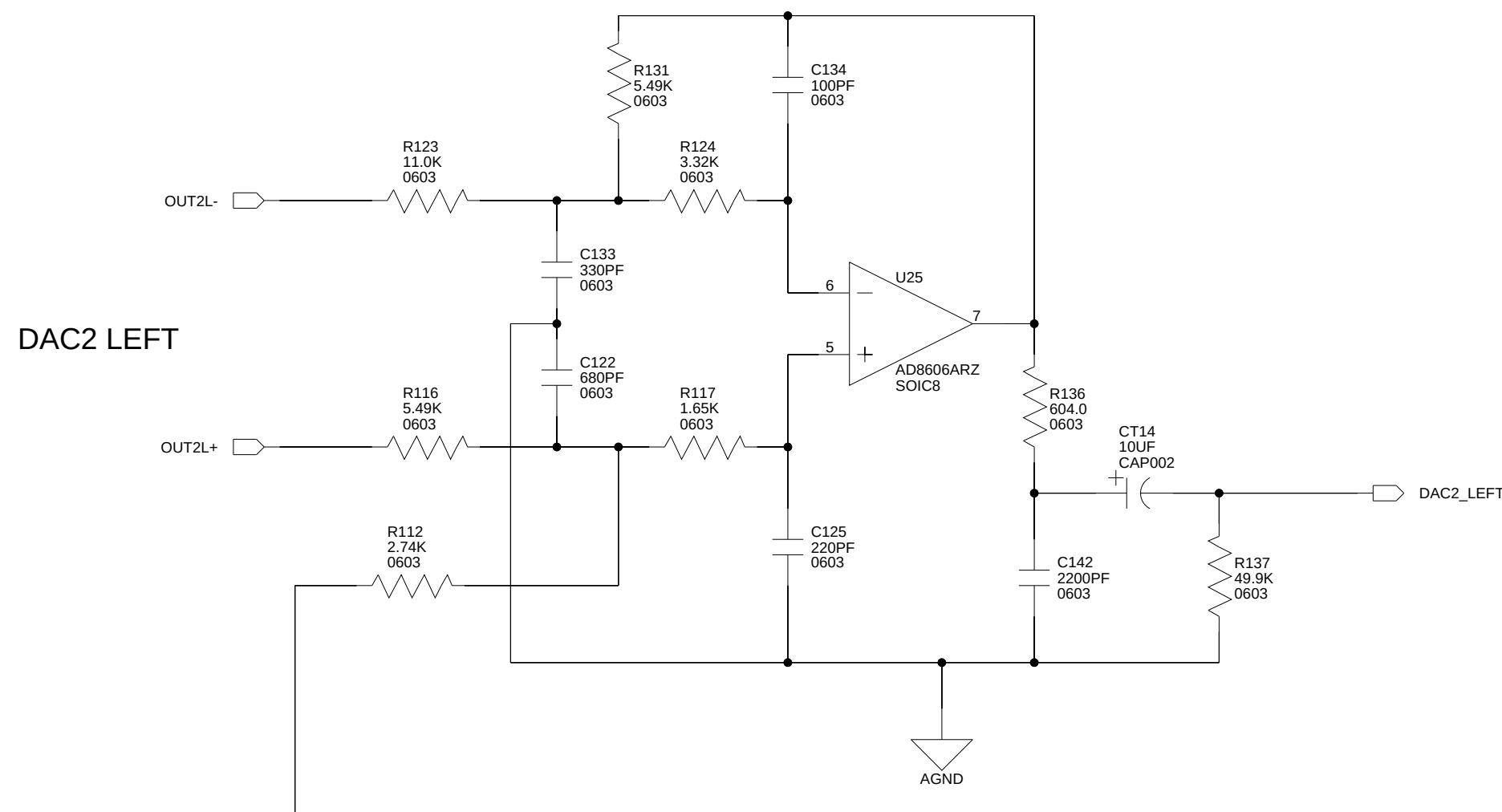
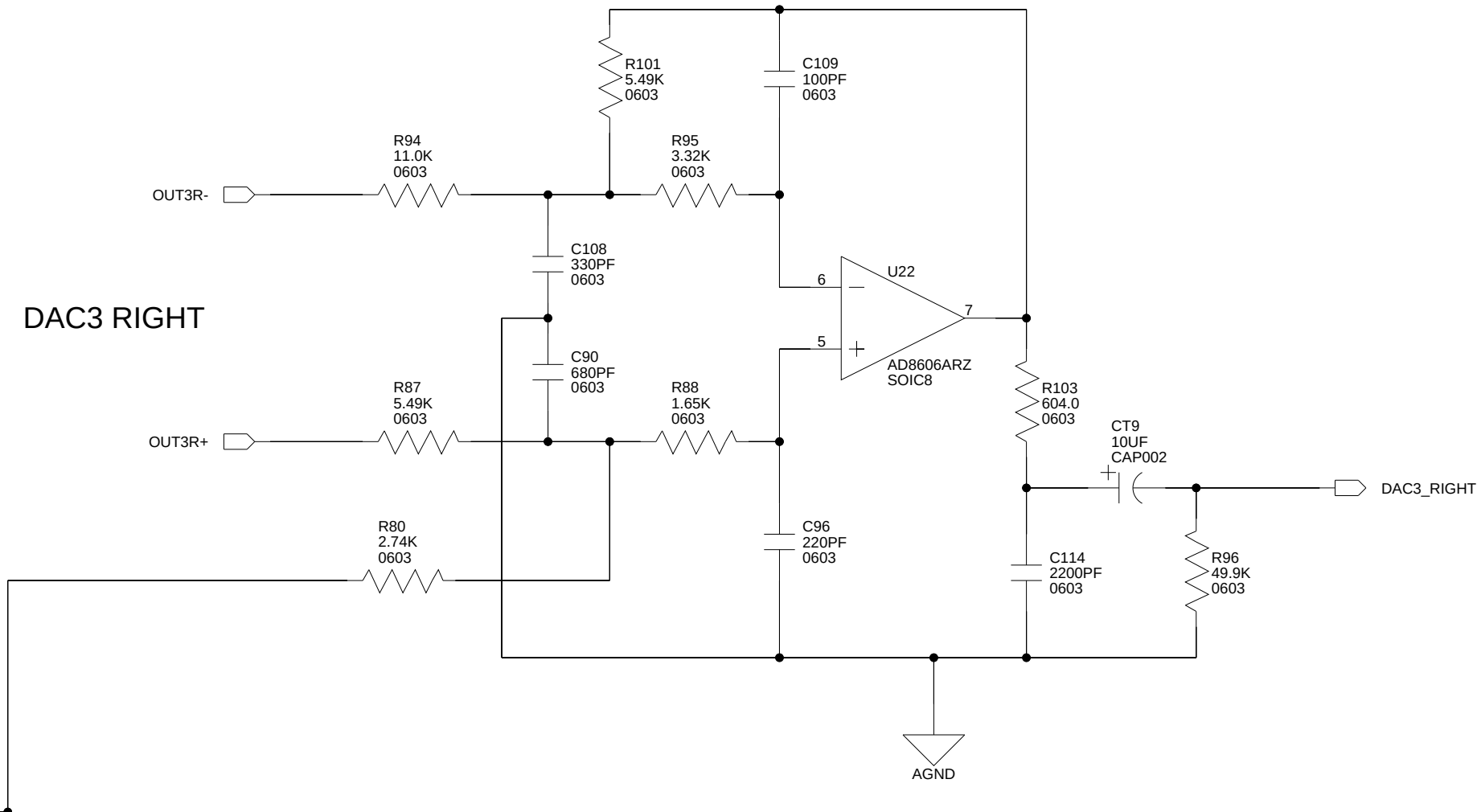
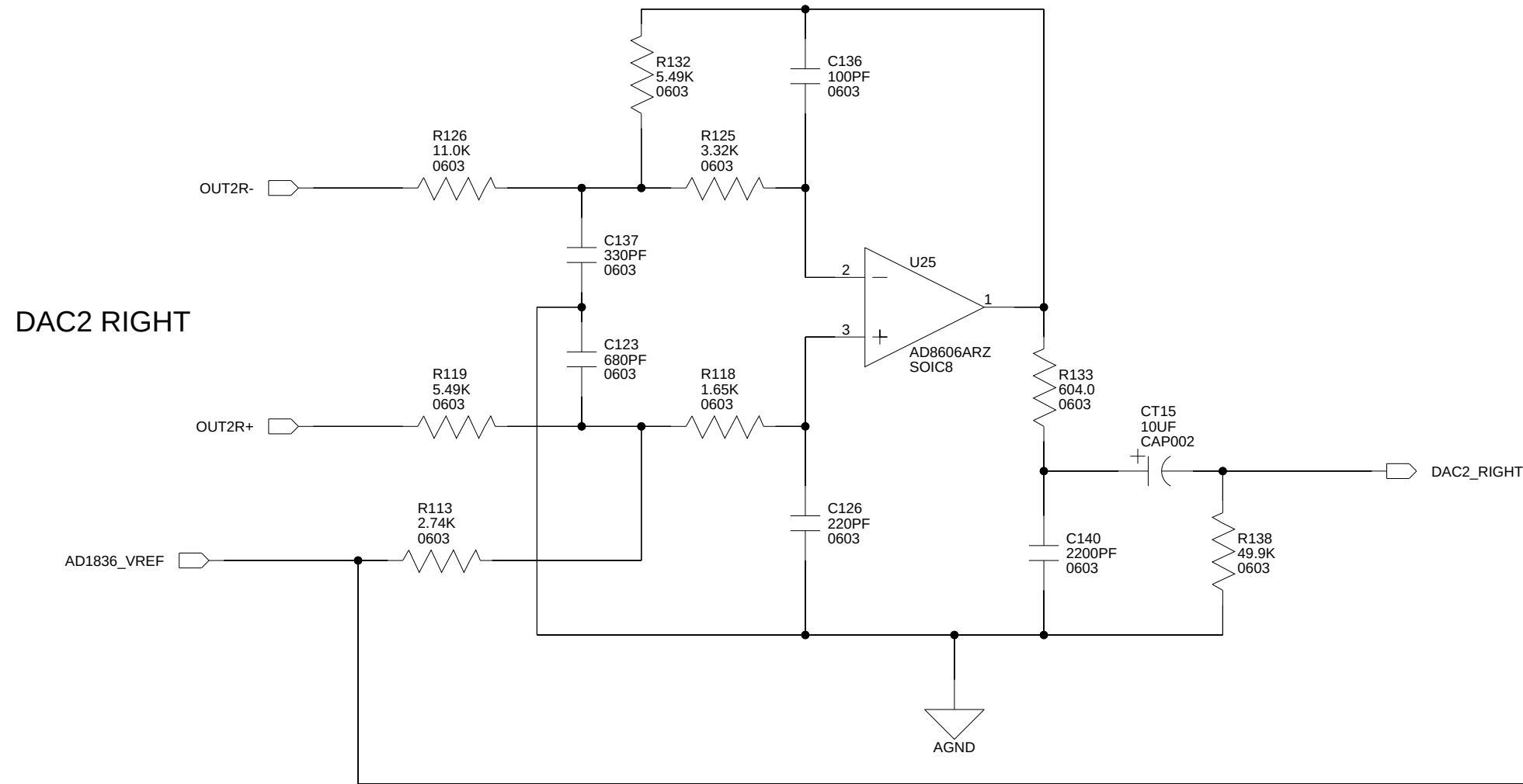
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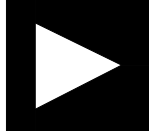


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|------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------------------------------------------|--------------|
|  <div> <b>ANALOG<br/>DEVICES</b> </div> |                  | 20 Cotton Road<br>Nashua, NH 03063<br>PH: 1-800-ANALOGD |              |
| <b>Title</b>                                                                                                                 |                  |                                                         |              |
| BLACKFIN A-V EZ-EXTENDER<br>AUDIO                                                                                            |                  |                                                         |              |
| <b>Size<br/>C</b>                                                                                                            | <b>Board No.</b> |                                                         | <b>Rev</b>   |
|                                                                                                                              | A0193-2004       |                                                         | 2.1          |
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|---------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|--------------------------------------|
|  |                                                         | 20 Cotton Road<br>Nashua, NH 03063<br>PH: 1-800-ANALOGD |                                      |
| Title                    BLACKFIN A-V EZ-EXTENDER<br>AUDIO OUT(CH1)                   |                                                         |                                                         |                                      |
| Size<br>C                                                                             | Board No.                                    A0193-2004 |                                                         | Rev<br>2.1                           |
| Date                                                                                  | 07-06-2011_15:16                                        |                                                         | Sheet            10 of            12 |



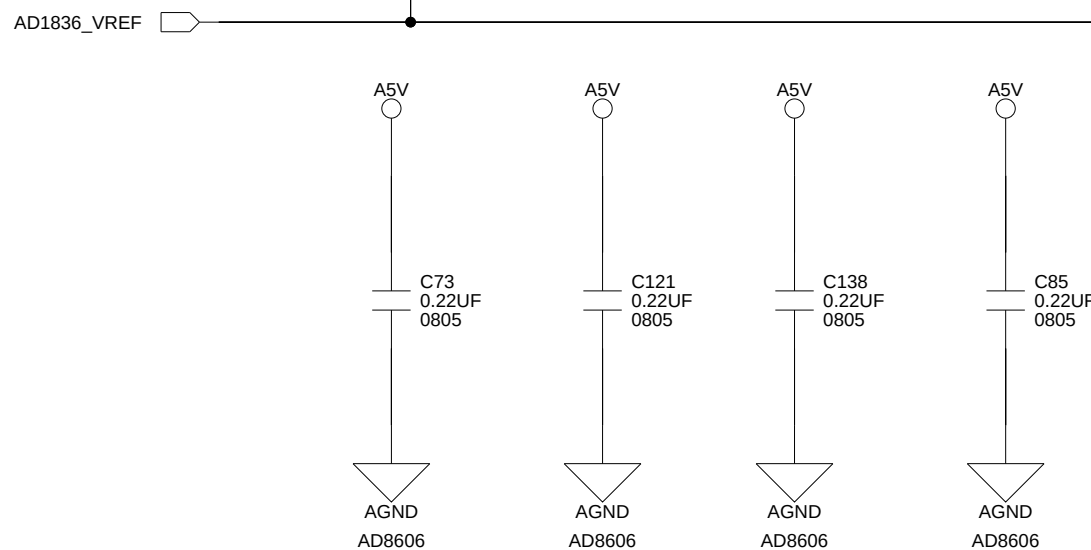
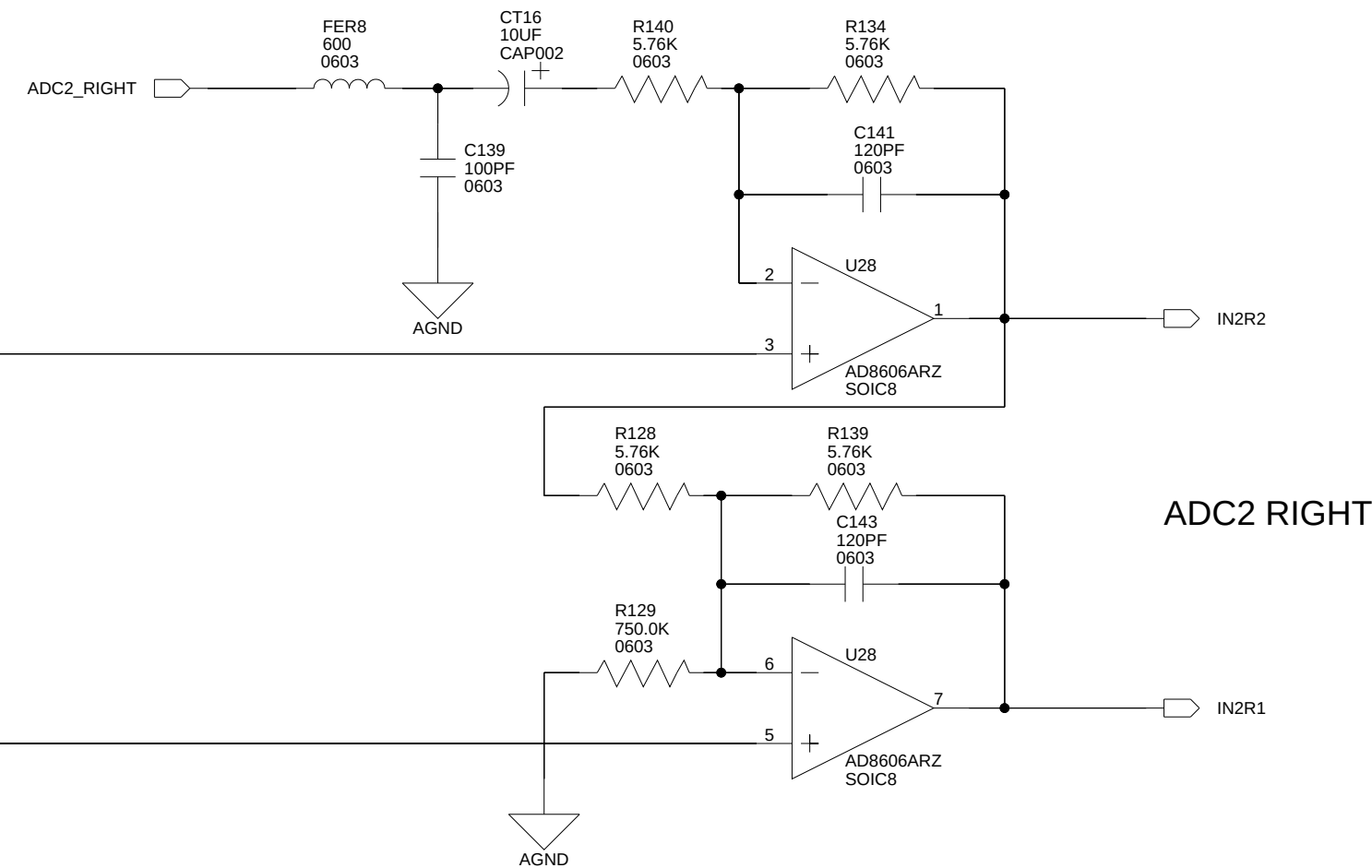
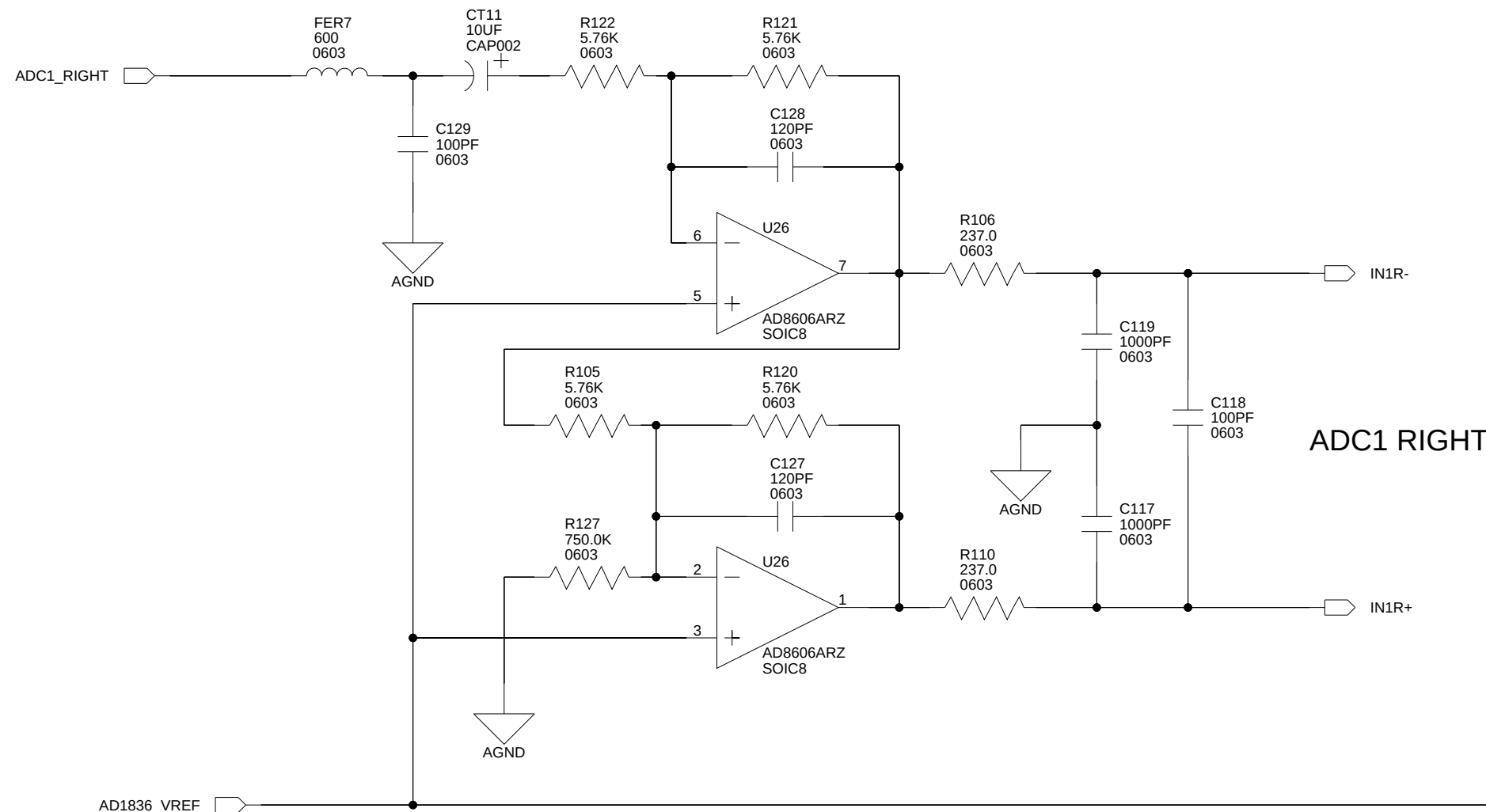
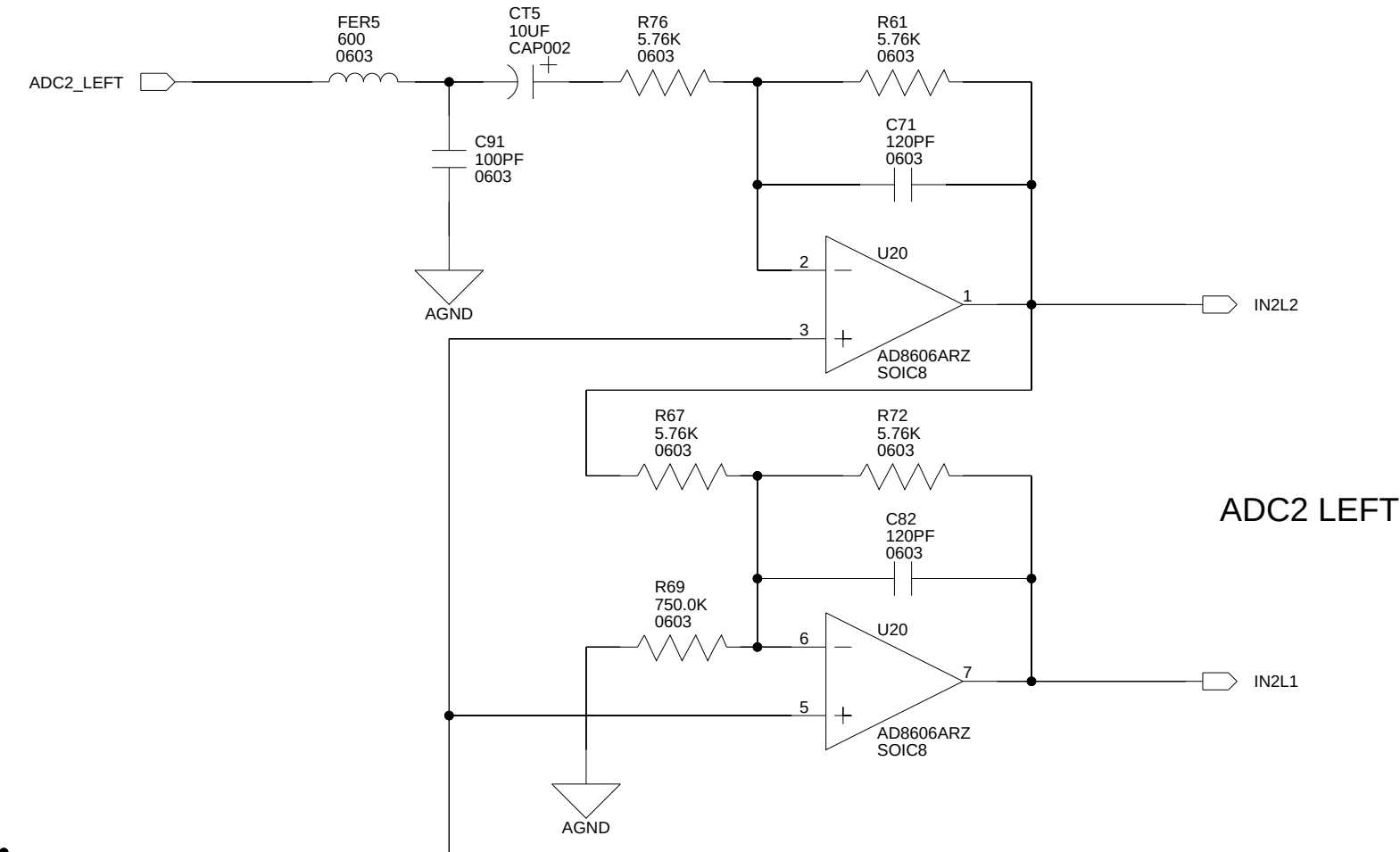
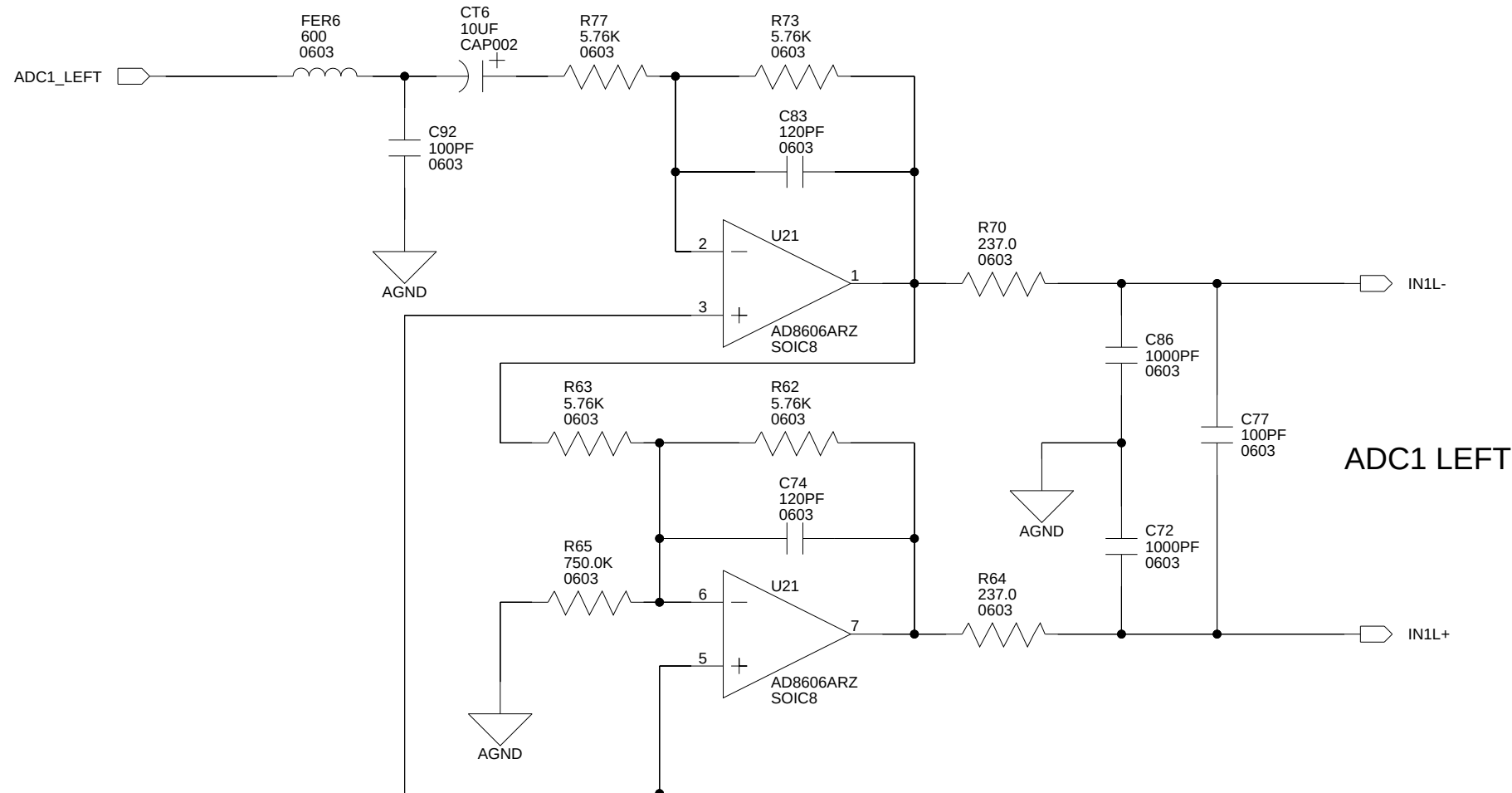
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|  <b>ANALOG<br/>DEVICES</b> |                                | 20 Cotton Road<br>Nashua, NH 03063<br>PH: 1-800-ANALOGD      |  |
|                                                                                                                 |                                | <b>Title</b> BLACKFIN A-V EZ-EXTENDER<br>AUDIO OUT(CH2, CH3) |  |
| <b>Size</b><br>C                                                                                                | <b>Board No.</b><br>A0193-2004 | <b>Rev</b><br>2.1                                            |  |
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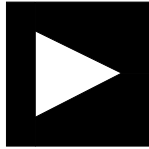
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|---------------------------------------------------------------------------------------|--|------------------------------|--|---------------------------------------------------------|----------------|
|  |  | <b>ANALOG<br/>DEVICES</b>    |  | 20 Cotton Road<br>Nashua, NH 03063<br>PH: 1-800-ANALOGD |                |
| <b>Title</b> BLACKFIN A-V EZ-EXTENDER<br>AUDIO IN(CH1, CH2)                           |  |                              |  |                                                         |                |
| <b>Size<br/>C</b>                                                                     |  | <b>Board No.</b> A0193-2004  |  |                                                         | <b>Rev</b> 2.1 |
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