

SHARC® Audio EZ-Extender® Manual

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



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Regulatory Compliance

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

The SHARC Audio 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 SHARC Audio 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: Z600ANA2.037, dated May 21, 2010.



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56 Shrivenham Hundred Business Park
Shrivenham, Swindon, SN6 8TY, UK

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



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PREFACE

Thank you for purchasing the SHARC® Audio EZ-Extender®, Analog Devices, Inc. daughter board to the EZ-Board® evaluation system for the ADSP-21xxx processors.

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 represents today's de facto standard for floating-point processing, targeted toward premium audio applications.

The EZ-Board and SHARC Audio EZ-Extender are designed to be used in conjunction with the CrossCore® Embedded Studio (CCES) and VisualDSP++® software development environments. The development environment facilitates advanced application code development and debug, such as:

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

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

Product Overview

The SHARC Audio EZ-Extender is a separately sold daughter board that plugs onto the expansion interface II of the ADSP-21469 EZ-Board and all future SHARC evaluation boards. The daughter board aids the design and prototyping phases of analog audio applications.

The board extends the capabilities of the evaluation system by providing a connection to three analog audio codecs.

The SHARC Audio EZ-Extender features:

- Analog audio interface
 - AD1939 – three Analog Devices 192 kHz audio codecs
 - 24 channels of audio out (twelve stereo channels)
 - Twelve channels of audio in (six stereo channels)
 - TDM and I²S modes at 48 KHz, 96 KHz, and 192 KHz sample rates
- Single-ended input/output
 - Three RCA phono jack inputs (4 x 1)
 - Three RCA phono jack outputs (4 x 2)
- Differential input/output
 - Two DB25 connector inputs
 - Three DB25 connector outputs

All of the power necessary to operate the extender is derived from the mating EZ-Board. Before using any of the interfaces, follow the setup procedure in [“SHARC Audio EZ-Extender Setup” on page 1-4](#).

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

Purpose of This Manual

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

Intended Audience

This manual is a user's guide and reference to the SHARC Audio EZ-Extender. Programmers who are familiar with the Analog Devices SHARC processor architecture, operation, and development tools are the primary audience for this manual.

Programmers who are unfamiliar with Analog Devices processors can use this manual but should supplement it with other texts that describe your target architecture. For the locations of these documents, see [“Related Documents”](#).

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

Manual Contents

Manual Contents

The manual consists of:

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

What’s New in This Manual

This is revision 1.1 of the *SHARC Audio 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.

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

- Post your questions in the processors and DSP support community at EngineerZone®:
<http://ez.analog.com/community/dsp>

- Submit your questions to technical support directly at:
<http://www.analog.com/support>

- E-mail your questions about processors, DSPs, and tools development software from **CrossCore Embedded Studio** or **VisualDSP++**:

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

- E-mail your questions about processors and processor applications to:
processor.support@analog.com or
processor.china@analog.com (Greater China support)
- In the **USA only**, call **1-800-ANALOGD** (1-800-262-5643)
- Contact your Analog Devices sales office or authorized distributor. Locate one at:
www.analog.com/adi-sales

Supported Products

- Send questions by mail to:
Processors and DSP Technical Support
Analog Devices, Inc.
Three Technology Way
P.O. Box 9106
Norwood, MA 02062-9106
USA

Supported Products

The SHARC Audio EZ-Extender is designed as an extender board to the ADSP-214xx EZ-Board evaluation systems.

Product Information

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

Analog Devices Web Site

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

To access a complete technical library for each processor family, go to <http://www.analog.com/dsp/tools>. 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

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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

Related Documents

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

Table 1. Related Processor Publications

Title	Description
<i>ADSP-214xx SHARC Processor Data Sheet</i>	General functional description, pinout, and timing
<i>ADSP-214xx SHARC Processor Hardware Reference</i>	Description of the internal processor architecture and all register functions
<i>SHARC Processor Programming Reference</i>	Description of all allowed processor assembly instructions

1 USING THE SHARC AUDIO EZ-EXTENDER

This chapter describes the SHARC Audio EZ-Extender package contents, configuration, installation procedure, and analog audio interface.

The information is presented in the following order.

- [“Package Contents” on page 1-2](#)
Describes the product’s package contents.
- [“SHARC Audio EZ-Extender Default Configuration” on page 1-2](#)
Describes the board’s default configuration.
- [“SHARC Audio EZ-Extender Setup” on page 1-4](#)
Provides the board’s setup procedure.
- [“Audio Interface” on page 1-4](#)
Describes the board’s analog audio interface.
- [“Example Programs” on page 1-6](#)
Describes the example programs installed with the board’s software.

For more information about the mating ADSP-21469 processor, see documents referred to as [“Related Documents”](#).

Package Contents

Package Contents

Your SHARC Audio EZ-Extender package contains the following items.

- SHARC Audio EZ-Extender board
- 3.5 mm stereo headphones
- 6-foot RCA audio cable
- 6-foot 3.5 mm/RCA x 2 Y-cable
- 3.5 mm stereo female to RCA male Y-cable

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

SHARC Audio EZ-Extender Default Configuration

The SHARC Audio 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.



The SHARC Audio EZ-Extender board is designed to run outside your personal computer as a standalone unit. You do not have to open your computer case.

Using the SHARC Audio EZ-Extender

When removing the extender 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 and switch settings, connector locations, and LED used in installation. Confirm that your board is in the default configuration before using the board.

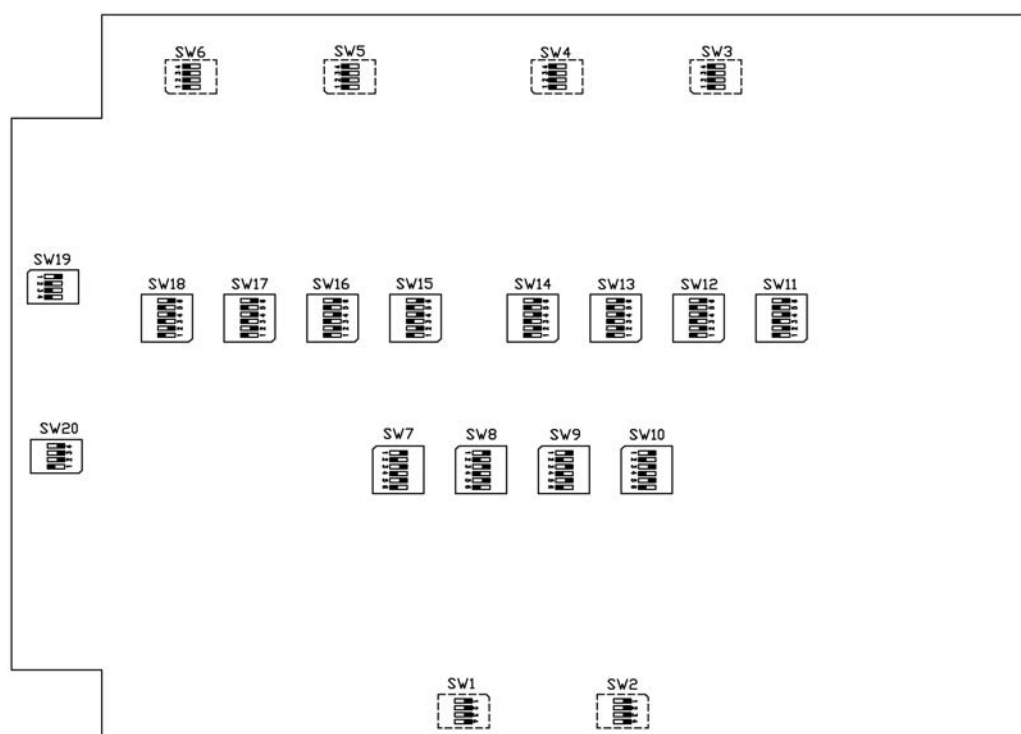


Figure 1-1. EZ-Extender Lite Hardware Setup

SHARC Audio EZ-Extender Setup

SHARC Audio EZ-Extender Setup

It is important to set up all components of the system containing the SHARC Audio EZ-Extender, then apply power to the system. The following procedure is recommended for the correct setup.

Power your system after these steps are completed:

1. Read the audio interface section in this chapter—the text provides an overview of the interface capabilities.
2. Read [“System Architecture” on page 2-2](#) to understand physical connections of the daughter board. For detailed information, refer to [“SHARC Audio EZ-Extender Schematic” on page B-1](#).
3. Refer to the readme files in the `Examples` folder of the installation directory. For custom setups, use [“System Architecture” on page 2-2](#) in conjunction with [“SHARC Audio EZ-Extender Hardware Reference” on page 2-1](#).

Audio Interface

The SHARC Audio EZ-Extender’s analog audio interface is comprised of three Analog Devices AD1939 multichannel audio codecs.

The AD1939 is a high performance, single-chip codec featuring four analog-to-digital converters (ADCs) for audio input and eight digital-to-analog converters (DACs) for audio output. This translates to twelve channels of audio in and twenty four channels of audio out. The codec/extender can input and output data at a sample rate of up to 192 kHz on all channels.

The audio interface connections are shown in [Figure 2-2](#); more details can be found in [“SHARC Audio EZ-Extender Schematic” on page B-1](#). The three codec chips (referred to as “AD1939A”, “AD1939B”, and

Using the SHARC Audio EZ-Extender

“AD1939C”) connect in parallel to the serial peripheral interface (SPI) port of the ADSP-21469 SHARC processor via the DPI pins. The SPI port of the processor is used to adjust volume and other audio parameters of each of the three codecs.

The serial ports (SPORTs) are used to transmit and receive audio data to and from the processor via the DAI pins. The analog audio channels are available via single-ended RCA connectors (J2–7) or differential DB25 connectors (P1–5). By default, the extender is shipped with the RCA connectors used by the AD1939 codecs for audio in and out. P1–5 are used to switch to differential mode. A standard, off the shelf DB25 connector to XLR cables is required to operate in differential mode. The P1–5 connectors require five XLR cables for full functionality. The XLR cables are not provided with the EZ-Extender. The mating cable’s manufacturer and part number information can be found in [“Differential In/Out Connectors \(P1–5\)” on page 2-19](#).

The DAI pins of the master codec can be configured to transfer serial data from the codec in Time-Division Multiplexing (TDM) mode or Integrated Interchip Sound (I²S) mode. The master input clock (MCLK) of the codec is generated by the on-board 12.288 MHz oscillator. The internal PLL of the codec is used to generate varying sample rates. The codec can be set up for 48 KHz, 96 KHz, or 192 KHz frequencies. The master codec (codec A) can run at these frequencies in both TDM and I²S modes with all ADCs inputs and DACs outputs. Codecs B and C are wired on the EZ-Extender and allow TDM mode operations only.

- At a 48 kHz sample rate, TDM mode allows up to 16 channels of data to be sent from each chip in each direction. Each chip uses four of the 16 input channels and eight of the 16 output channels. The number of channels can be set up in the control registers and is dependent on the sample rate. As the sample rate increases, the number of possible channels decreases.

Example Programs

- At 96 kHz, the AD1939 operates with a maximum of eight channels in each direction. At 96 kHz, all of the TDM channels are used by all analog outputs, but there are still four extra input channels, two of which can be used by the digital inputs.
- At the 192 kHz sample rate, a maximum of four channels in each direction can be used, meaning that four of the output channels cannot be used. To run at 192 KHz with all ADCs and DACs in TDM mode, the codec must run in dual-line TDM mode.

For more information about the AD1939 codecs, go to [AD1939](#).

Example programs are included in the EZ-Extender installation directory to demonstrate how to configure and use the board's analog audio interface.

For more information, see [“System Architecture” on page 2-2](#), [“Configuration Switches” on page 2-5](#), [“Power LED” on page 2-16](#), and [“Connectors” on page 2-17](#).

Example Programs

Example programs are provided with the SHARC Audio 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.

2 SHARC AUDIO EZ-EXTENDER HARDWARE REFERENCE

This chapter describes the hardware design of the SHARC Audio EZ-Extender.

The following topics are covered.

- [“System Architecture” on page 2-2](#)
Describes the daughter board’s configuration and explains how the board components interface with the processor and EZ-Board.
- [“Configuration Switches” on page 2-5](#)
Shows the locations and describes the on-board configuration switches.
- [“Power LED” on page 2-16](#)
Shows the location and describes the on-board power LED.
- [“Connectors” on page 2-17](#)
Shows the locations, describes, and provides part numbers for the on-board connectors. In addition, the manufacturer and part number information is provided for the mating parts.

System Architecture

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

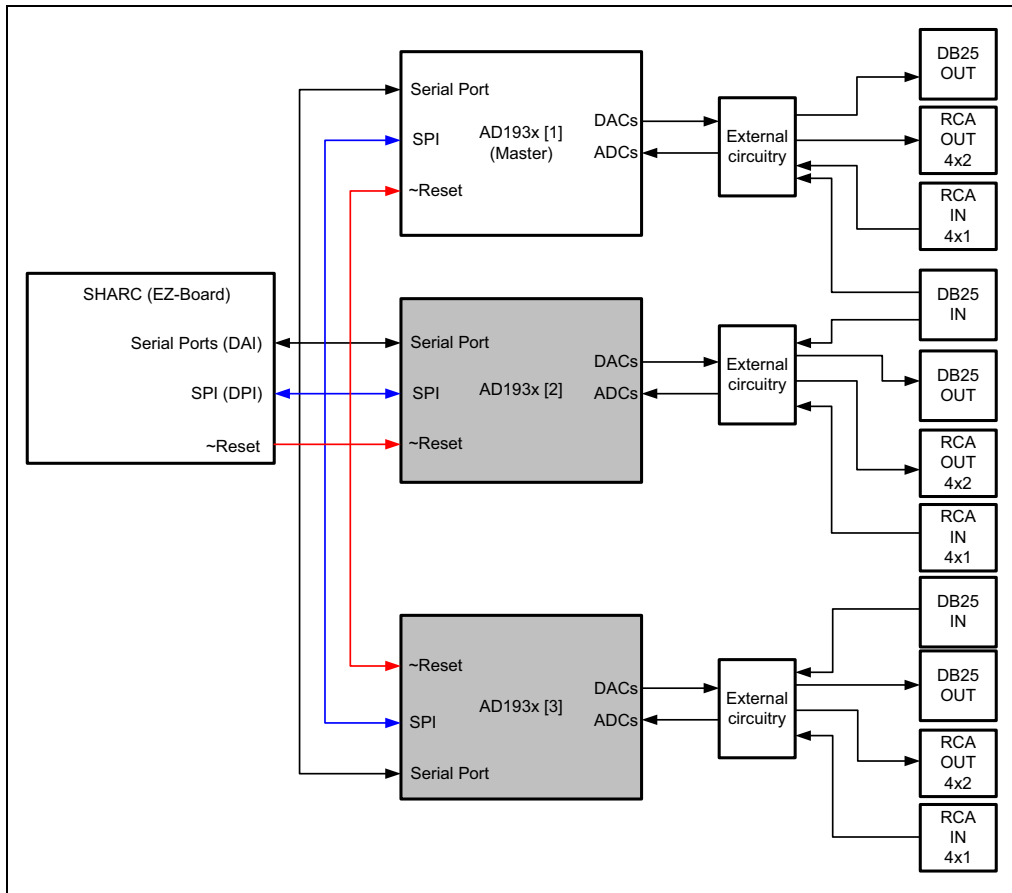


Figure 2-1. SHARC Audio EZ-Extender Block Diagram

SHARC Audio EZ-Extender Hardware Reference

Figure 2-2 is a block diagram of the audio interface; the diagram illustrates how the serial ports are interfaced to the processor and AD1939 codecs on a mating SHARC EZ-Board. The block diagram is a high-level diagram and does not show the voltage translation circuitry or clock buffers. The schematic pages are available in “SHARC Audio EZ-Extender Schematic” on page B-1.

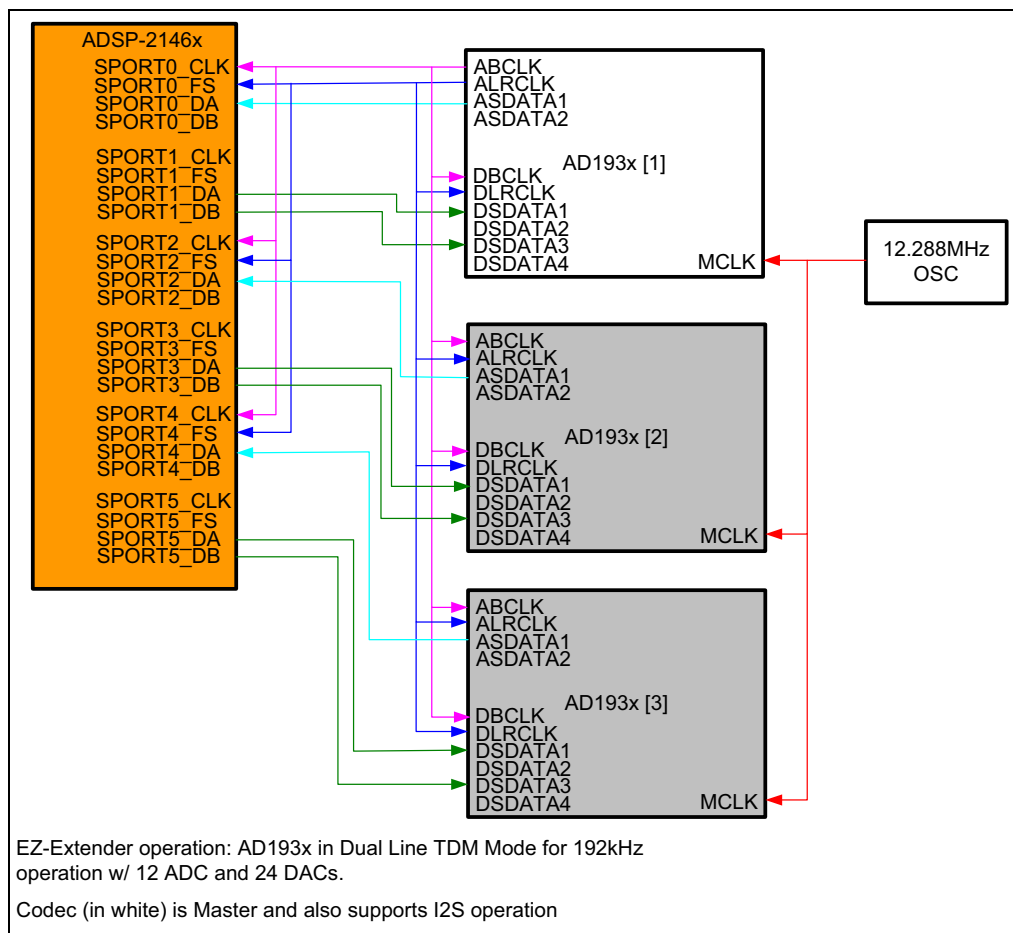


Figure 2-2. Serial Port Configuration Block Diagram

System Architecture

The analog audio interface consists of three AD1939 audio codec ICs (referred to as “AD1939A”, “AD1939B”, and “AD1939C”), which use up to six serial ports (SPORTs) of the processor. All of the clock and frame sync signals of the processor are driven by the master AD1939 codec (AD1939A).

The master codec can run in either Time-Division Multiplexed (TDM) mode or Integrated Interchip Sound (I²S) mode at a 48 KHz, 96 KHz, or 192 KHz sample rate in both modes using only two serial ports. Codecs B and C are connected to be slaves only and are hard-wired on the EZ-Extender to run in dual-line TDM. Codecs B and C can run in conjunction with codec A using six of the processor’s eight serial ports for dual-line TDM operation at a 192 KHz sample rate. In all cases, the processor is wired to be a slave, and the serial port clock and frame syncs are generated by the master codec (AD1939A).

Each of the Audio EZ-Extender’s codecs is configured using the SPI port of the processor. Each codec includes its own chip select pin.

The SHARC Audio EZ-Extender also is equipped with a 2-wire I²C serial flash memory device (M24C02). The M24C02 memory can store up to 2 KB of data, which includes a section pre-programmed with board revision data (PCB revision, BOM revision, serial number, etc.) and allows software to search for board-specific information at runtime. The flash memory device is connected to the EZ-Board via DPI pins 7 and 8. The address of the two-wire device can be modified using the DIP switch on the Audio EZ-Extender; see [“Memory Configuration Switch \(SW19\)” on page 2-14](#) for more information.

Configuration Switches

This section describes operation of the configuration switches. Before using the SHARC Audio EZ-Extender, follow the steps documented in the readme text files in the `Examples` folder of the installation directory. The switch locations are shown in [Figure 2-3](#). Switches on the bottom side of the EZ-Extender board are shown with a dashed line.

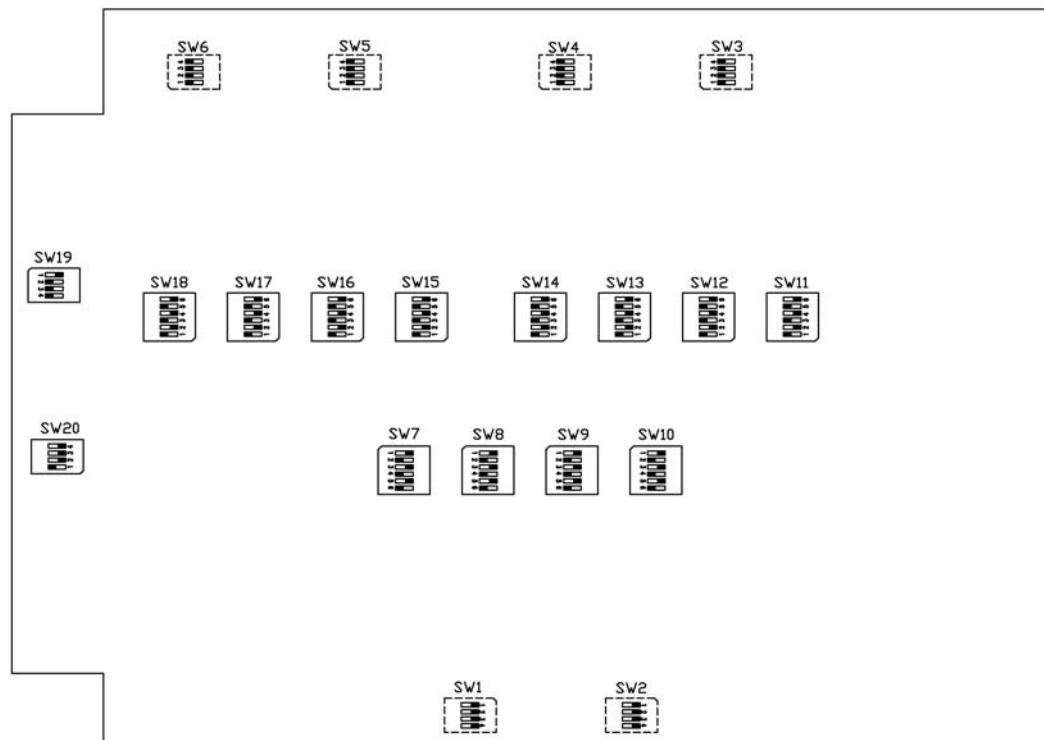


Figure 2-3. Switch Locations

Configuration Switches

Audio Loopback Switches (SW1–6)

The audio loopback switches (SW1–6) are intended for test purposes only. The switches loop-back any analog output signal generated from an AD1939 codec’s digital-to-analog converter (DAC) circuit to analog-to-digital converter (ADC) circuit:

- SW1–2 are designed for the master codec (AD1939A)
- SW3–4 are designed for the secondary codec (AD1939B)
- SW5–6 are designed for the third codec (AD1939C)

By default, switches SW1–6 are all OFF.

Audio In1 Left Selection Switch (SW7)

The audio selection switch (SW7) connects the left channel of the In1 line, connected to the AD1939’s ADC1 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors. The switch circuit is connected to AD1939A (codec A). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-1](#). See also “[Differential In/Out Connectors \(P1–5\)](#)” on page 2-19.

Table 2-1. Audio In1 Left Selection Switch (SW7)

SW7 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P1)
SW7.1	ON	OFF
SW7.2	OFF	ON
SW7.3	ON	OFF
SW7.4	OFF	ON
SW7.5	ON	OFF
SW7.6	OFF	ON

Audio In1 Right Selection Switch (SW8)

The audio selection switch (SW8) connects the right channel of the In1 line, connected to the AD1939's ADC2 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors for audio in. The switch circuit is connected to AD1939A (codec A). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-2](#). See also [“Differential In/Out Connectors \(P1–5\)” on page 2-19](#).

Table 2-2. Audio In1 Right Selection Switch (SW8)

SW8 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P1)
SW8.1	ON	OFF
SW8.2	OFF	ON
SW8.3	ON	OFF
SW8.4	OFF	ON
SW8.5	ON	OFF
SW8.6	OFF	ON

Audio In2 Left Selection Switch (SW9)

The audio selection switch (SW9) connects the left channel of the In2 line, connected to the AD1939's ADC3 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors. The switch circuit is connected to AD1939A (codec A). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-3](#). See also [“Differential In/Out Connectors \(P1–5\)” on page 2-19](#).

Configuration Switches

Table 2-3. Audio In2 Left Selection Switch (SW9)

SW9 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P1)
SW9.1	ON	OFF
SW9.2	OFF	ON
SW9.3	ON	OFF
SW9.4	OFF	ON
SW9.5	ON	OFF
SW9.6	OFF	ON

Audio In2 Right Selection Switch (SW10)

The audio selection switch (SW10) connects the right channel of the In2 line, connected to the AD1939's ADC4 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors for audio in. The switch circuit is connected to AD1939A (codec A). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-4](#). See also "[Differential In/Out Connectors \(P1-5\)](#)" on [page 2-19](#).

Table 2-4. Audio In2 Right Selection Switch (SW10)

SW10 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P1)
SW10.1	ON	OFF
SW10.2	OFF	ON
SW10.3	ON	OFF
SW10.4	OFF	ON
SW10.5	ON	OFF
SW10.6	OFF	ON

Audio In3 Left Selection Switch (SW11)

The audio selection switch (SW11) connects the left channel of the In3 line, connected to the AD1939's ADC5 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors. The switch circuit is connected to AD1939B (codec B). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-5](#). See also [“Differential In/Out Connectors \(P1–5\)”](#) on page 2-19.

Table 2-5. Audio In3 Left Selection Switch (SW11)

SW11 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P1)
SW11.1	ON	OFF
SW11.2	OFF	ON
SW11.3	ON	OFF
SW11.4	OFF	ON
SW11.5	ON	OFF
SW11.6	OFF	ON

Audio In3 Right Selection Switch (SW12)

The audio selection switch (SW12) connects the right channel of the In3 line, connected to the AD1939's ADC6 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors for audio in. The switch circuit is connected to AD1939B (codec B). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-6](#). See also [“Differential In/Out Connectors \(P1–5\)”](#) on page 2-19.

Configuration Switches

Table 2-6. Audio In3 Right Selection Switch (SW12)

SW12 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P1)
SW12.1	ON	OFF
SW12.2	OFF	ON
SW12.3	ON	OFF
SW12.4	OFF	ON
SW12.5	ON	OFF
SW12.6	OFF	ON

Audio In4 Left Selection Switch (SW13)

The audio selection switch (SW13) connects the left channel of the In4 line, connected to the AD1939's ADC7 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors. The switch circuit is connected to AD1939B (codec B). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-7](#). See also "[Differential In/Out Connectors \(P1-5\)](#)" on page 2-19.

Table 2-7. Audio In4 Left Selection Switch (SW13)

SW13 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P1)
SW13.1	ON	OFF
SW13.2	OFF	ON
SW13.3	ON	OFF
SW13.4	OFF	ON
SW13.5	ON	OFF
SW13.6	OFF	ON

Audio In4 Right Selection Switch (SW14)

The audio selection switch (SW14) connects the right channel of the In4 line, connected to the AD1939's ADC8 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors for audio in. The switch circuit is connected to AD1939B (codec B). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-8](#). See also [“Differential In/Out Connectors \(P1–5\)” on page 2-19](#).

Table 2-8. Audio In4 Right Selection Switch (SW14)

SW14 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P1)
SW14.1	ON	OFF
SW14.2	OFF	ON
SW14.3	ON	OFF
SW14.4	OFF	ON
SW14.5	ON	OFF
SW14.6	OFF	ON

Audio In5 Left Selection Switch (SW15)

The audio selection switch (SW15) connects the left channel of the In5 line, connected to the AD1939's ADC9 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors. The switch circuit is connected to AD1939C (codec C). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-9](#). See also [“Differential In/Out Connectors \(P1–5\)” on page 2-19](#).

Configuration Switches

Table 2-9. Audio In5 Left Selection Switch (SW15)

SW15 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P2)
SW15.1	ON	OFF
SW15.2	OFF	ON
SW15.3	ON	OFF
SW15.4	OFF	ON
SW15.5	ON	OFF
SW15.6	OFF	ON

Audio In5 Right Selection Switch (SW16)

The audio selection switch (SW16) connects the right channel of the In5 line, connected to the AD1939's ADC10 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors for audio in. The switch circuit is connected to AD1939C (codec C). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-10](#). See also “[Differential In/Out Connectors \(P1–5\)](#)” on [page 2-19](#).

Table 2-10. Audio In5 Right Selection Switch (SW16)

SW16 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P2)
SW16.1	ON	OFF
SW16.2	OFF	ON
SW16.3	ON	OFF
SW16.4	OFF	ON
SW16.5	ON	OFF
SW16.6	OFF	ON

Audio In6 Left Selection Switch (SW17)

The audio selection switch (SW17) connects the left channel of the In6 line, connected to the AD1939's ADC11 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors. The switch circuit is connected to AD1939C (codec C). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-11](#). See also [“Differential In/Out Connectors \(P1–5\)”](#) on [page 2-19](#).

Table 2-11. Audio In6 Left Selection Switch (SW17)

SW17 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P2)
SW17.1	ON	OFF
SW17.2	OFF	ON
SW17.3	ON	OFF
SW17.4	OFF	ON
SW17.5	ON	OFF
SW17.6	OFF	ON

Audio In8 Right Selection Switch (SW18)

The audio selection switch (SW18) connects the right channel of the In8 line, connected to the AD1939's ADC12 circuit, to either the single-ended RCA connectors or the differential DB25 connector. By default, the switch is set up to use the RCA connectors for audio in. The switch circuit is connected to AD1939C (codec C). To use the standard, off the shelf DB25 connector to XLR cables, change the switch to the differential setting; see [Table 2-12](#). See also [“Differential In/Out Connectors \(P1–5\)”](#) on [page 2-19](#).

Configuration Switches

Table 2-12. Audio In8 Right Selection Switch (SW18)

SW18 Position	Single-Ended Mode RCA IN (Default)	Differential Mode DB25 IN (P2)
SW18.1	ON	OFF
SW18.2	OFF	ON
SW18.3	ON	OFF
SW18.4	OFF	ON
SW18.5	ON	OFF
SW18.6	OFF	ON

Memory Configuration Switch (SW19)

The memory configuration switch (SW19) settings are shown in [Table 2-13](#). For more information on the memory functionality, refer to the memory manufacturer's data sheet. By default, the memory write protection is on and as a result, the device select and address bytes are acknowledged, but the data bytes are not. In order to write to the memory device, turn the DIP switch (SW19.1) OFF.

Table 2-13. Memory Configuration Switch (SW19)

SW19 Position	Function	Switch Setting (Default)
SW19.1	Write protection	ON
SW19.2	ADDR0	OFF
SW19.3	ADDR1	OFF
SW19.4	ADDR2	OFF

Soft Reset Enable Switch (SW20)

The software reset enable switch (SW20) settings are shown in [Table 2-14](#). The switch resets all three AD1939 codecs simultaneously via a programmable flag pin.

By default, FLAG0 is enabled and can be used to reset the three codecs. FLAG1, FLAG2, or FLAG3 also can be used (in place of FLAG0) to reset the codecs via software by changing the respective SW20 pins. To reset all three codecs via a single reset supervisor on the EZ-Board, turn all positions of SW20 to OFF.

If a soft reset is required, only one position of SW20 can be enabled at any given time.

Table 2-14. Soft Reset Enable Switch (SW20)

SW20 Position	Processor Flag Pin	Switch Setting (Default)
SW20.1	FLAG0	ON
SW20.2	FLAG1	OFF
SW20.3	FLAG1	OFF
SW20.4	FLAG3	OFF

Power LED

Power LED

This section describes the power LED (LED1) When LED1 is lit solid, it indicates that the board is powered. [Figure 2-4](#) shows the LED location.

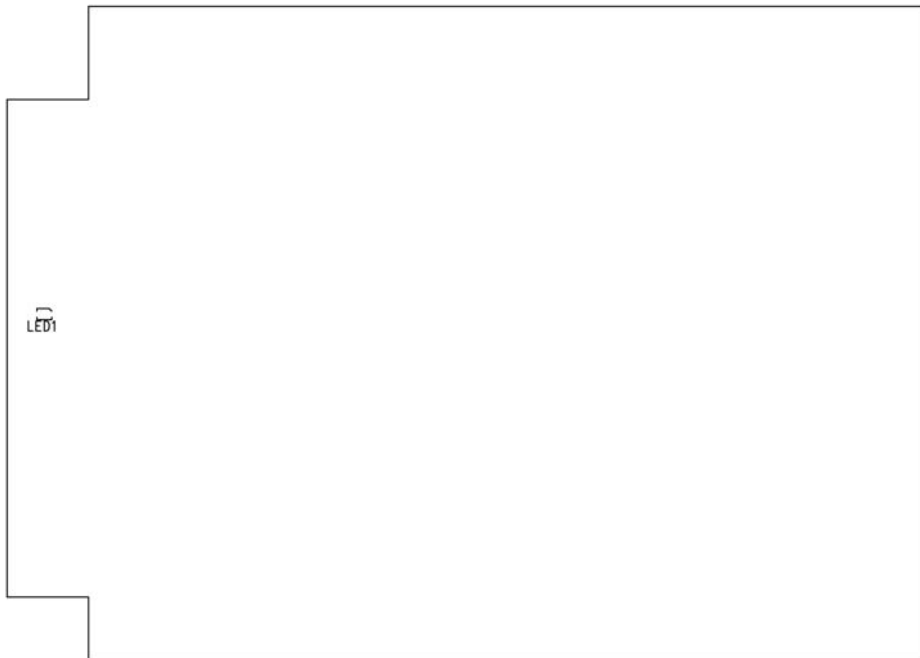


Figure 2-4. Power LED Location

Connectors

This section describes connector functionality and provides information about mating connectors. The connector locations are shown in [Figure 2-5](#). Dashed lines denote connectors located on the bottom side of the board.

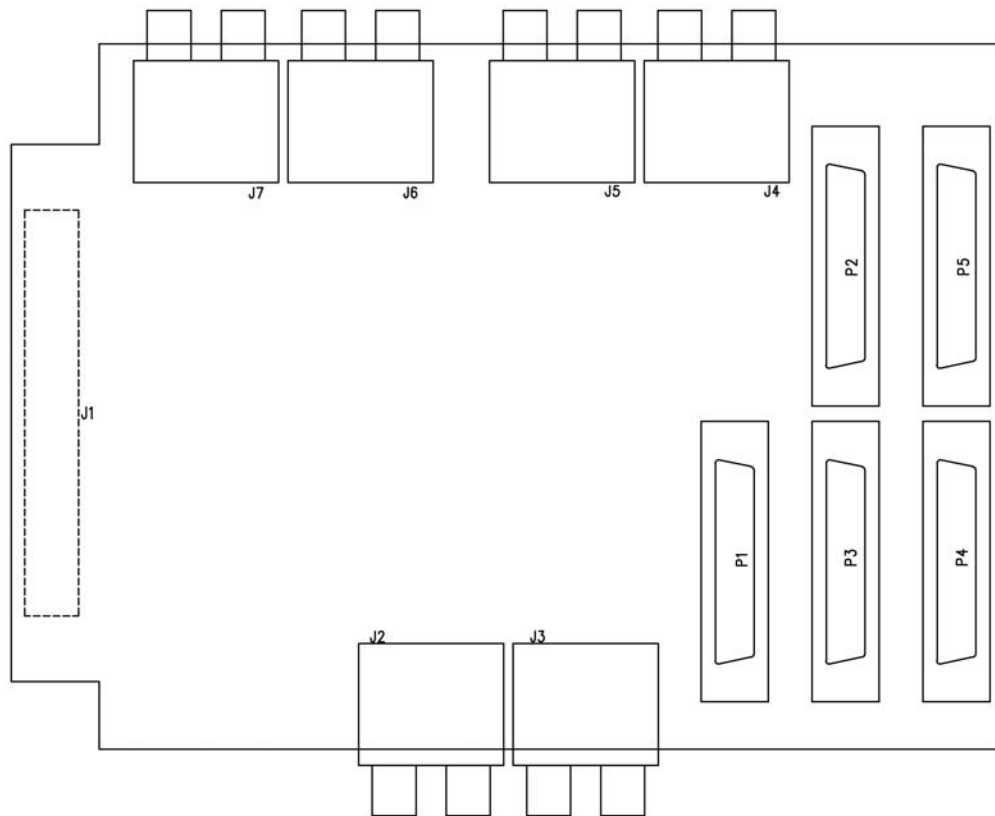


Figure 2-5. Connector Locations

Connectors

Expansion Interface II Connector (J1)

The board-to-board connector (J1) providing signals for the DAI and DPI interfaces and general-purpose I/O (GPIO) signals of the mating EZ-Board. J1 also provides the EZ-Extender's power. Consequently, no extra power supply is needed when using the product. The connector is located on the left edge of the board. For availability and pricing of the connector, contact Samtec.

Part Description	Manufacturer	Part Number
60-position 0.1", SMT socket	SAMTEC	SSW-130-22-F-D-VS
Mating Connector		
60-position 0.1", SMT header	SAMTEC	TSSH-130-01-L-DV-A

RCA Audio Connectors (J2-7)

Analog audio channels via single-ended RCA connectors (J2-7).

Part Description	Manufacturer	Part Number
RCA 2 x 3	KYOYAKU ENT	WSP-256V1-09
Mating Cable (shipped with the EZ-Extender)		
6' RCA audio cable	CABLESTOGO	03171

SHARC Audio EZ-Extender Hardware Reference

Differential In/Out Connectors (P1–5)

The differential in and out connectors (P1–5) are intended for an evaluation of the AD1939 codecs via XLR connectors. A standard, off the shelf DB25 connector to XLR cables is required.

Part Description	Manufacturer	Part Number
25-position DB25 socket	FCI	D25S24AGX00LF
Mating Cable		
Snake (8)XLRF-25P 9.9'	HOSA	DTF-803
Snake (8)XLRM-25P 9.9'	HOSA DTM	DTM-803

Connectors

A SHARC AUDIO EZ-EXTENDER BILL OF MATERIALS

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

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
1	1	12.288MHZ OSC003	U1	EPSON	SG-8002CA MP
2	3	SN74LVC1G08 SOT23-5	U57-59	TI	SN74LVC1G08DBVR
3	3	SN74AVC8T245 TSSOP24	U54-56	TI	SN74AVC8T245PW
4	1	IDT5T30553 SOIC8	U2	IDT	5T30553DCG
5	2	PCK3807A TSSOP20	U60-61	NXP	PCK3807APW
6	3	AD1939 LQFP64	U3-5	ANALOG DEVICES	AD1939YSTZ
7	48	AD8652ARZ SOIC_N8	U6-53	ANALOG DEVICES	AD8652ARZ
8	1	ADP1715 MSOP8	VR1	ANALOG DEVICES	ADP1715ARMZ- 3.3-R7
9	12	DIP6 SWT017	SW7-18	CTS	218-6LPST
10	8	DIP4 SWT018	SW1-6,SW19-20	ITT	TDA04HOSB1
11	6	RCA 2x3 CON_RCA_6B	J2-7	KYOYAKU ENT.	WSP-256V1-09H
12	5	DB25 25PIN DB25FV	P1-5	FCI	D25S24AGX00LF

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
13	1	IDC 30x2 IDC30X2_SMT_F	J1	SAMTEC	SSW-130-22-F-D-VS
14	6	10UF 6.3V 10% 0805	C17,C20,C113,C116, C211,C214	AVX	08056D106KAT2A
15	74	0.1UF 10V 10% 0402	C24,C32,C34-35,C40, C42,C46-47,C52,C64- 67,C73-75,C78, C87-89,C92, C101-103,C107,C130, C132-133,C138,C140, C144-145,C150, C162-165,C171-173, C176,C185-187,C190, C199-201,C205,C228, C230-231,C236,C238, C242-243,C248, C260-263,C269-271, C274,C283-285,C288, C297-299,C303,	AVX	0402ZD104KAT2A
16	34	0.01UF 16V 10% 0402	C1-16,C23,C112, C119-124,C210, C217-222,C308,C311, C313	AVX	0402YC103KAT2A
17	14	10K 1/16W 5% 0402	R1-2,R22,R24-29, R43-44,R617-619	VISHAY	CRCW040210K0FKE D
18	44	33 1/16W 5% 0402	R3-21,R23,R30-42, R46-49,R237,R425, R612-616	VISHAY	CRCW040233R0JNEA
19	3	100UF 10V 10% C	CT2,CT43,CT84	AVX	TPSC107K010R0075
20	2	2.2UF 10V 10% 0805	C25-26	AVX	0805ZD225KAT2A
21	1	1A SK12 DO-214AA	D2	DIODES INC	B120B-13-F
22	6	0.1UF 16V 10% 0603	C18-19,C114-115, C212-213	AVX	0603YC104KAT2A

SHARC Audio EZ-Extender Bill of Materials

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
23	1	330 1/10W 5% 0603	R622	VISHAY	CRCW0603330RJNEA
24	24	237.0 1/10W 1% 0603	R53,R57,R65,R68, R77,R80-81,R84, R241,R245,R253, R256,R265,R268-269, R272,R429,R433, R441,R444,R453, R456-457,R460	DIGI-KEY	311-237HRTR-ND
25	72	49.9K 1/10W 1% 0603	R50,R56,R67,R71, R79,R82,R90-92, R118-119,R127-128, R147-148,R155,R164, R183-184,R191,R200, R219-220,R227,R238, R244,R255,R259, R267,R270,R278-280, R306-307,R315-316, R335-336,R343,R352, R371-372,R379,R388, R407-408,R415,R426, R432,R443,R447, R455,R458,R466-468, R494-4	DIGI-KEY	311-49.9KHRTR-ND
26	3	562.0 1/10W 1% 0603	R45,R236,R424	VISHAY	CRCW0603562RFKEA
27	3	390PF 25V 5% 0603	C21,C117,C215	AVX	06033A391FAT2A
28	3	5600PF 16V 5% 0805	C22,C118,C216	AVX	0805YA562JAT2A

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
29	120	4.99K 1/16W 1% 0603	R51,R58,R63-64, R75-76,R85-86,R93, R95-96,R106, R108-110,R126, R133-134,R136-138, R141,R150,R157, R169-170,R172-174, R177,R186,R193, R205-206,R208-210, R213,R222,R229, R239,R246,R251-252, R263-264,R273-274, R281,R283-284,R294, R296-298,R314, R321-322,R324-326, R329,R338	VISHAY	CRCW06034K99FKEA
30	6	10UF 10V 10% 0805	C41,C139,C237, C309-310,C312	PANASONIC	ECJ-2FB1A106K
31	24	5.76K 1/16W 1% 0603	R52,R55,R62,R66, R74,R78,R83,R87, R240,R243,R250, R254,R262,R266, R271,R275,R428, R431,R438,R442, R450,R454,R459, R463	PANASONIC	ERJ-3EKF5761V
32	1	GREEN LED001	LED1	PANASONIC	LN1361CTR
33	3	1.0K 1/16W 1% 0402	R70,R258,R446	PANASONIC	ERJ-2RKF1001X
34	24	100K 1/16W 5% 0402	R121-122,R151-152, R187-188,R223,R225, R309-310,R339-340, R375-376,R411,R413, R497-498,R527-528, R563-564,R599,R601	DIGI-KEY	541-100KJTR-ND

SHARC Audio EZ-Extender Bill of Materials

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
35	48	2.67K 1/16W 1% 0402	R98,R100,R104,R120, R153-154,R159,R163, R189-190,R195,R199, R224,R226,R231, R235,R286,R288, R292,R308,R341-342, R347,R351,R377-378, R383,R387,R412, R414,R419,R423, R474,R476,R480, R496,R529-530,R535, R539,R565-566,R571, R575,R600,R602, R607,R611	PANASONIC	ERJ-2RKF2671X
36	84	100.0 1/16W 1% 0402	R59-60,R72,R89, R113-117,R124,R135, R142-146,R171, R178-182,R207, R214-218,R247-248, R260,R277,R301-305, R312,R323,R330-334, R359,R366-370,R395, R402-406,R435-436, R448,R465,R489-493, R500,R511,R518-522, R547,R554-558,R583, R590-594	DIGI-KEY	541-100LCT-ND
37	12	37.4K 1/16W 1% 0402	R54,R61,R73,R88, R242,R249,R261, R276,R430,R437, R449,R464	DIGI-KEY	541-37.4KLCT-ND
38	24	1000PF 50V 5% 0402	C27-28,C33,C39,C45, C48,C54-55,C125- 126,C131,C137,C143, C146,C152-153, C223-224,C229,C235, C241,C244,C250-251	DIGI-KEY	490-3244-1-ND

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
39	12	100pF 50V 5% 0402	C31,C37,C44,C50, C129,C135,C142, C148,C227,C233, C240,C246	MURATA	GCM1555C1H101JZ1 3D
40	24	300PF 100V 5% 0603	C29-30,C36,C38,C43, C49,C51,C53,C127- 128,C134,C136,C141, C147,C149,C151, C225-226,C232,C234, C239,C245,C247, C249	DIGI-KEY	490-1362-2-ND
41	48	2.43K 1/16W 1% 0402	R97,R101,R105,R107, R130-131,R160-161, R166-167,R196-197, R202-203,R232-233, R285,R289,R293, R295,R318-319, R348-349,R354-355, R384-385,R390-391, R420-421,R473,R477, R481,R483,R506-507, R536-537,R542-543, R572-573,R578-579, R608-609	DIGI-KEY	541-2.43KLCT-ND
42	48	750.0 1/16W 1% 0402	R99,R102-103,R125, R129,R132,R158, R162,R165,R168, R194,R198,R201, R204,R230,R234, R287,R290-291,R313, R317,R320,R346, R350,R353,R356, R382,R386,R389, R392,R418,R422, R475,R478-479,R501, R505,R508,R534, R538,R541,R544, R570,R574,R577, R580,R606,R610	DIGI-KEY	541-750LCT-ND

SHARC Audio EZ-Extender Bill of Materials

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
43	48	620PF 50V 5% 0402	C57,C62-63,C68, C70-71,C76,C80, C84-85,C90,C94, C98-99,C104,C108, C155,C160-161,C166, C168-169,C174,C178, C182-183,C188,C192, C196-197,C202,C206, C253,C258-259,C264, C266-267,C272,C276, C280-281,C286,C290, C294-295,C300,C304	DIGI-KEY	490-3239-1-ND
44	48	680PF 50V 5% 0402	C58-59,C61,C69,C77, C79,C82-83,C91,C93, C96-97,C105-106, C110-111,C156-157, C159,C167,C175, C177,C180-181,C189, C191,C194-195, C203-204,C208-209, C254-255,C257,C265, C273,C275,C278-279, C287,C289,C292-293, C301-302,C306-307	DIGI-KEY	490-3240-1-ND
45	120	22UF 6.3V 20% ELEC_4MM	CT1,CT3-42,CT44- 83,CT85-123	PANASONIC	EEE-FC0J220R
46	24	22UF 6.3V 20% ELEC_5MM	C56,C60,C72,C81, C86,C95,C100,C109, C154,C158,C170, C179,C184,C193, C198,C207,C252, C256,C268,C277, C282,C291,C296, C305	MOUSER	647-UWP0J220MCL

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
47	48	6.81K 1/10W 1% 0603	R94,R111-112,R123, R139-140,R149,R156, R175-176,R185,R192, R211-212,R221,R228, R282,R299-300,R311, R327-328,R337,R344, R363-364,R373,R380, R399-400,R409,R416, R470,R487-488,R499, R515-516,R525,R532, R551-552,R561,R568, R587-588,R597,R604	DIGI-KEY	311-6.81KHRTR-ND
48	3	806 1/10W 1% 0402	R69,R257,R445	VISHAY	CRCW0402806RFKE D
49	1	30A GSOT03 SOT23-3	D1	VISHAY	GSOT03-GS08

2

SHARC

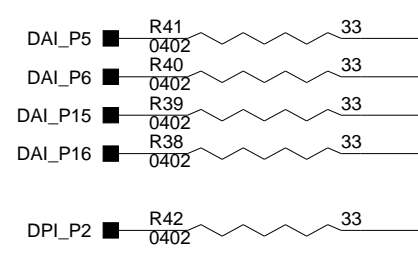
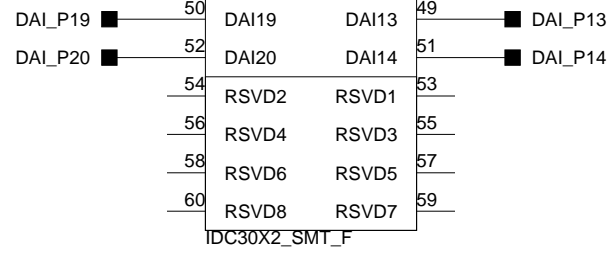
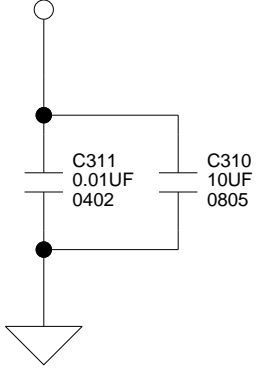
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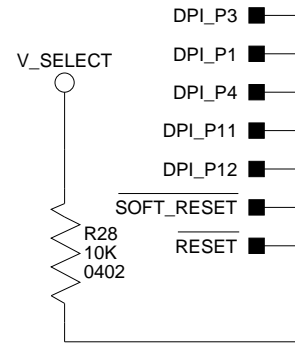
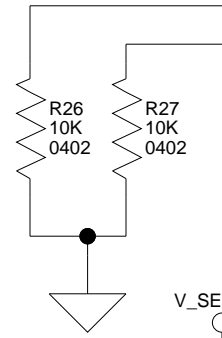
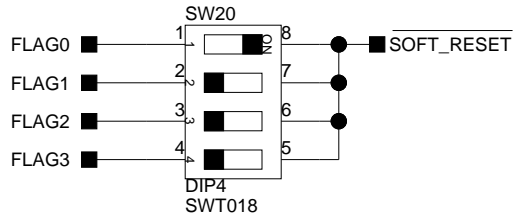
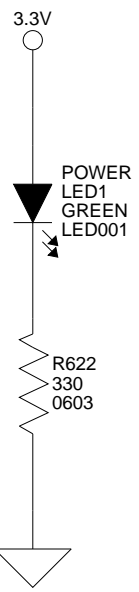
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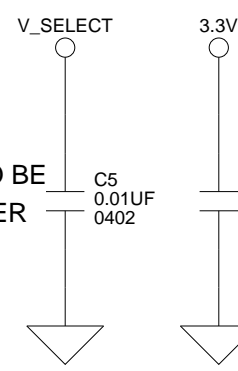
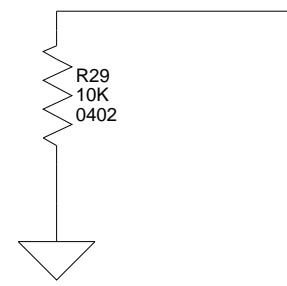
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DSP PIN NAME	PERIPHERAL NET CONNECTED TO
DAI_P1	NOT USED
DAI_P2	AD1939A_ABCLK
DAI_P3	AD1939C_DSDDATA3
DAI_P4	AD1939C_DSDDATA1
DAI_P5	AD1939A_ASDDATA1
DAI_P6	AD1939A_ASDDATA2
DAI_P7	AD1939A_ABCLK
DAI_P8	AD1939A_ALRCLK
DAI_P9	AD1939A_DSDDATA4
DAI_P10	AD1939A_DSDDATA3
DAI_P11	AD1939A_DSDDATA2
DAI_P12	AD1939A_DSDDATA1
DAI_P13	AD1939B_DSDDATA3
DAI_P14	AD1939B_DSDDATA1
DAI_P15	AD1939B_ASDDATA1
DAI_P16	AD1939C_ASDDATA1
DAI_P17	AD1939A_ABCLK
DAI_P18	NOT USED
DAI_P19	AD1939A_ALRCLK
DAI_P20	AD1939A_ALRCLK

DSP PIN NAME	PERIPHERAL NET CONNECTED TO
DPI_P1	SPI_MOSI
DPI_P2	SPI_MISO
DPI_P3	SPI_CLK
DPI_P4	AD1939A_CS
DPI_P5	NOT USED
DPI_P6	NOT USED
DPI_P7	I2C_SDA
DPI_P8	I2C_SCK
DPI_P9	NOT USED
DPI_P10	NOT USED
DPI_P11	AD1939B_CS
DPI_P12	AD1939C_CS
DPI_P13	NOT USED
DPI_P14	NOT USED

NOTE: DIP SWITCHES ON THE EZ-BOARD MAY NEED TO BE TURNED OFF TO USE THEM ON THIS EZ-EXTENDER

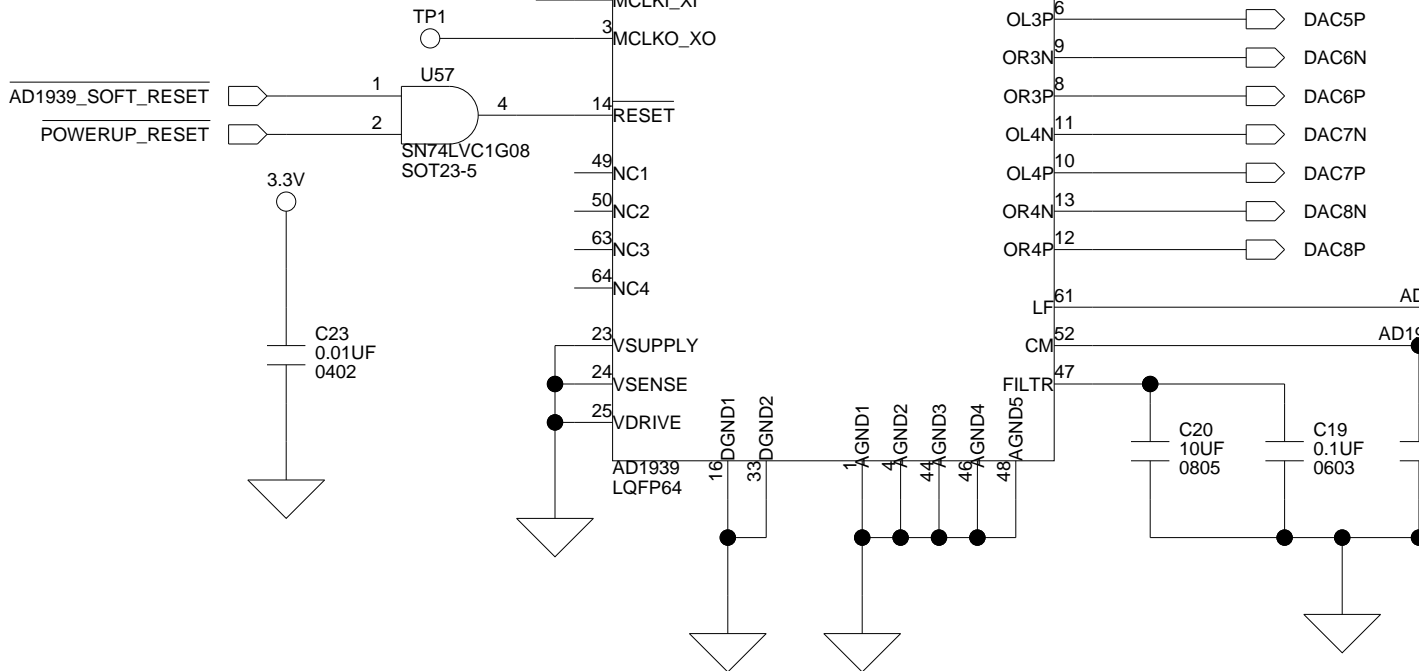


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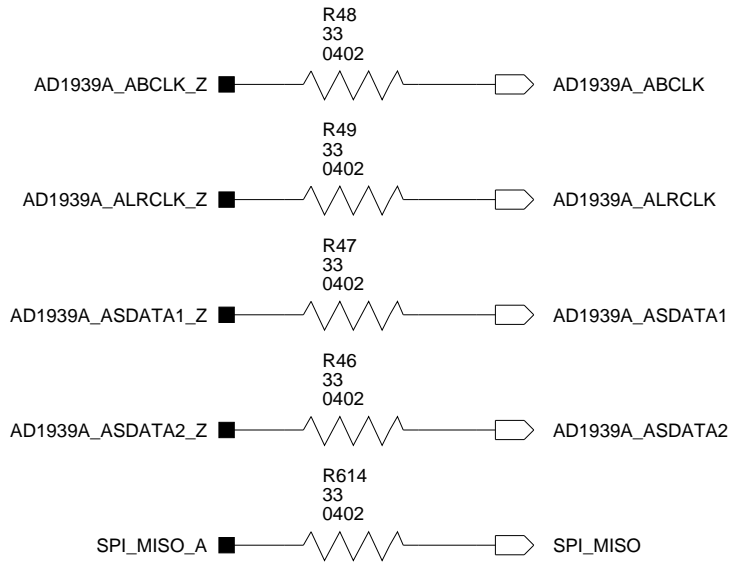
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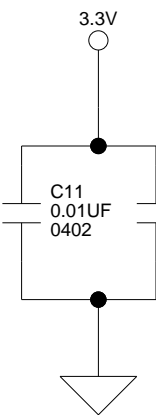
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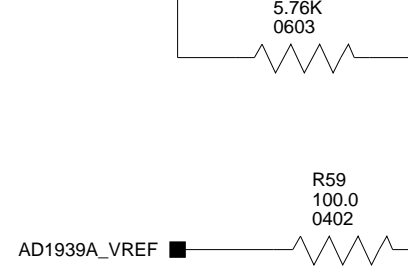
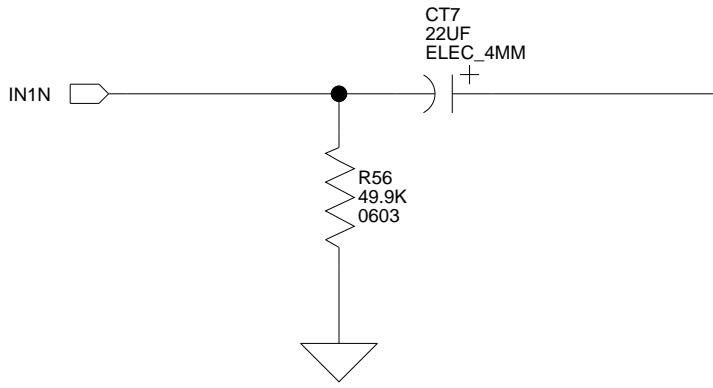
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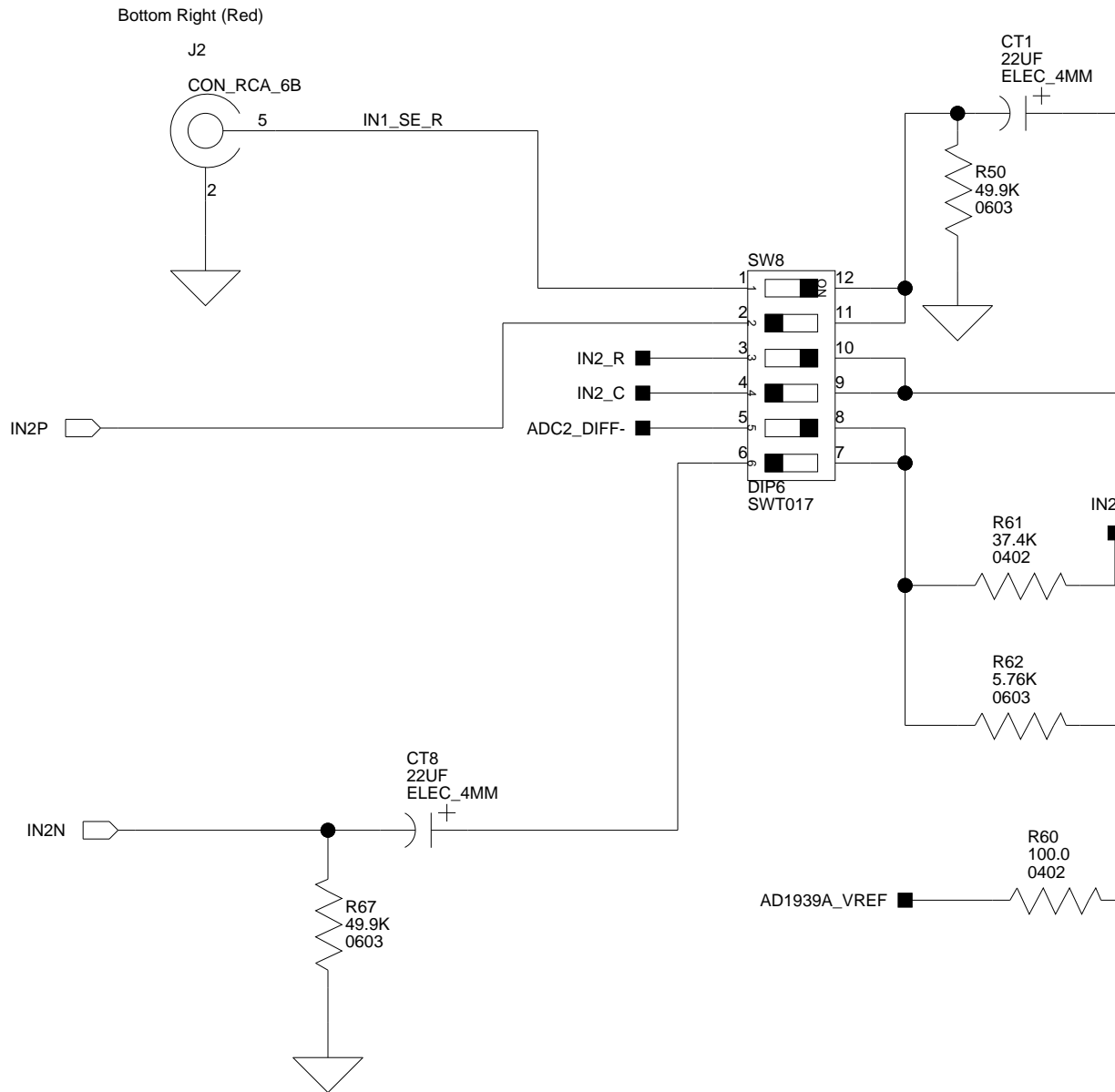
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B

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3

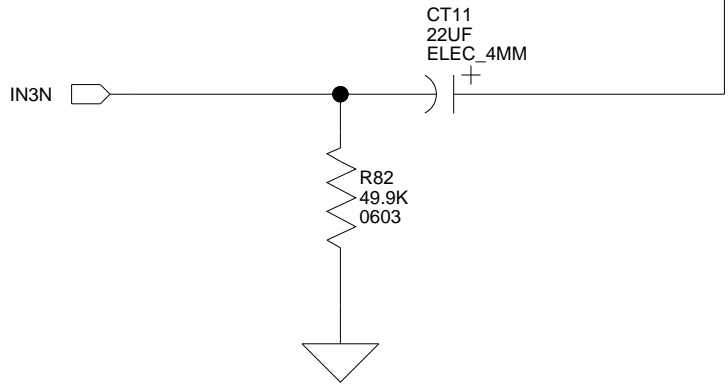


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A

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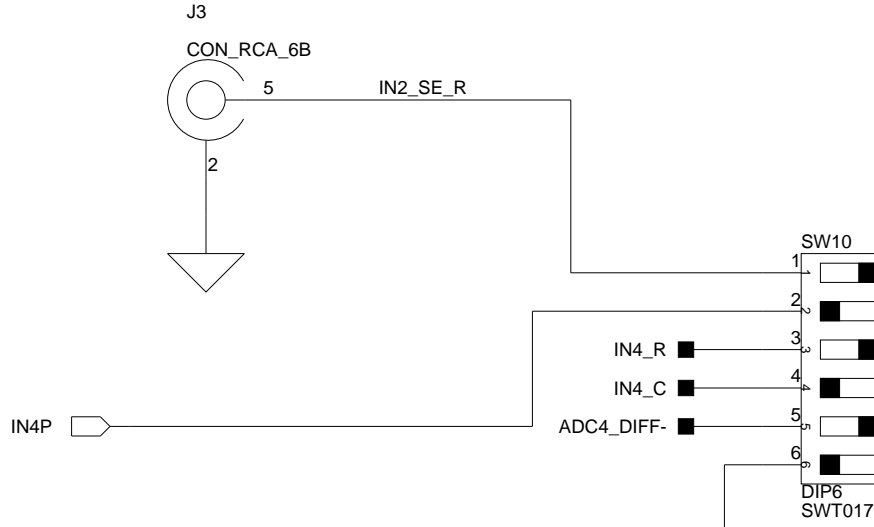
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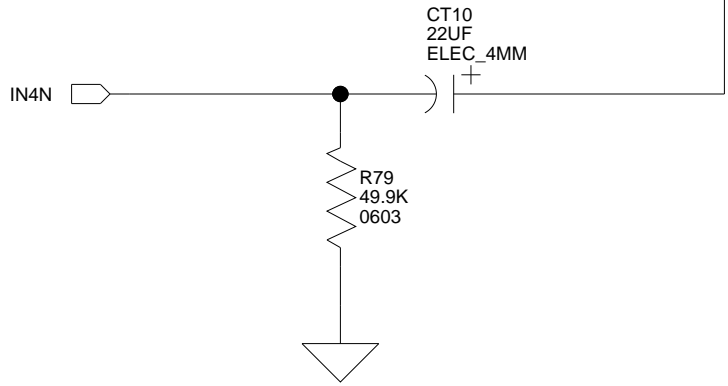
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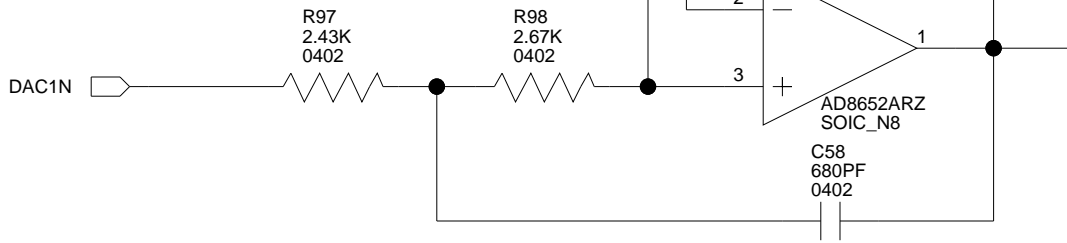
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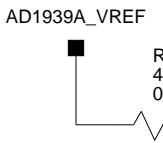
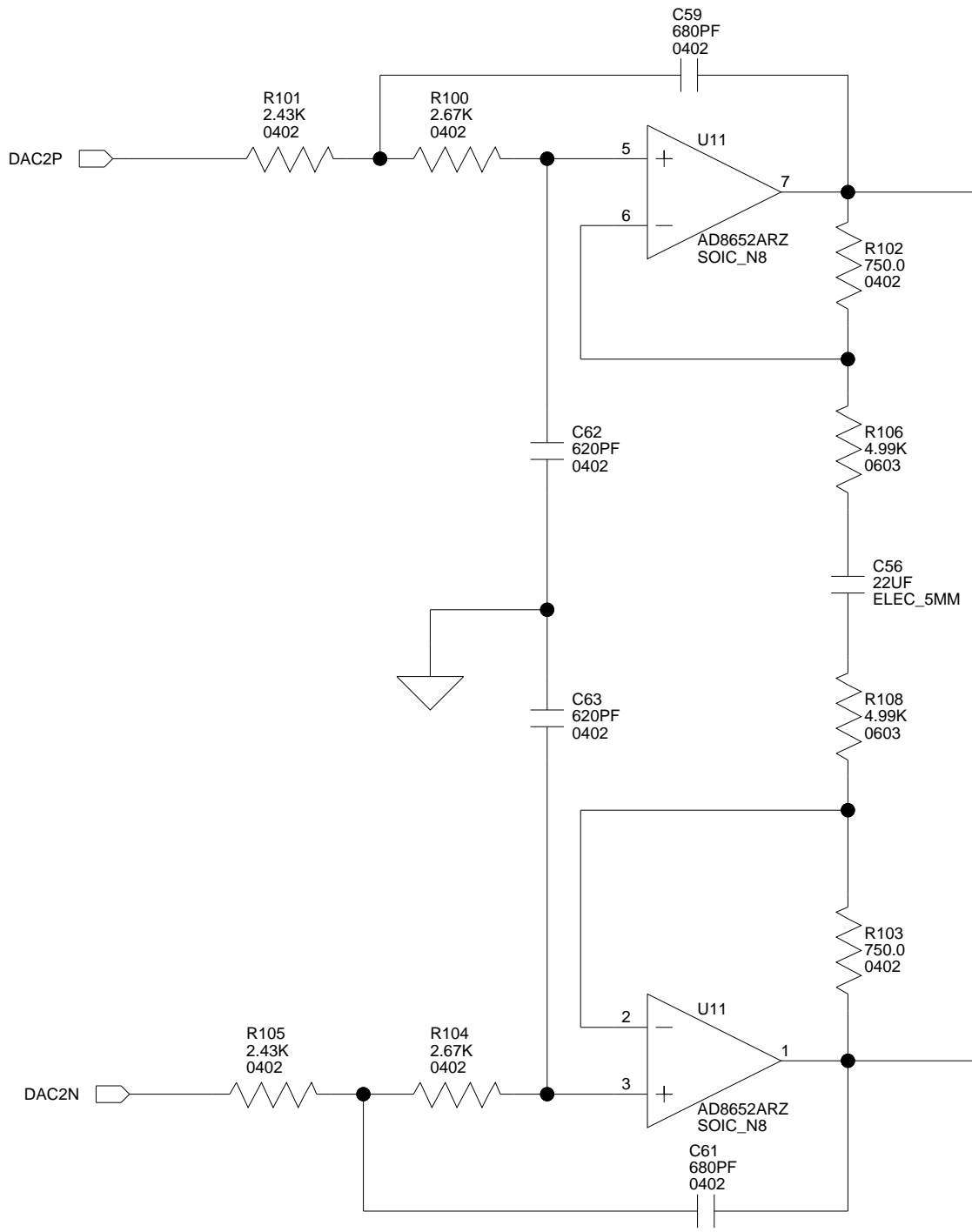
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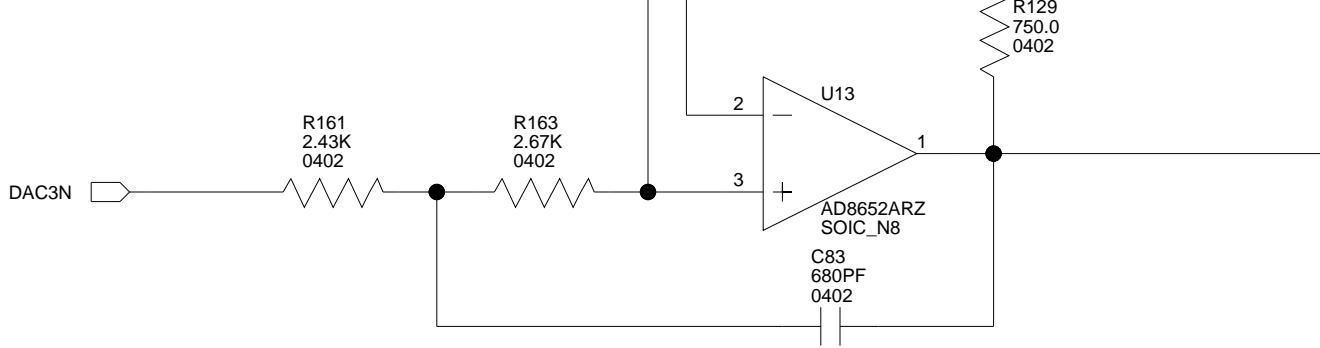


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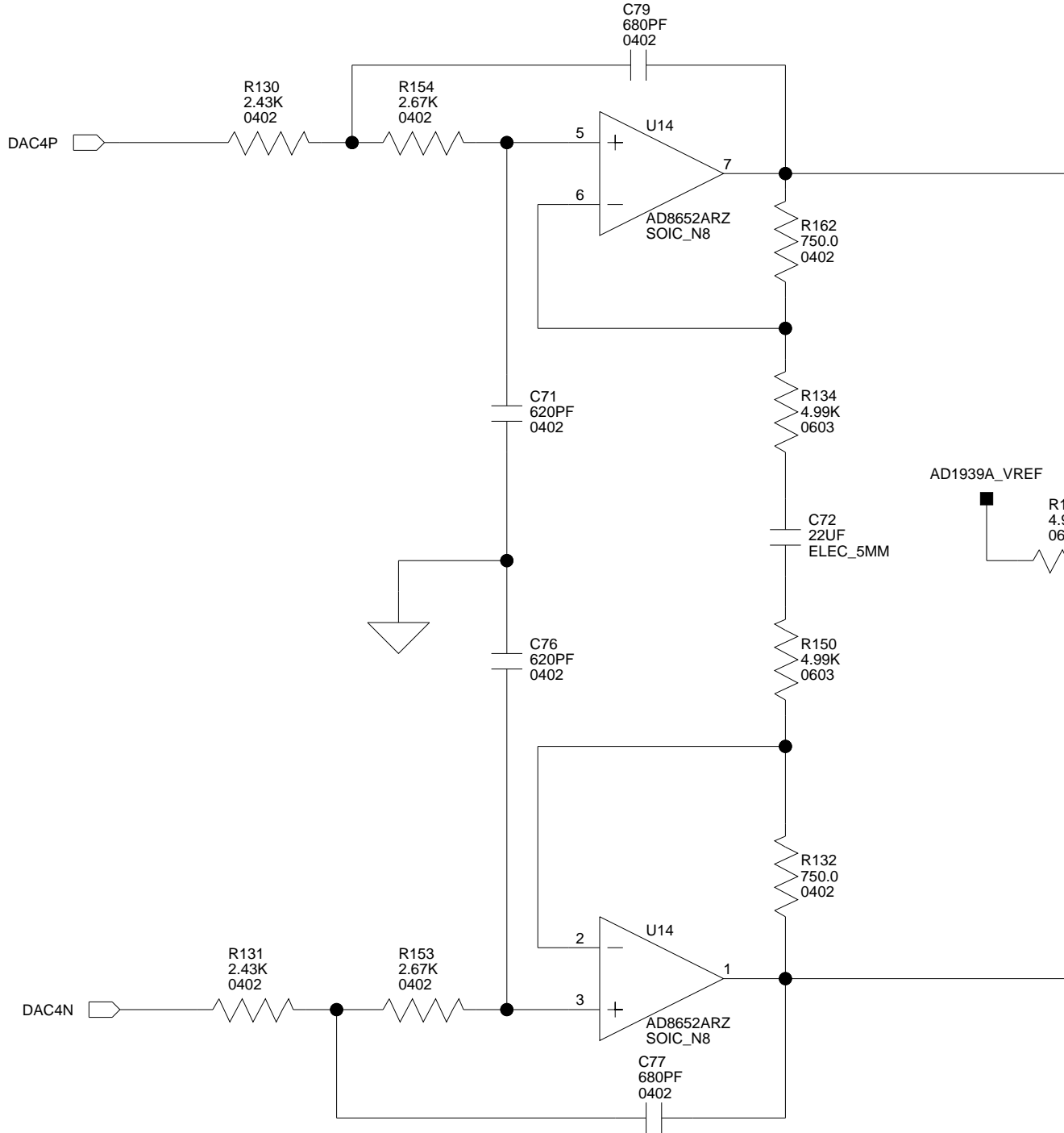
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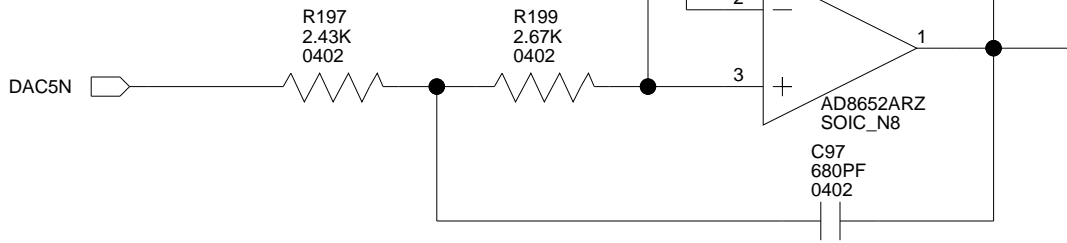


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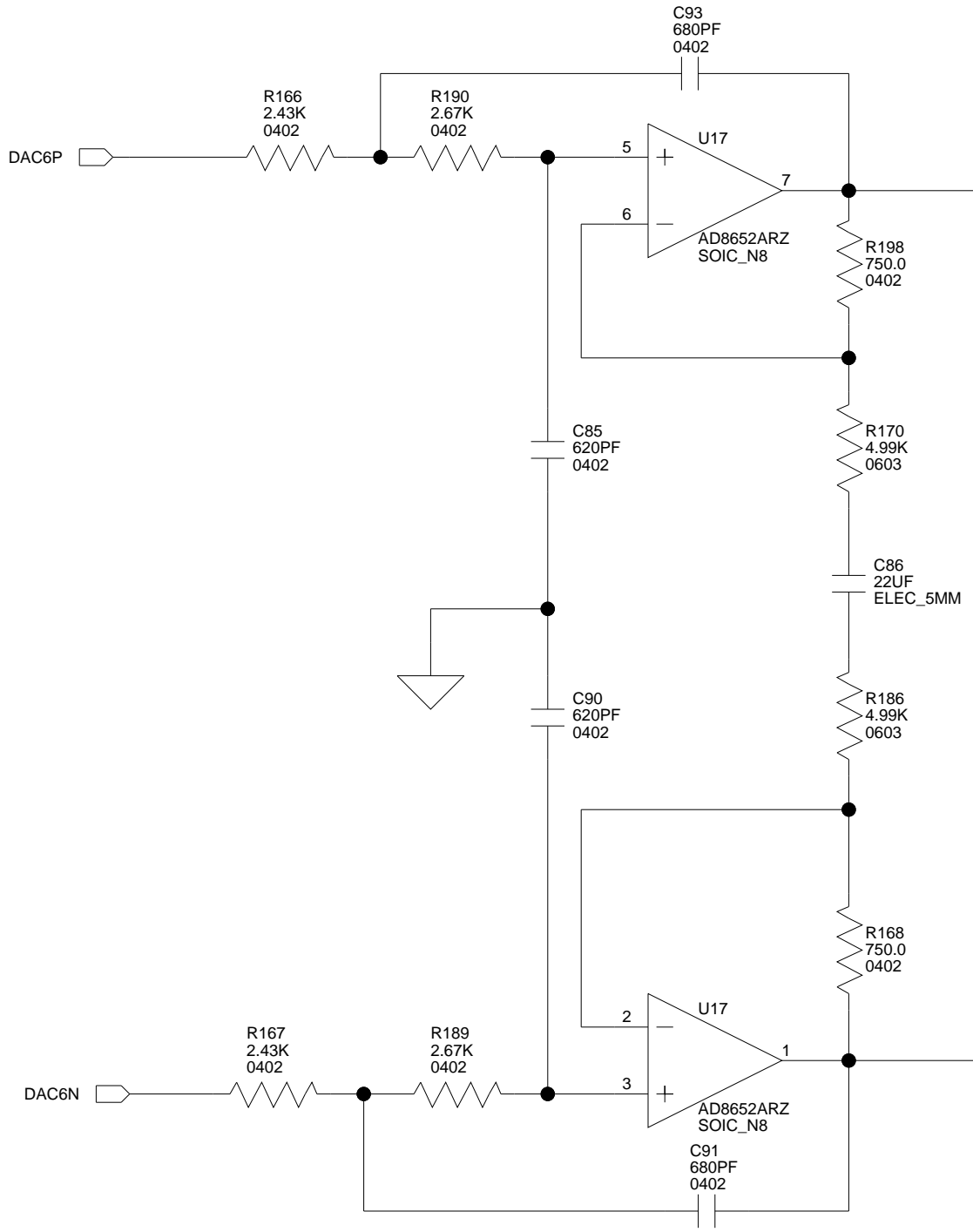
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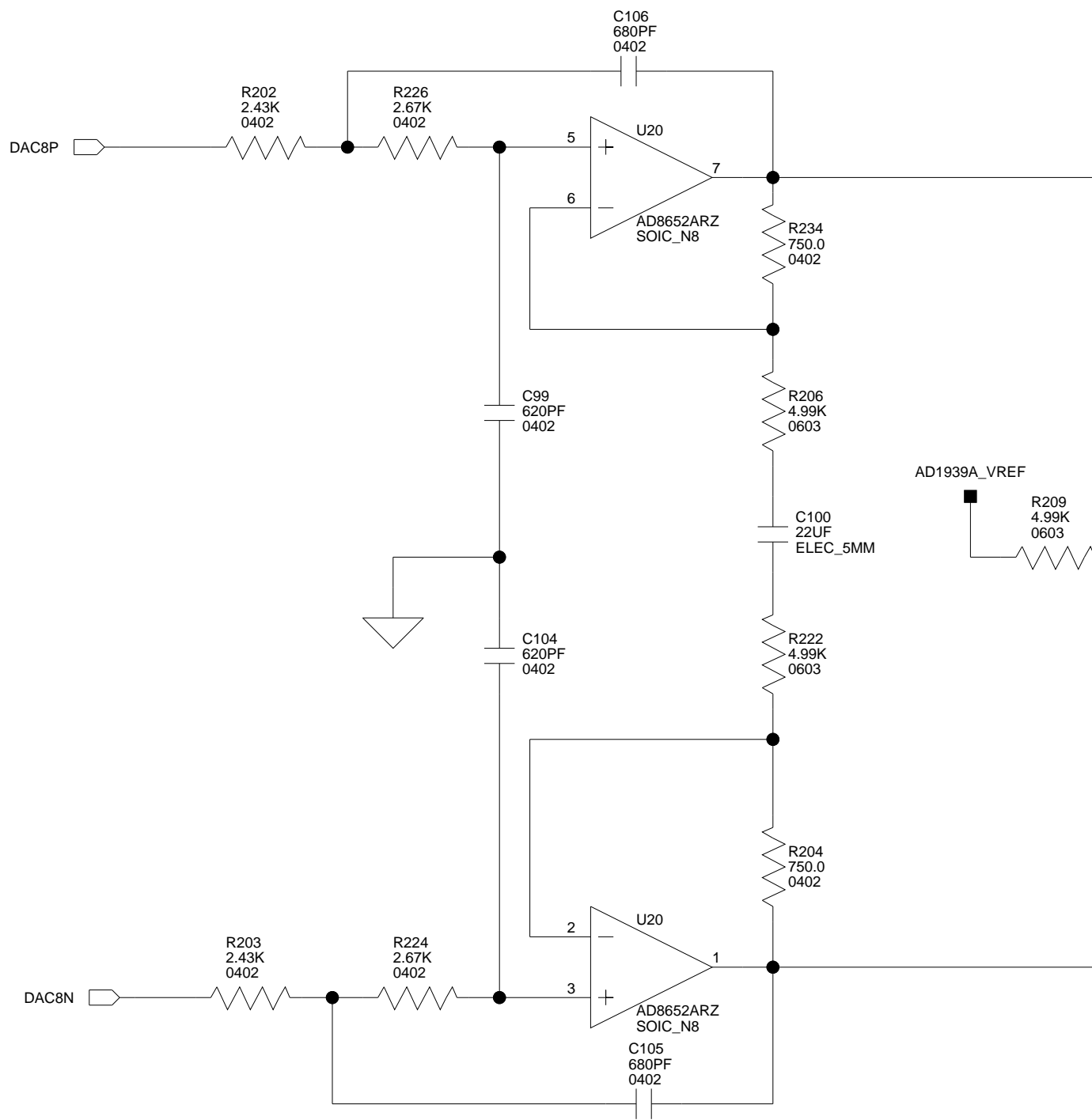
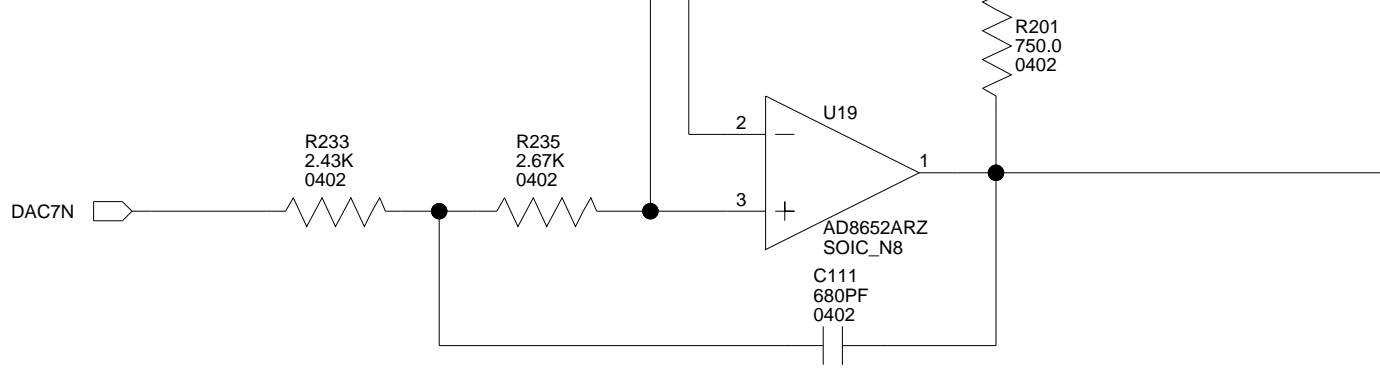
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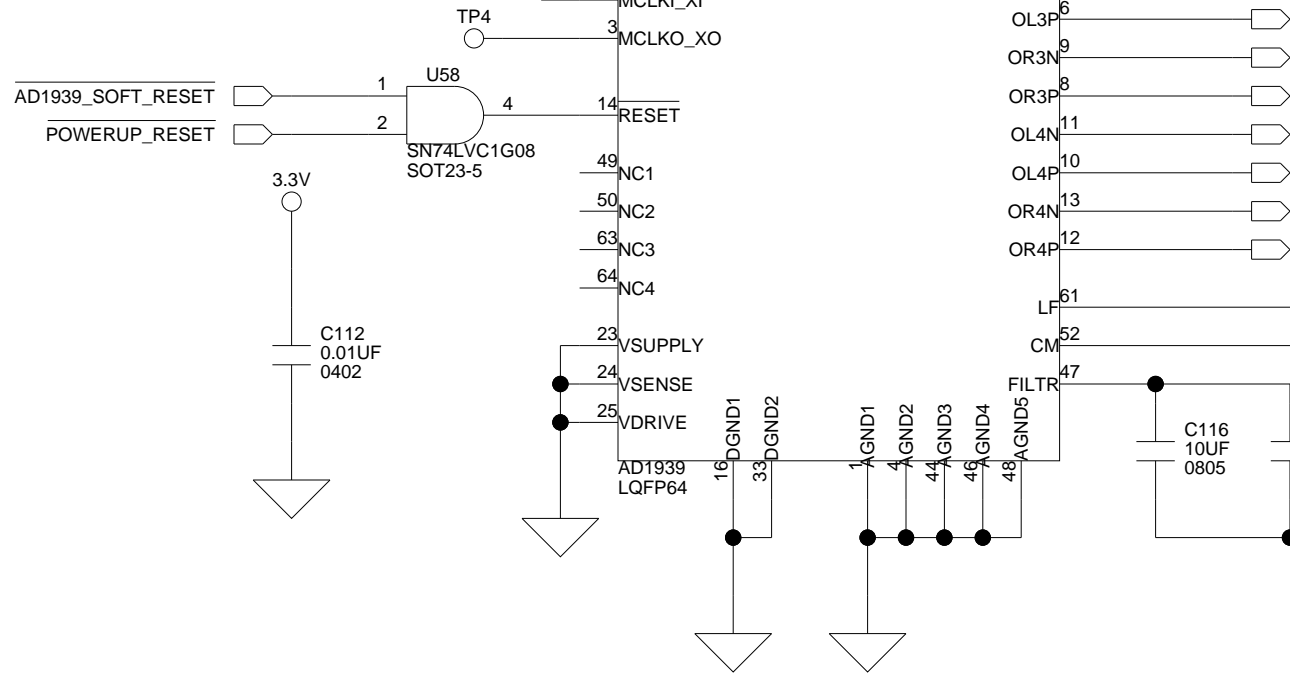
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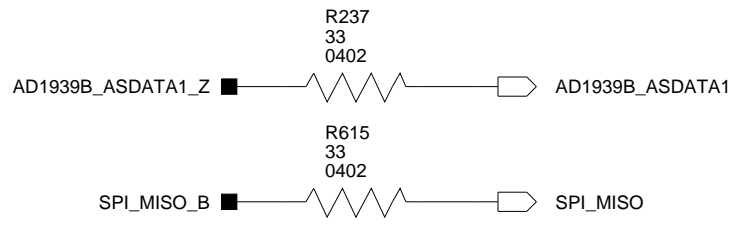
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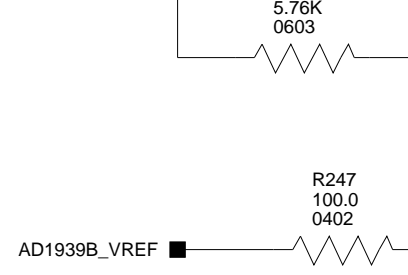
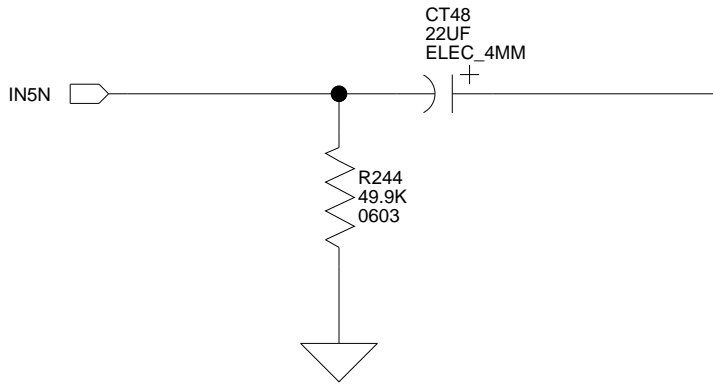


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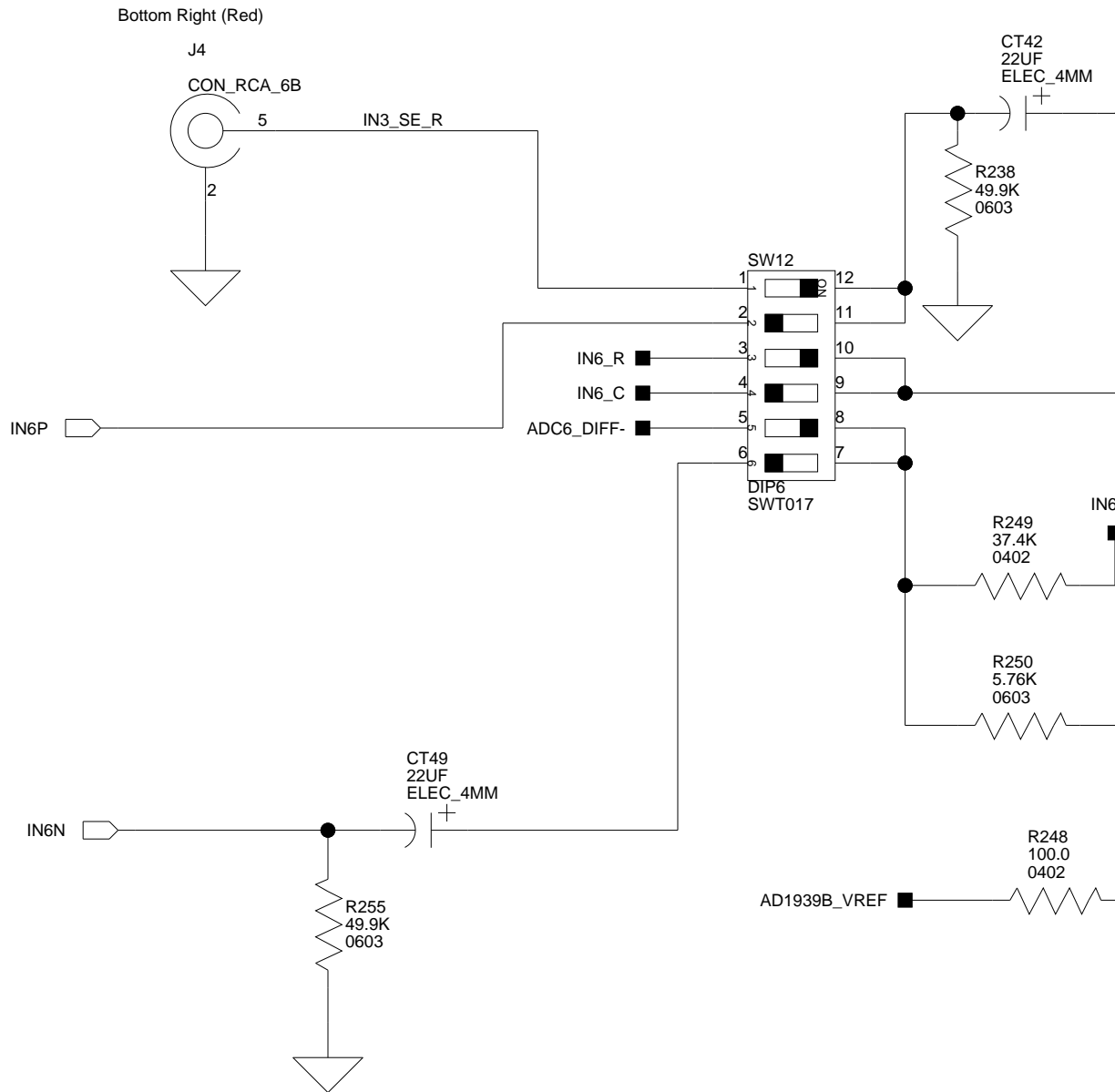
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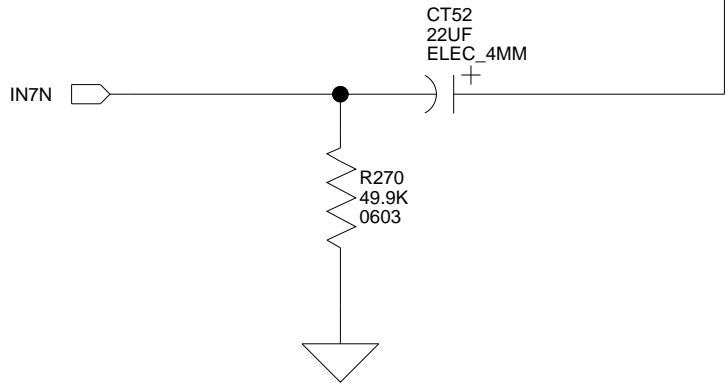


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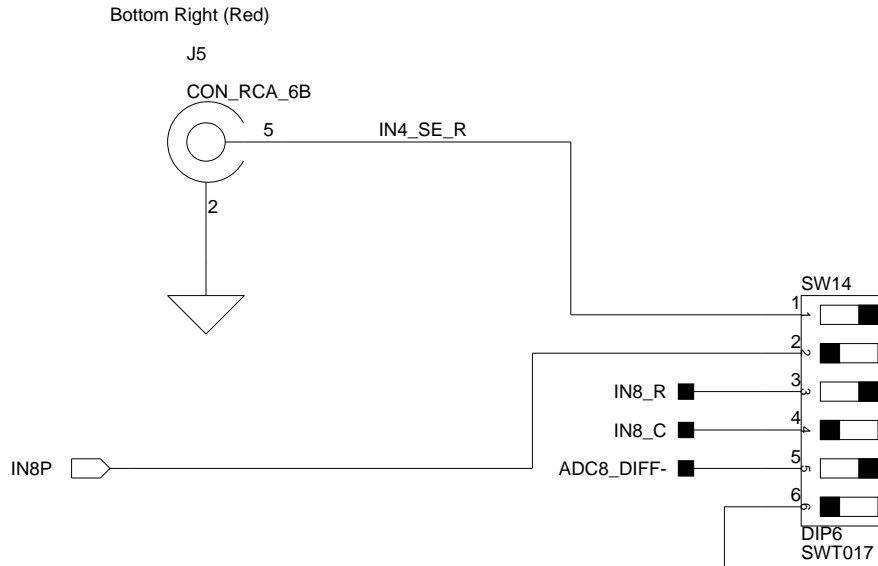
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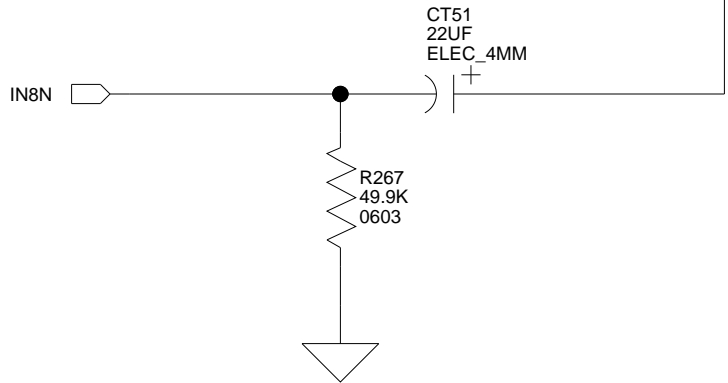
AD1939B_VR8

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AD1939B_VR8

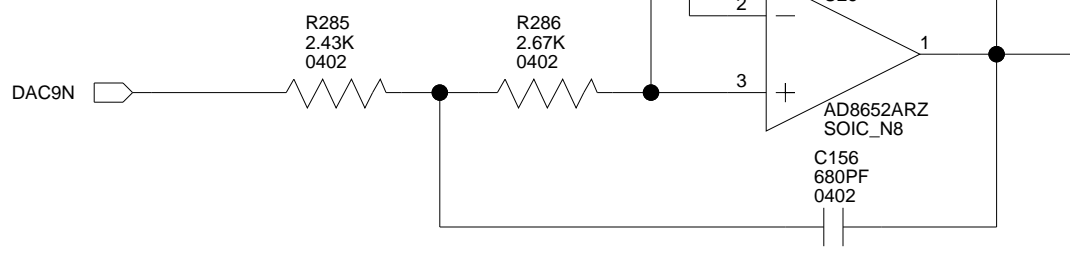
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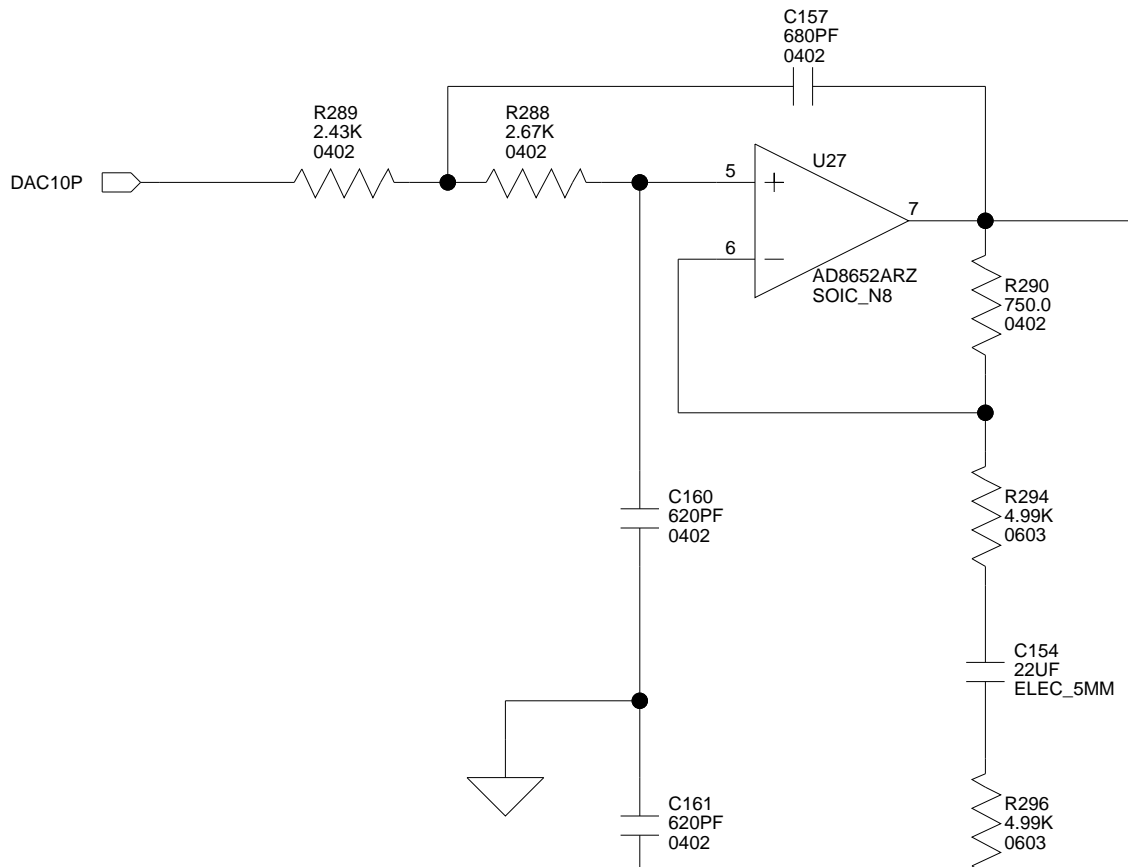
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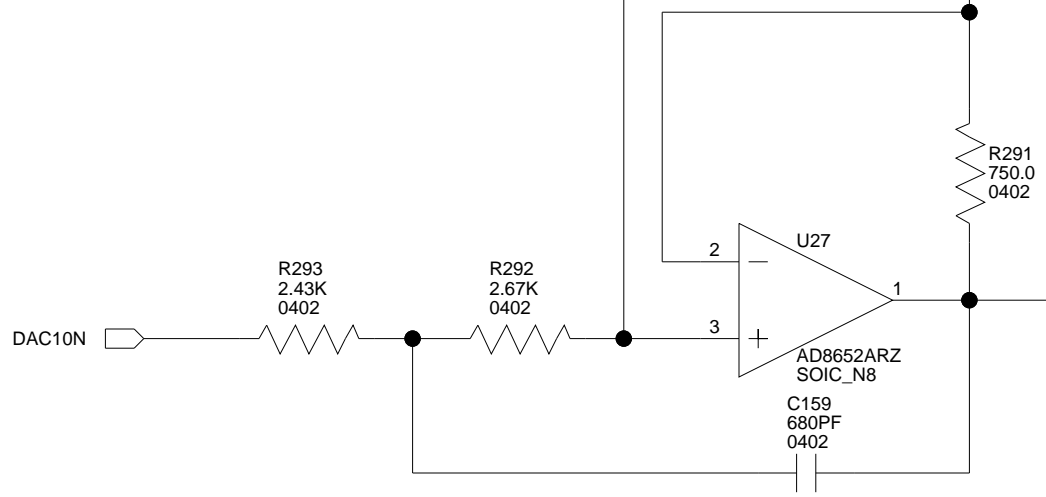
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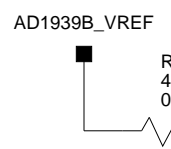


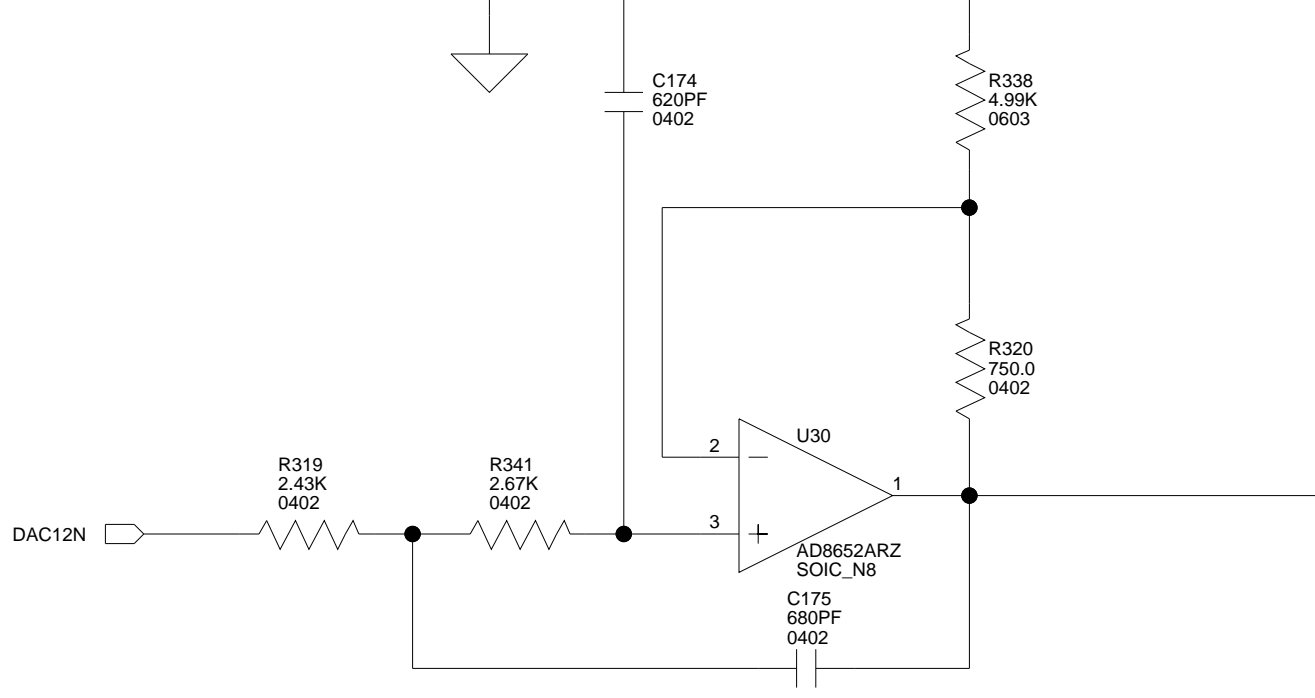
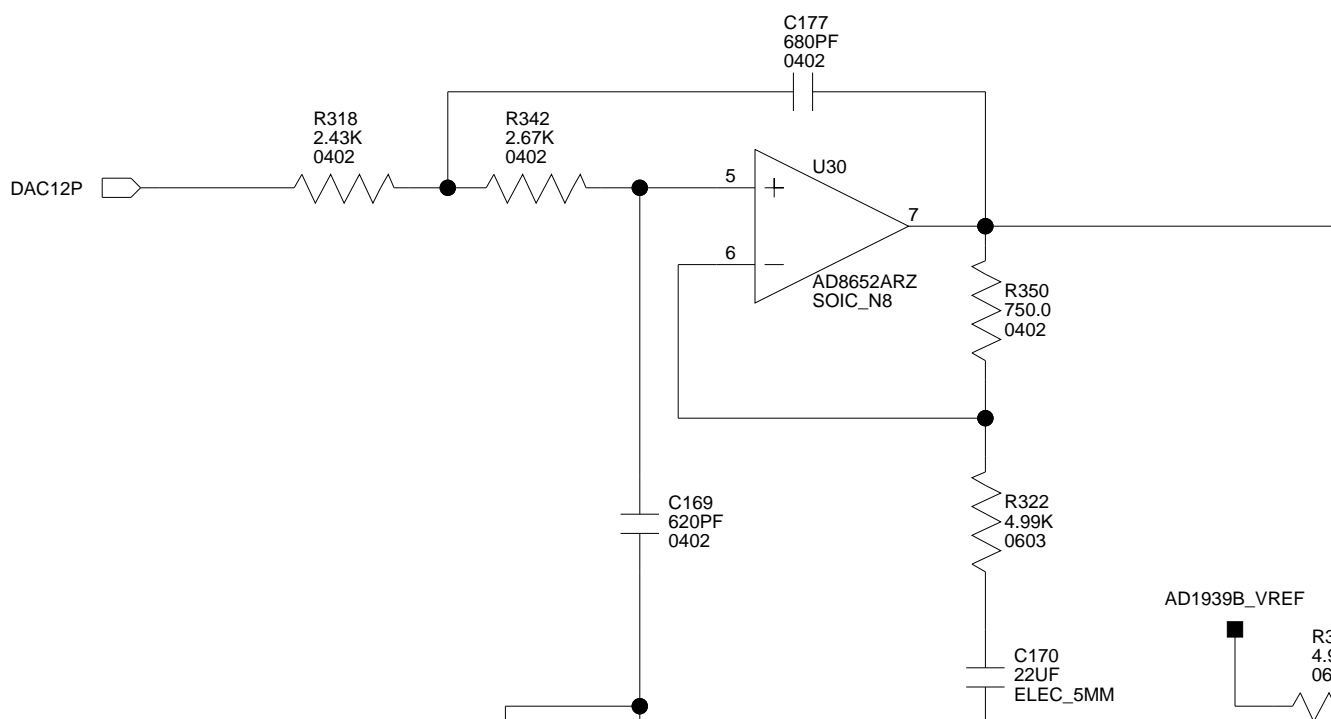
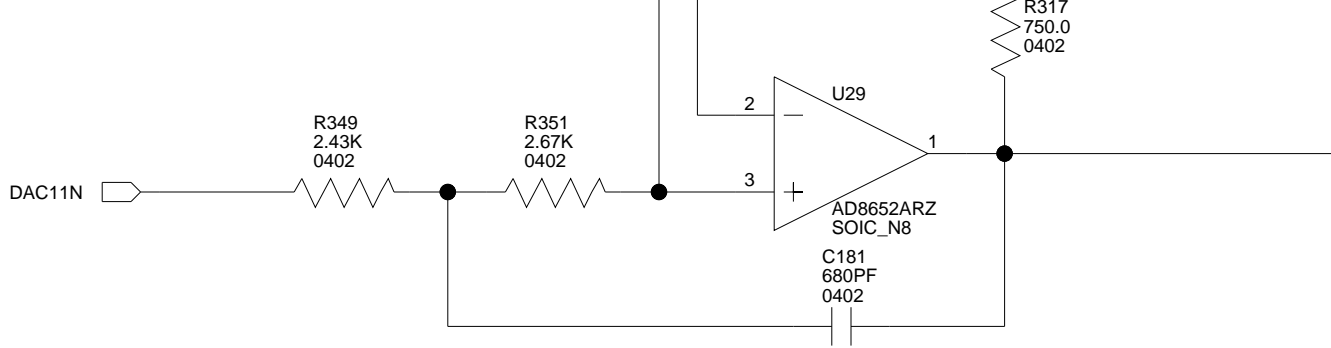
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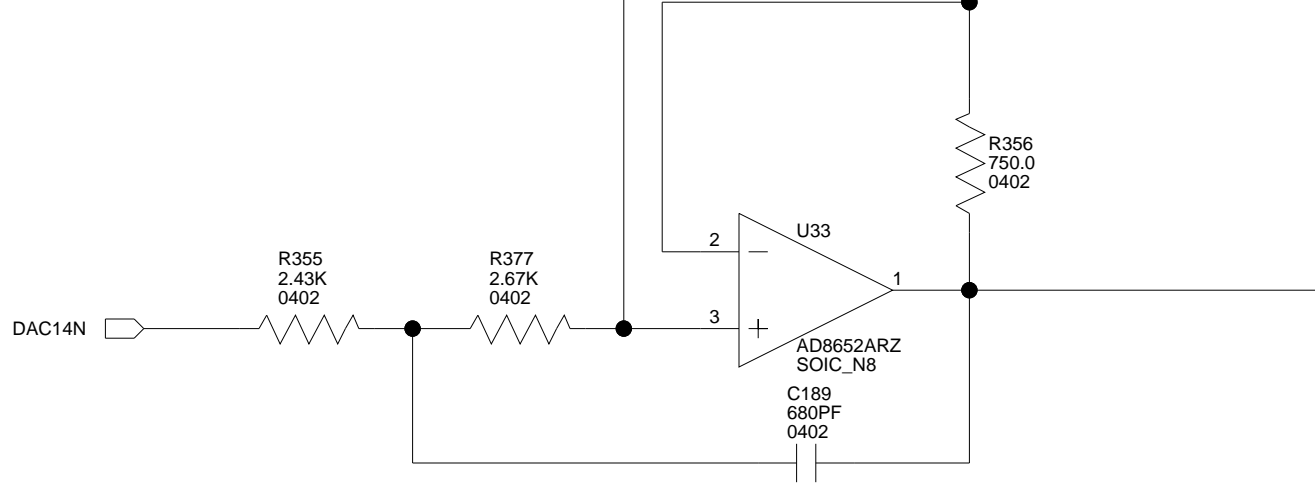
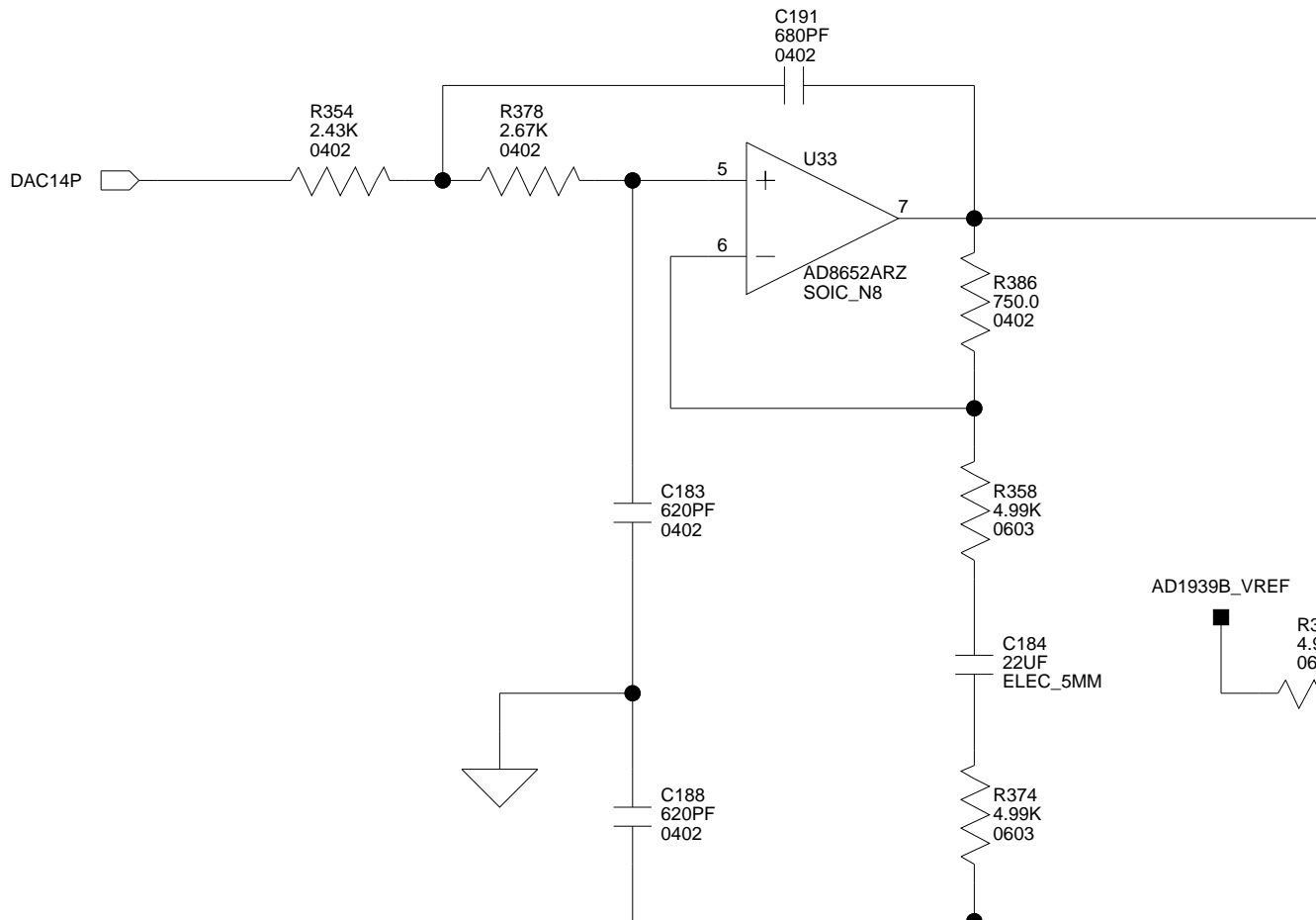
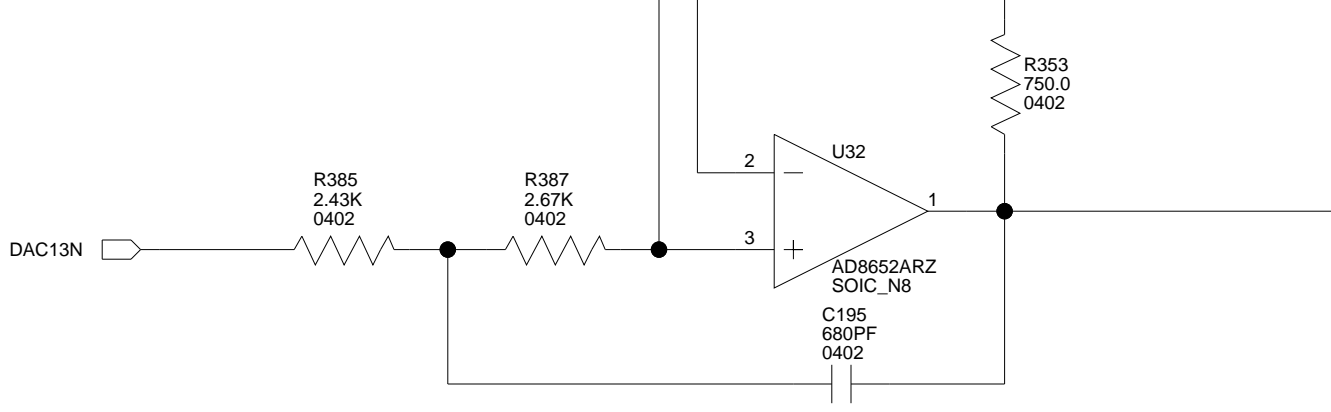
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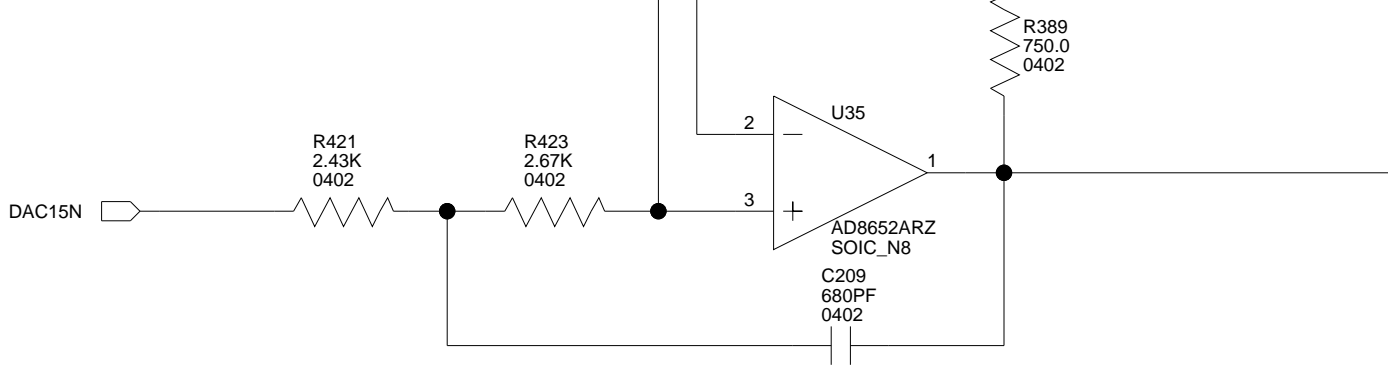
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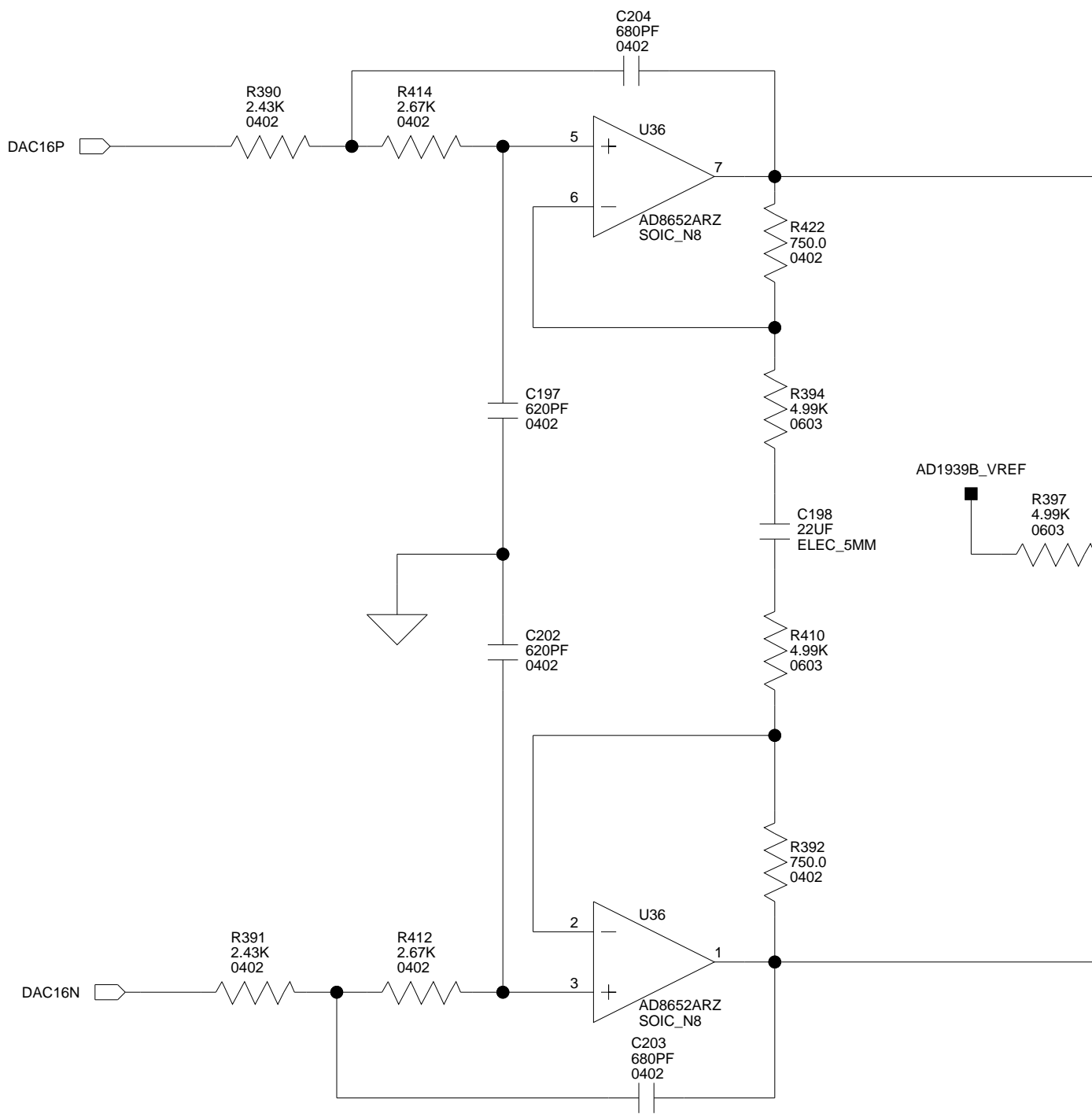
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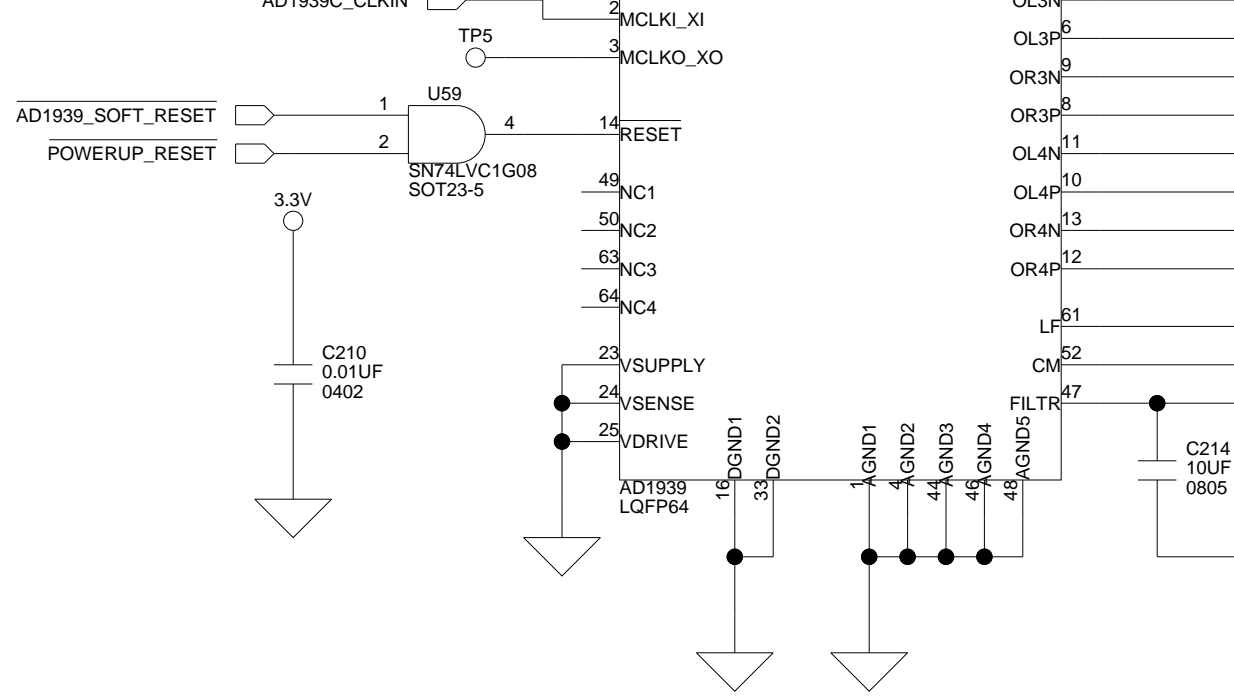


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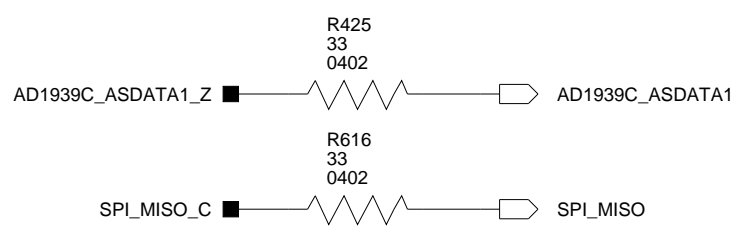
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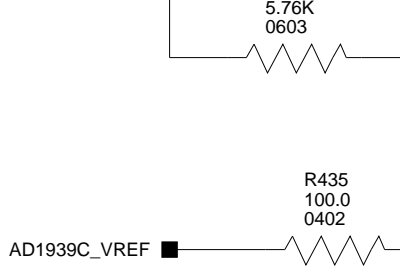
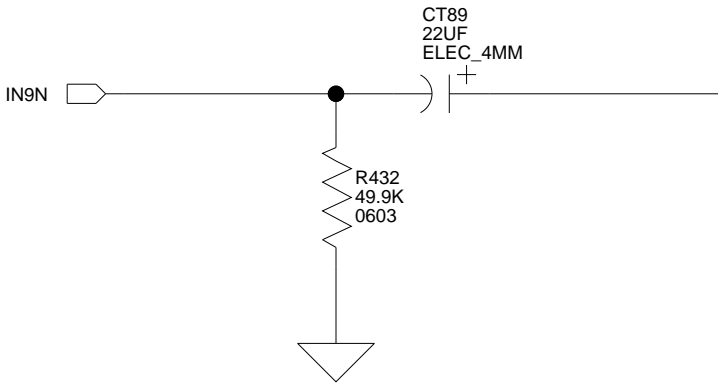


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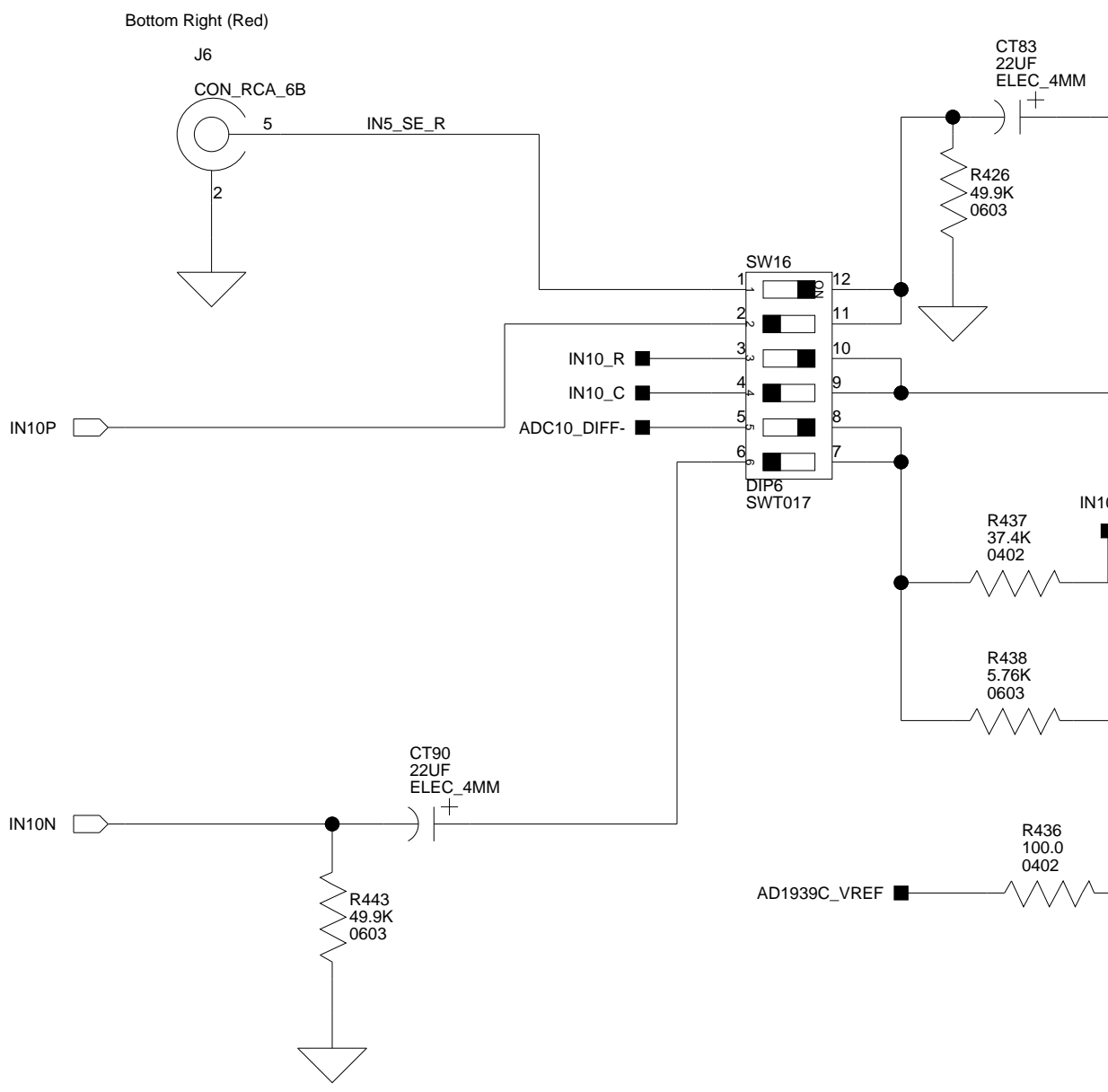
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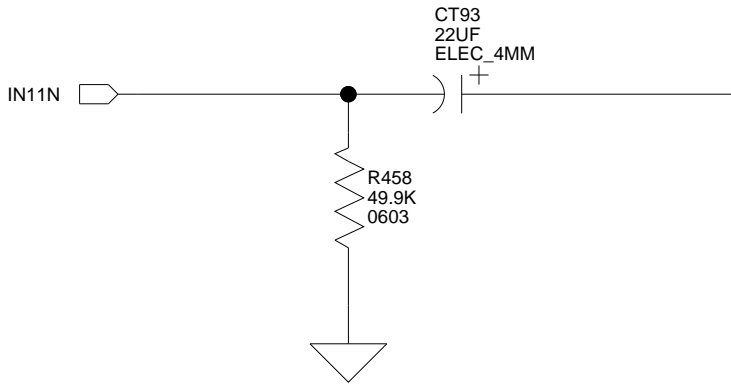


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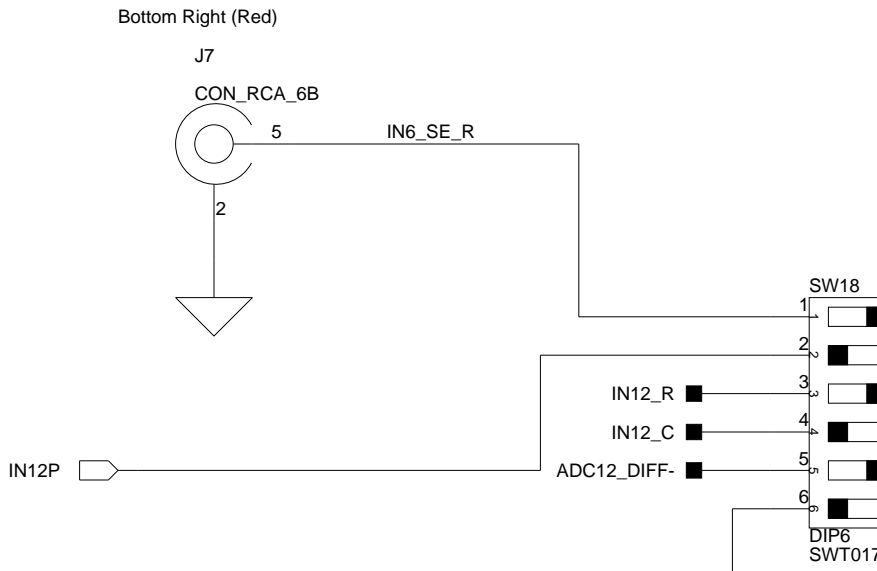
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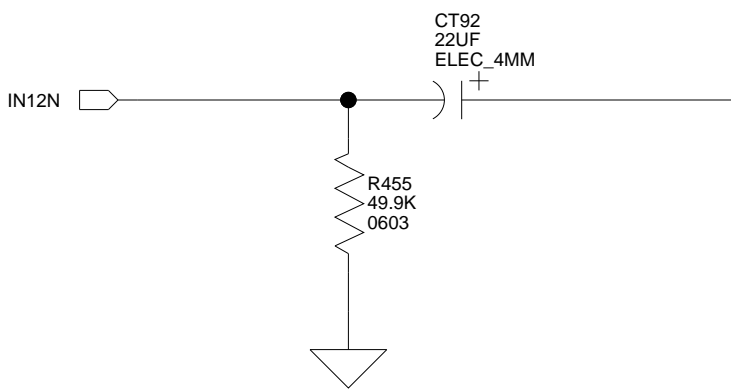


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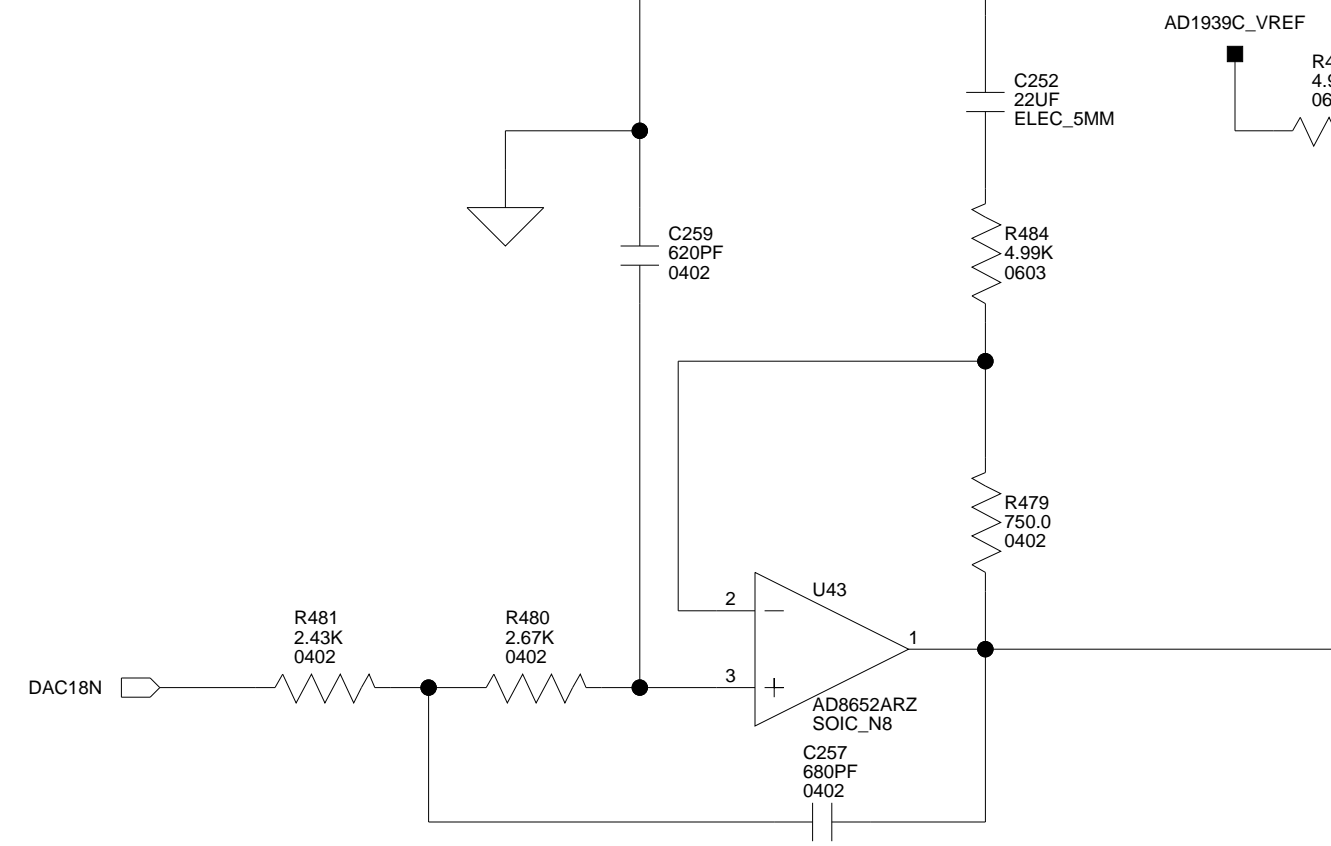
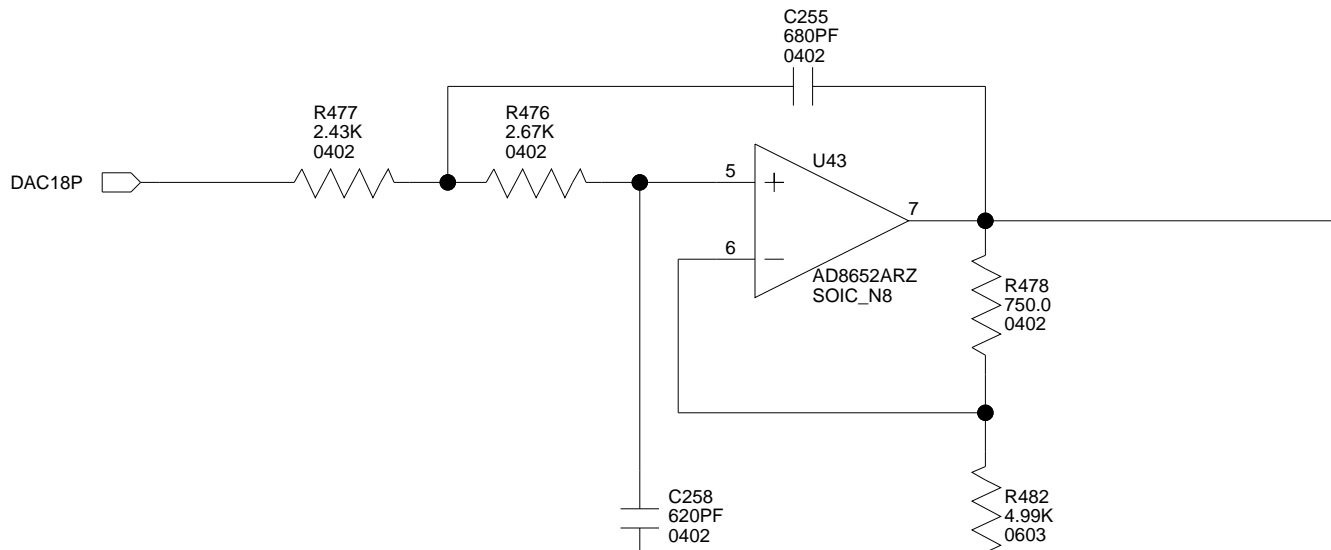
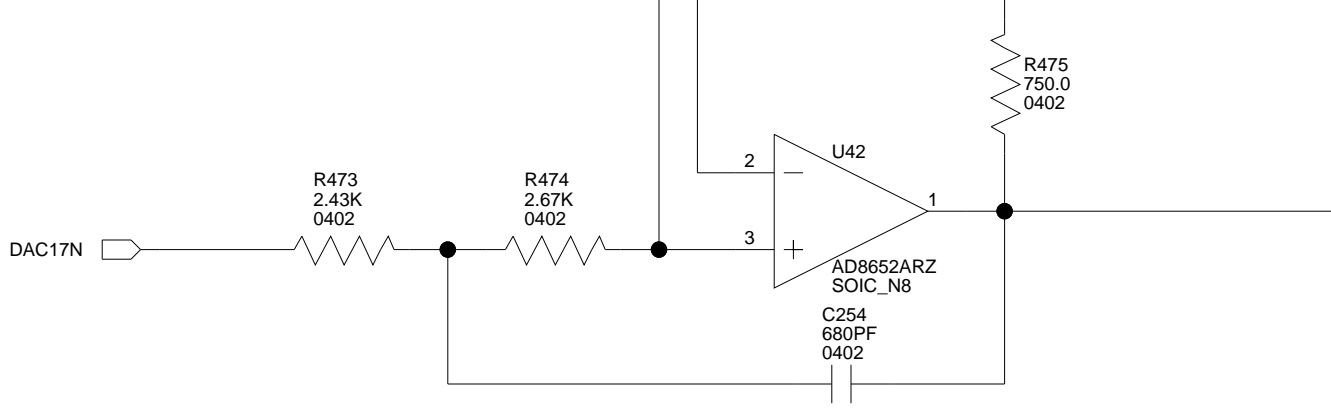
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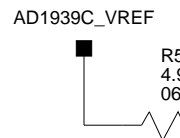
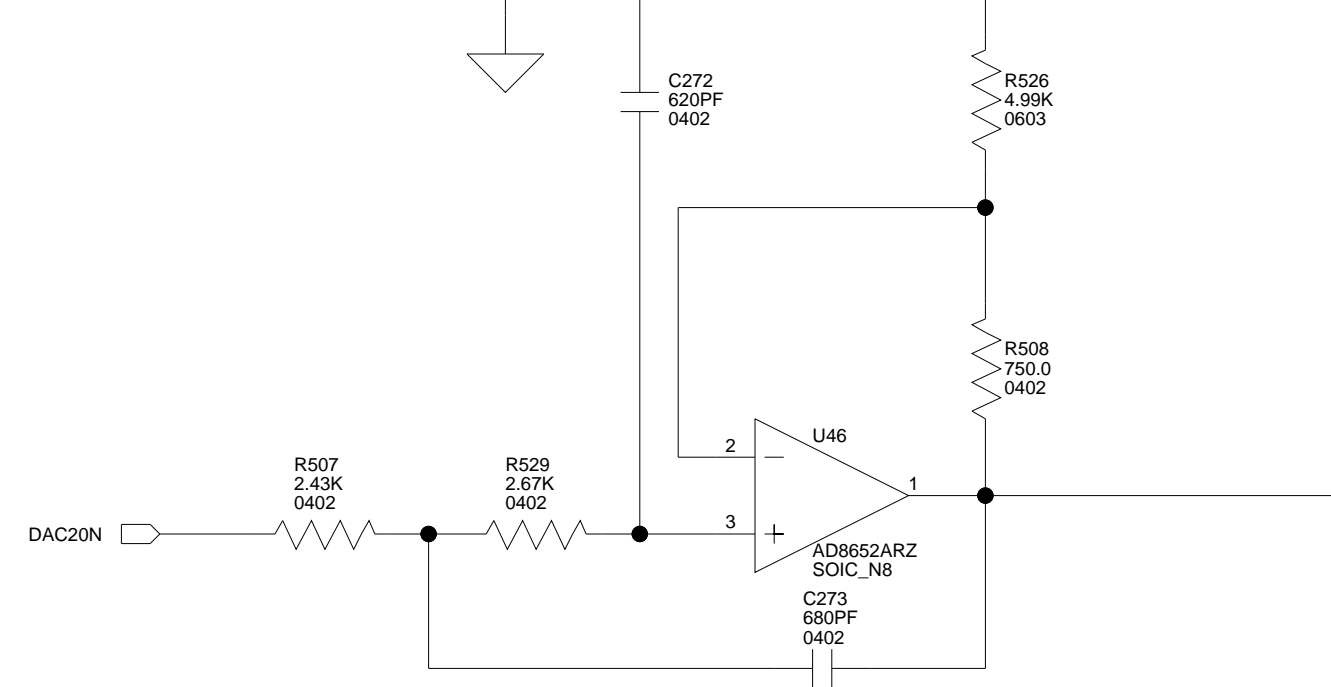
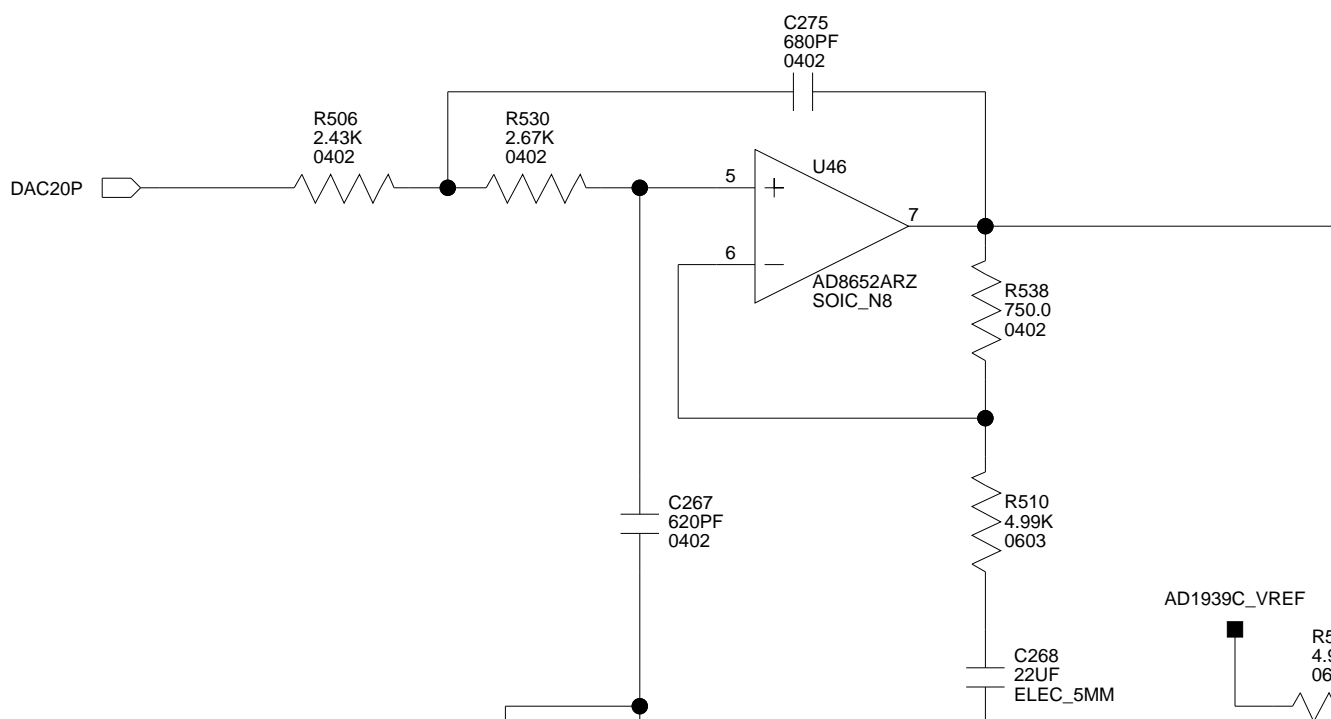
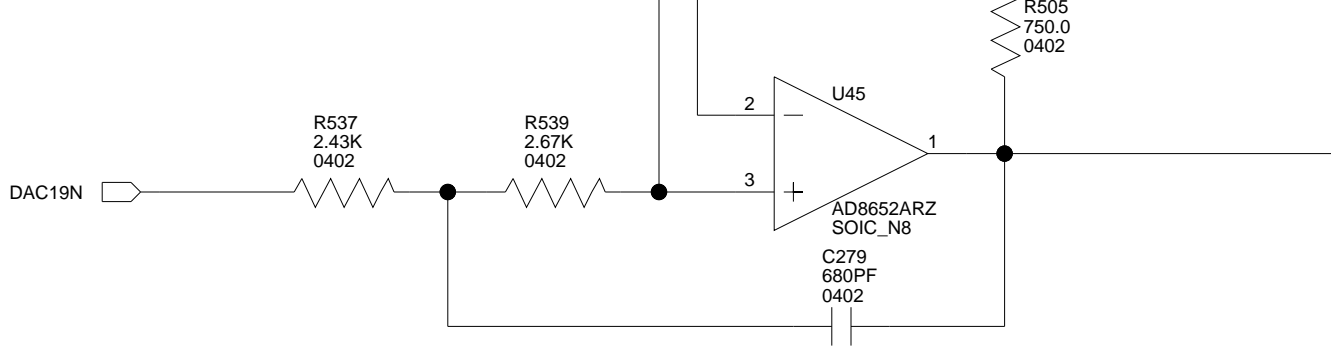
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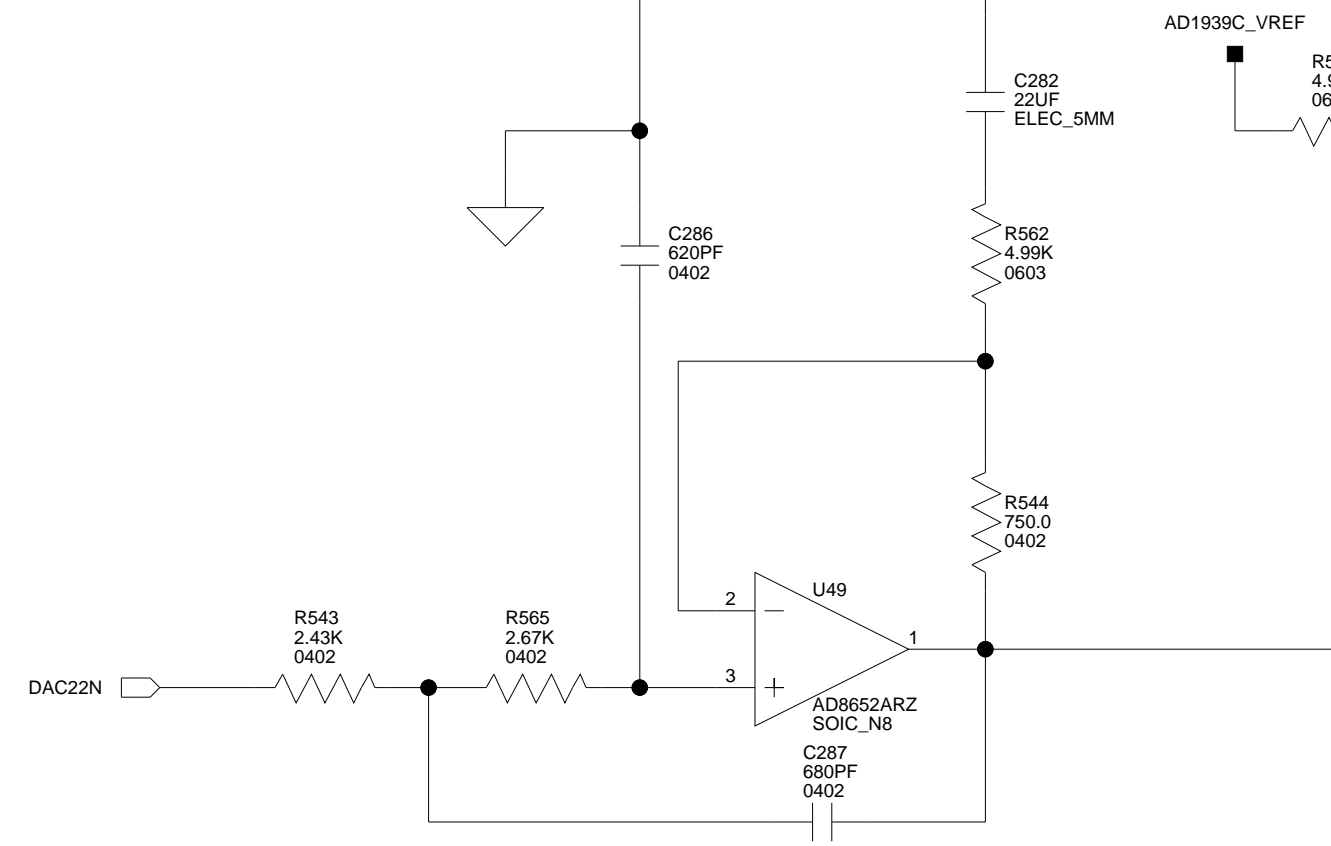
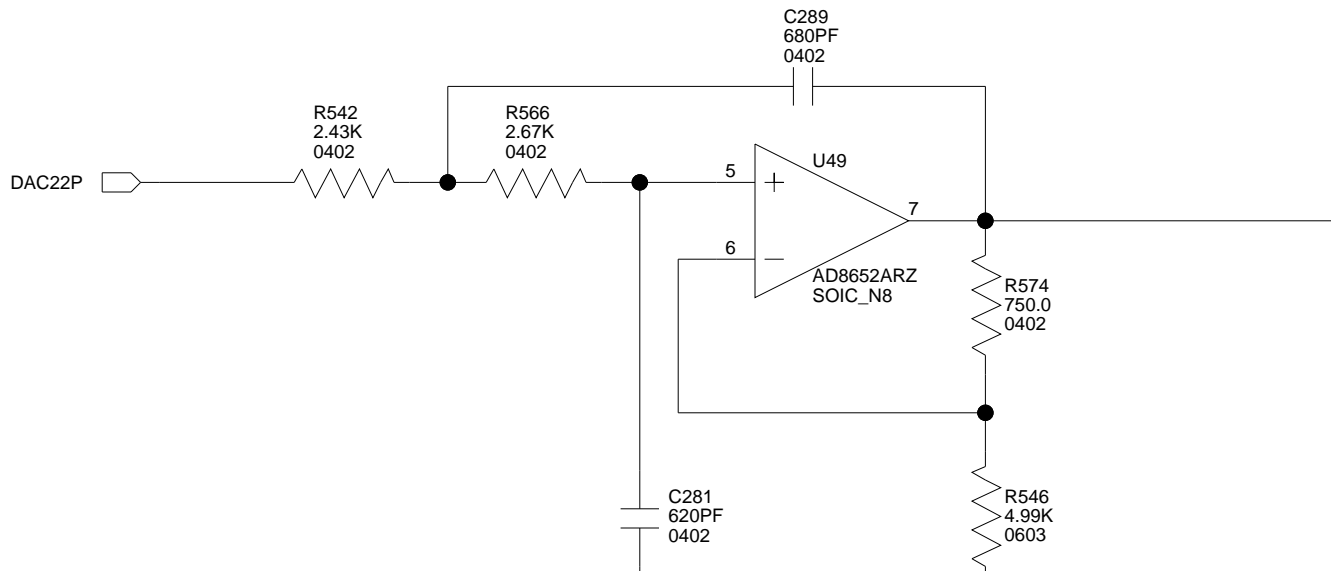
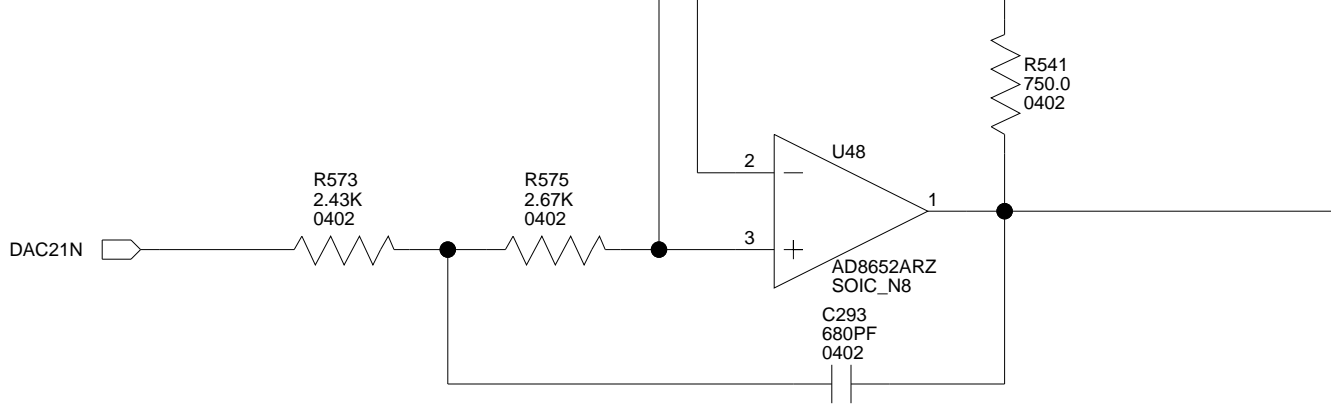
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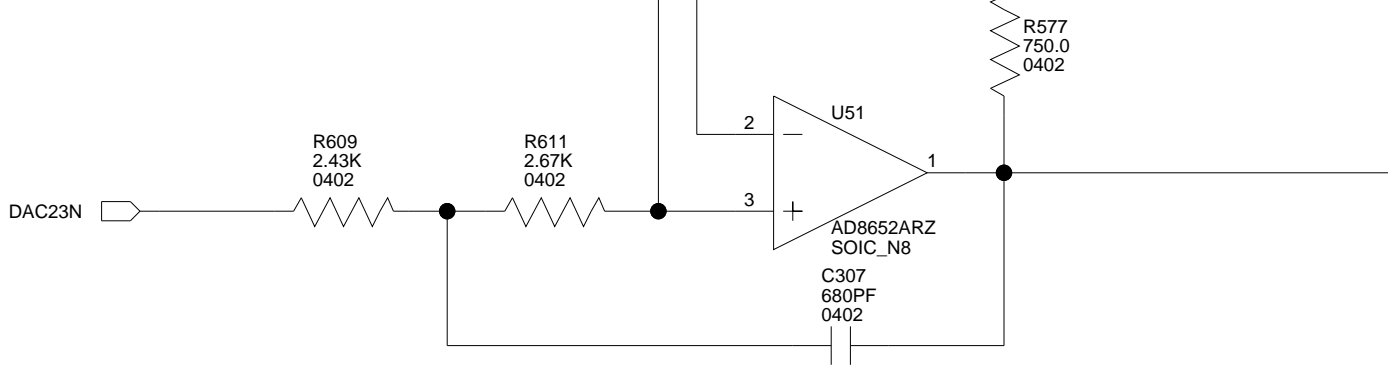
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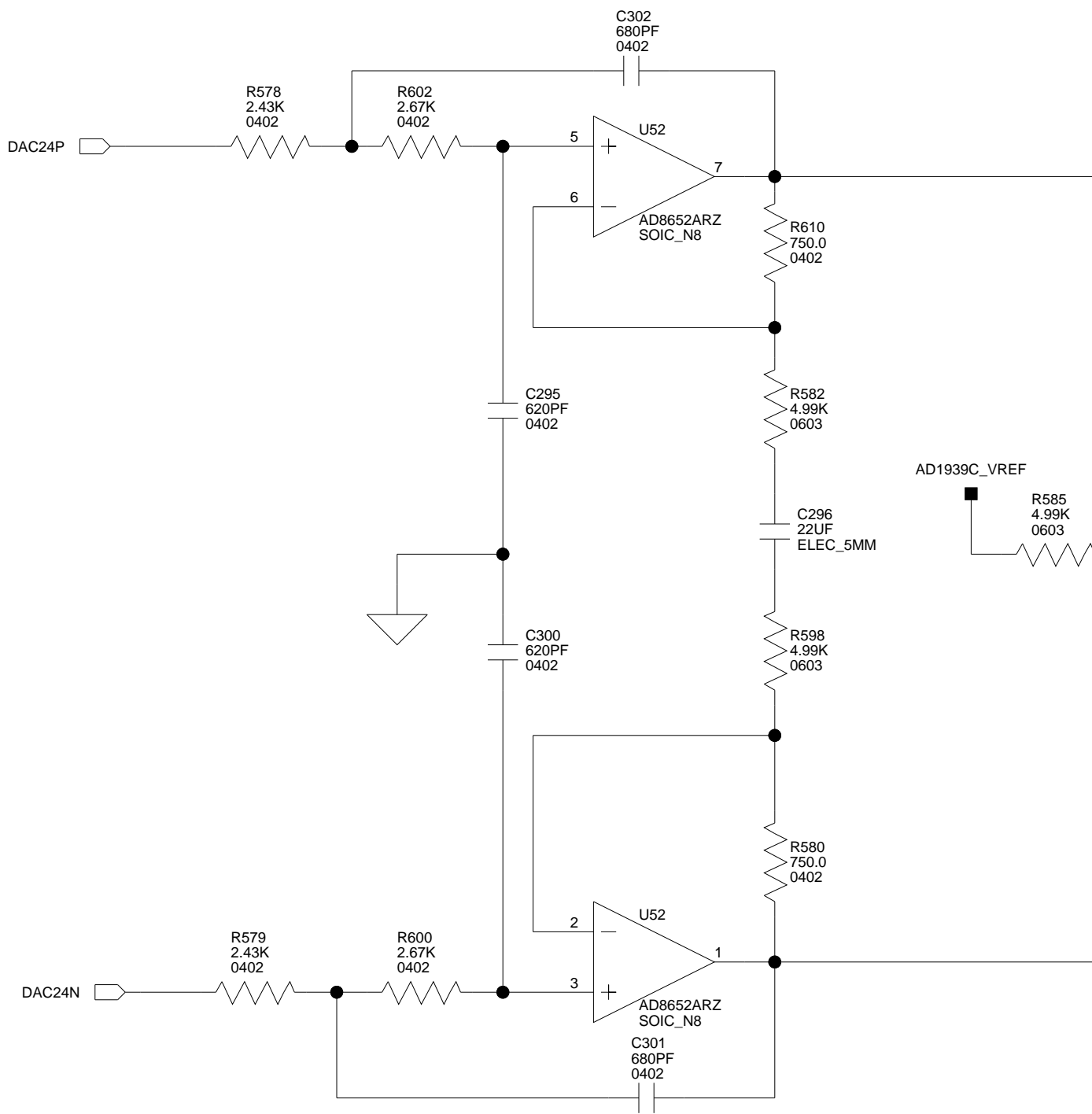
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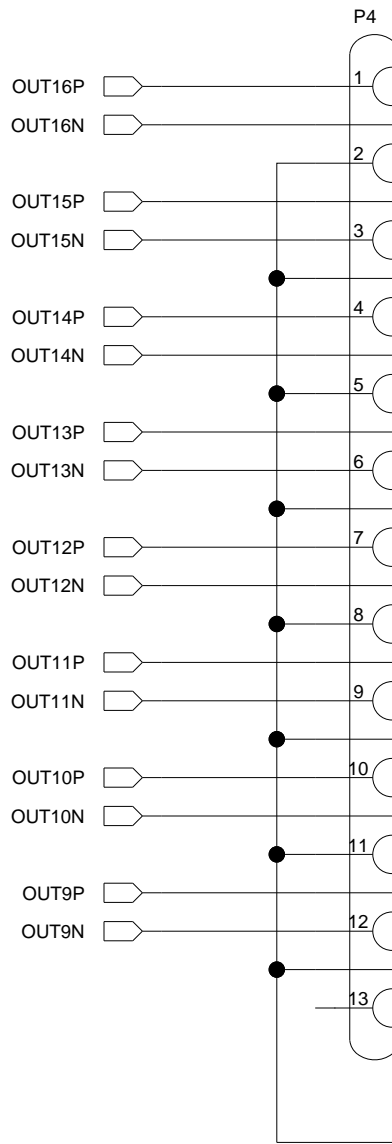
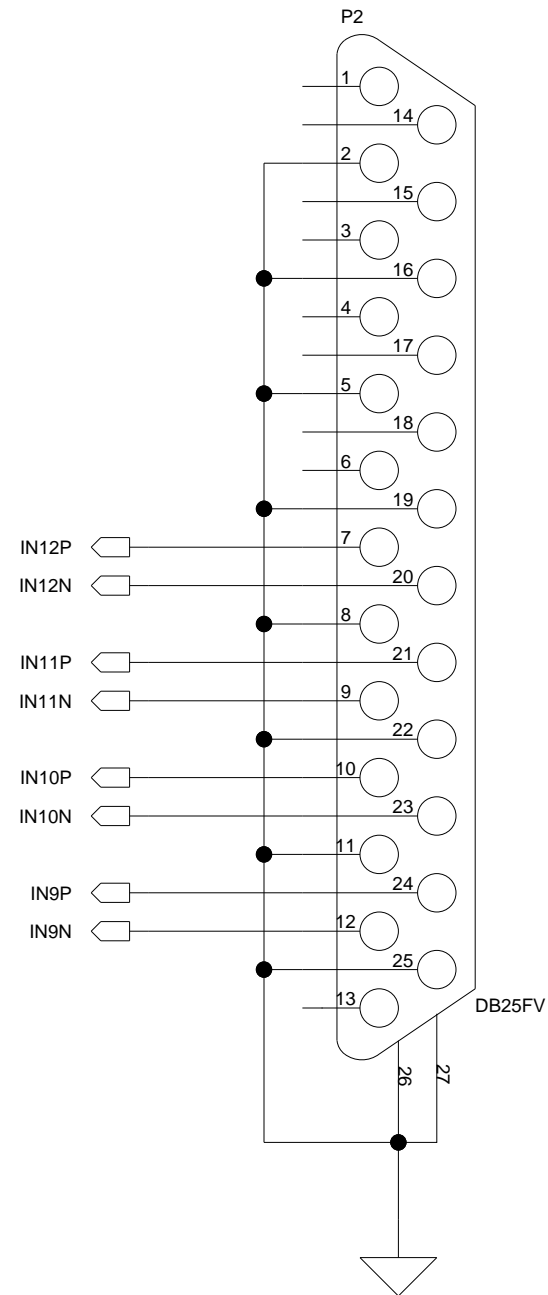
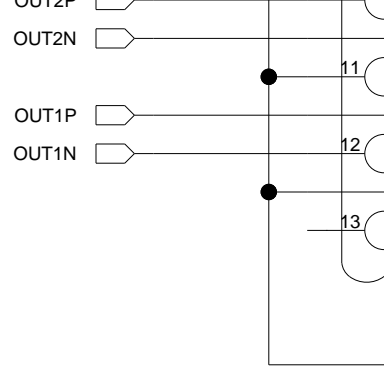
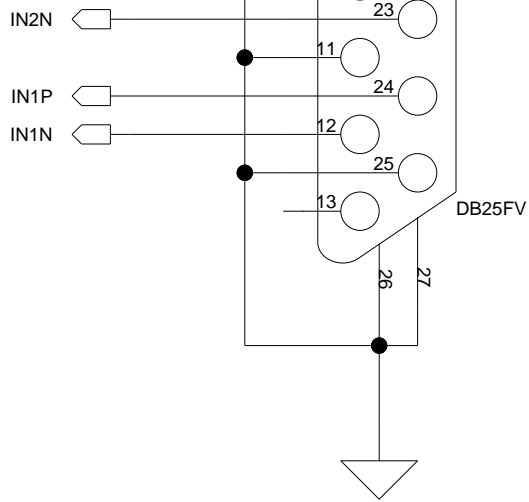
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