Evaluating the AD4195-4, 24-Bit, 62.5kSPS, Multichannel, Low-Noise Precision Sigma-Delta ADC with PGA

FEATURES

- Fully-featured evaluation board for the AD4195-4
- On-board 2.5V ADR4525 and LTC6655 references
- ADXL1002 on-board vibration sensor
- PC control in conjunction with SDP-K1
- PC software for control and data analysis (time domain and frequency domain)
- Compatible interface with Analysis | Control | Evaluation (ACE) Software, IIO Scope, Python, and MATLAB

EVALUATION KIT CONTENTS

- EVAL-AD4195-4ARDZ evaluation board

ONLINE RESOURCES

- Documents needed
  - AD4195-4 data sheet
- Required software
  - AD417x ACE plug-in

EQUIPMENT NEEDED

- EVAL-AD4195-4ARDZ evaluation board
- SDP-K1 system demonstration platform
- DC signal source
- USB cable
- PC running Windows® with USB 2.0 port

GENERAL DESCRIPTION

The EVAL-AD4195-4ARDZ evaluation board features the AD4195-4, which is a 24-bit, multichannel, low-noise precision sigma-delta analog-to-digital converter (ADC).

The EVAL-AD4195-4ARDZ evaluation board connects to the USB port of the PC by connecting to the SDP-K1 controller board. A 5V USB supply by the PC is regulated to supply the AD4195-4 and support all necessary components.

The AD4195-4 ACE plug-in fully configures the AD4195-4 device register functionality and provides DC time domain analysis in the form of waveform graphs and associated noise analysis for ADC performance evaluation. The AC analysis is also provided by the software such as a fast fourier transform (FFT), which displays the first five harmonics of the following parameters: SNR, SFDR, S/N+D, and THD.

The EVAL-AD4195-4ARDZ is an evaluation board that allows the user to evaluate the features of the ADC. The user PC software executable controls the AD4195-4 over the USB through the SDP-K1 system demonstration platform (SDP) board.

Full specifications on the AD4195-4 are available in the AD4195-4 data sheet available from Analog Devices, Inc., and must be consulted with this user guide when using the EVAL-AD4195-4ARDZ evaluation board.

TABLE OF CONTENTS

REVISION HISTORY

6/2025—Revision 0: Initial Version

EVAL-AD4195-4ARDZ EVALUATION BOARD PHOTOGRAPHS

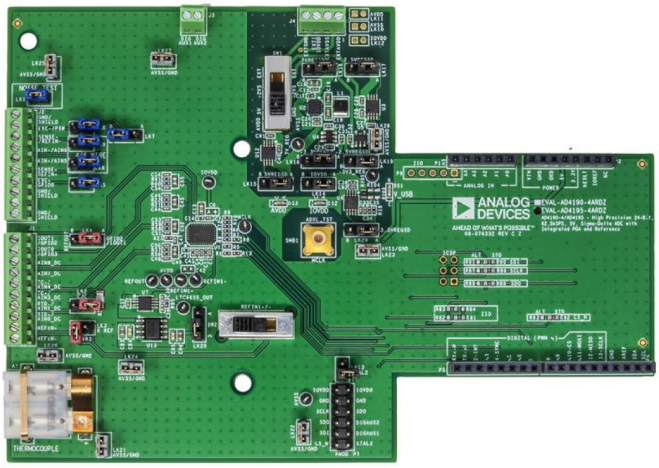


Figure 1. EVAL-AD4195-4ARDZ Evaluation Board Photograph — Top

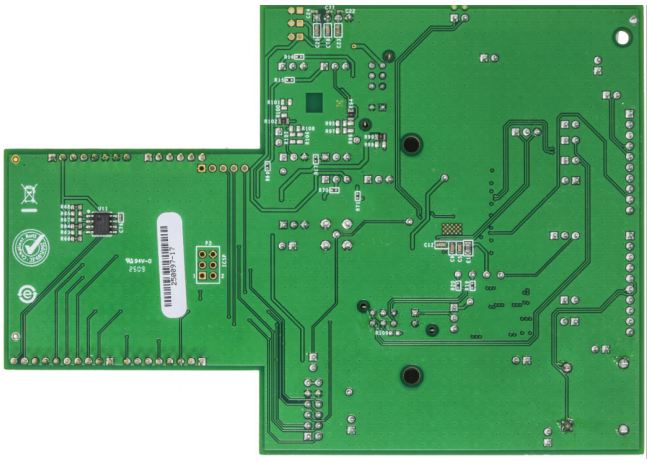


Figure 2. EVAL-AD4195-4ARDZ Evaluation Board Photograph — Bottom

EVAL-AD4195-4ARDZ QUICK START GUIDE

To use the evaluation board, do the following steps:

1. With the SDP-K1 board disconnected from the USB port of the PC, install the ACE software. Restart the PC after the software installation is complete. For complete software installation instructions, see the Evaluation Board Software section.
2. Download the **Board.AD417x** plug-in on the ACE **Plug-in Manager**.
3. Connect the SDP-K1 board to the EVAL-AD4195-4ARDZ board using the Arduino connector (see Figure 3).
4. Connect the SDP-K1 board to the PC using the supplied USB cable. For the Windows XP, search for the SDP-K1 drivers. Choose to automatically search for the drivers for the SDP-K1 board if prompted by the operating system.
5. From the **Programs** menu, go to the **Analog Devices** subfolder, and click **ACE** to launch the ACE software (see the Launching the Software section).

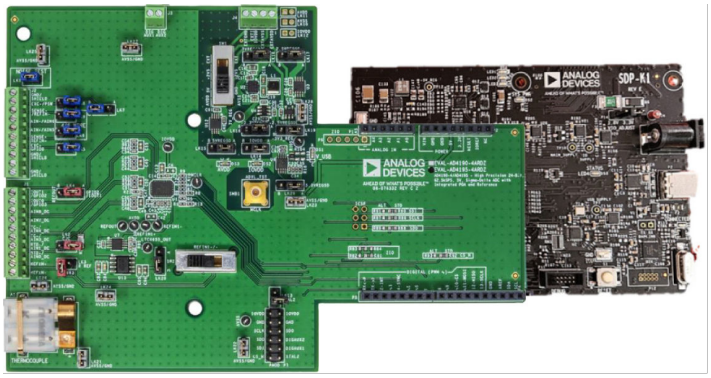


Figure 3. Hardware Configuration, Setting Up the EVAL-AD4195-4ARDZ Evaluation Board

EVAL-AD4195-4ARDZ QUICK START GUIDE

EVAL-AD4195-4ARDZ BLOCK DIAGRAM

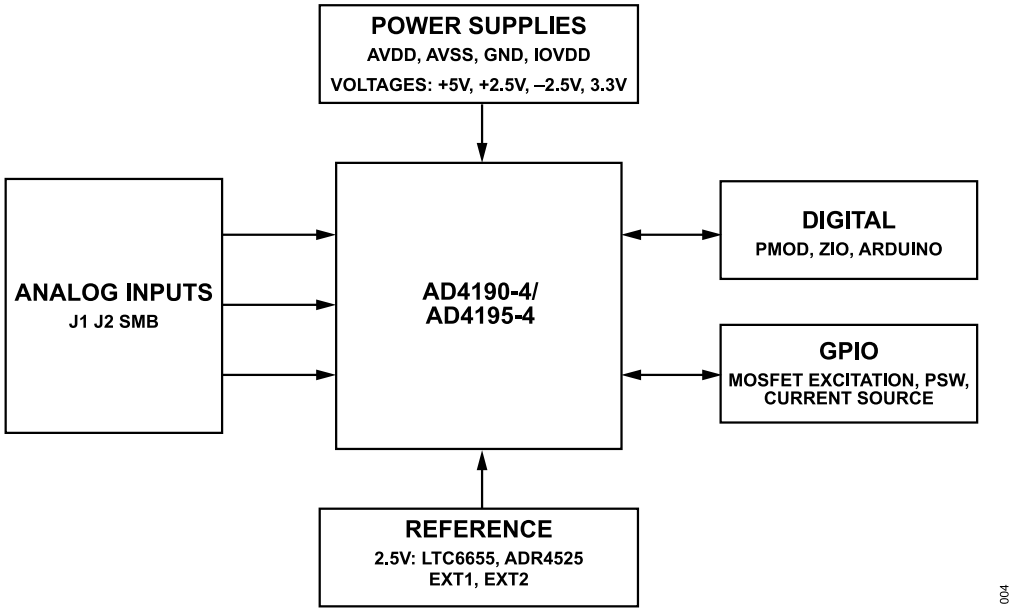


Figure 4. Block Diagram

EVALUATION BOARD HARDWARE

DEVICE DESCRIPTION

The AD4195-4 is a low-noise, precision complete analog front end (AFE) for high-precision measurement applications. It contains a low-noise, 24-bit Σ-Δ ADC. The AD4195-4 can support four differential inputs, eight pseudodifferential or single-ended inputs. The on-chip low-noise instrumentation amplifier means that signals of small amplitude can interface directly to the ADC. Other on-chip features include a low drift 2.5V reference, excitation currents, reference buffers, multiple filter options, and many diagnostic features.

Full specifications for the AD4195-4 are provided in the product data sheet and must be consulted with this user guide when using the EVAL-AD4195-4ARDZ evaluation board. For more details on the SDP-K1, refer to the SDP-K1.

HARDWARE LINK OPTIONS

The default link options are listed in Table 1. By default, the board operates from the USB power supply by the SDP-K1. The 5V default supply required for the AD4195-4 comes from the on-board LTC3129-1 low-dropout regulators (LDOs), which generate their voltages from the SDP-K1.

Table 1. Default Link and Solder Link Options

Link Number	Color	Default Option	Description	Pitch
LK1	Blue	Inserted	Noise test, Channel AIN5 + Channel AIN6.	2mm
LK2	Red	1 Pin	Thermocouple, cold junction resistor bypass.	2mm
LK3	Red	1 Pin	Precision reference resistor bypass.	2mm
LK4	Red	A	Position (Pos) A: GPIO2 (IOUT1) to J1, Pos B: REFOUT.	2.54mm
LK5	Blue	2 Pin	Short PSW/EXC+ to VDD: Pos inserted = short VDD with EXC+.	2.54mm
LK6	Blue	1 Pin	Short EXC+/REFIN+: Pos inserted = 4-wire bridge[1].	2mm
LK7	Blue	B	Wire bridge EXC− select, Pos A: power switch (GPIO1)− Pos, B: power switch (GPIO0).	2.54mm
LK8	Blue	1 Pin	Short EXC−/AVSS: Pos inserted = 4-wire bridge.	2mm
LK9	Blue	1 Pin	Short EXC−/REFIN−: Pos inserted = 4-wire bridge[2].	2mm
LK10	N/A[3]	DNI[4]	SCP connects external AVSS and GND.	2mm
LK11	N/A[3]	DNI[4]	SCP connects external AVDD and GND.	2mm
LK12	N/A[3]	DNI[4]	SCP connects external IOVDD and GND.	2mm
LK13	Black	2 Pin	XTAL2 to digital connector.	2mm
LK14	Black	A	IOVDD select. Pos A: 3.3V, Pos B: EXT.	2.54mm
LK15	Black	A	+5V supply enable: LT1962-5 power down, Pos A: On.	2.54mm
LK16	Black	A	+7V supply enable: LT3129 power down, Pos A: On.	2.54mm
LK17	Black	A	+2.5V supply enable: LT1962-2.5 power down, Pos A: On.	2.54mm
LK18	Black	A	−3.3V supply enable: LTC1983 power down, Pos A: On.	2.54mm
LK19	Black	A	−2.5V supply enable: ADP7182 power down, Pos A: On.	2.54mm
LK20	Black	B	LTC6655 2.5V reference Pos A, ADR4525.	2.54mm
LK21 to LK28	Grey	Inserted	AVSS to GND short.	2mm
LK29	Black	N/A[3]	ADP150 power down, Pos A: On.	2.54mm
SW1	N/A[3]	Supply, AVDD, and AVSS	Set the AVDD voltage.	Switch
			Sets AVDD to +5V and AVSS to GND (USB power).	
			Sets AVDD to +2.5V and AVSS to −2.5V.	
			Sets AVDD and AVSS to external supply.	
			Default: Pos 1, AVDD to 5V and AVSS to GND.	
SW2	N/A[3]	REF1+/−	Sets where REFIN+/− are connected to the part.	Switch
			Sets REFIN+/− to the LTC6655 or AD4525 reference outputs.	
			Sets REFIN+/− to the REFIN1+/− pins, Connector 1	
			Sets REFIN+/− to the REFIN2+/− pins, Connector 2	
			Default: Pos 1, REFIN+/− to the LTC6655 or ADR4525 reference outputs.	

EVALUATION BOARD HARDWARE

1 When LK6 is used, then do not use LK5 and vice versa.

2 When LK9 is used, then do not use LK8 and vice versa.

3 N/A means not applicable.

4 DNI means do not install.

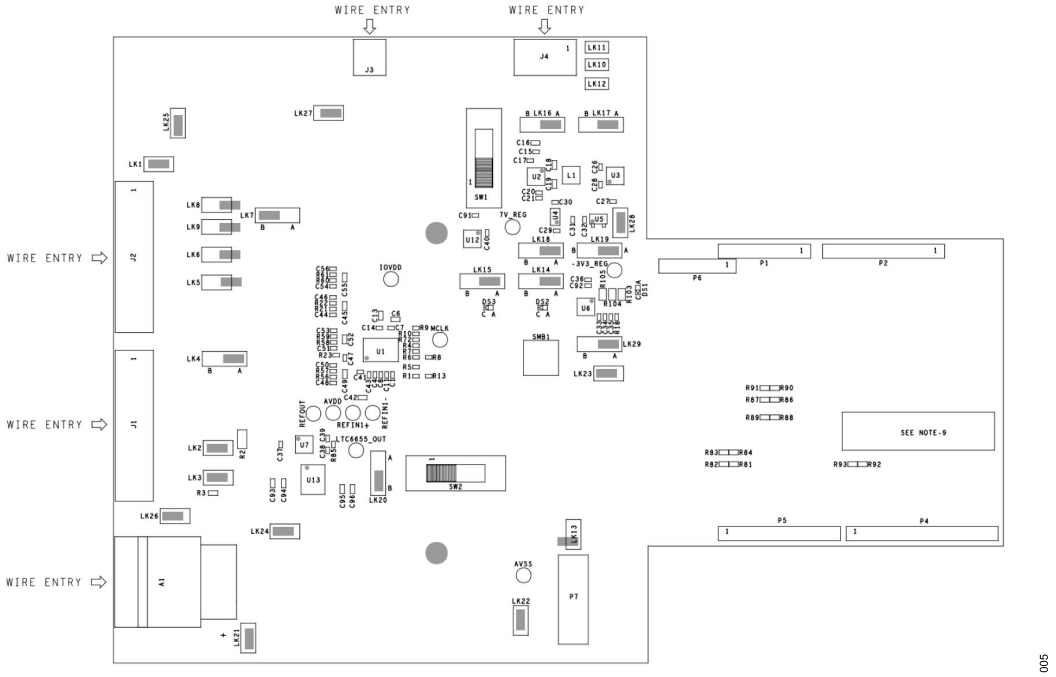


Figure 5. Silkscreen Showing Link Locations

EVALUATION BOARD HARDWARE

On-Board Connectors

Table 2 provides information about the external connectors on the EVAL-AD4195-4ARDZ.

Table 2. On-Board Connectors

Connector	Function	Pin Number	Pin Function
J1	DC analog inputs	1	IOUT1/GPIO2 excitation current for 3-wire RTD REFOUT
		2	IOUT0 GPIO3 excitation current for RTDs
		3	AIN8 with DC filtering
		4	AIN7 with DC filtering
		5	AIN4 with DC filtering (TC− connection)
		6	AIN3 with DC filtering (TC+ connection)
		7	AIN1 with DC filtering (RTD− connection), (Cold Junction− connection)
		8	AIN0 with DC filtering (RTD+ connection), (Cold Junction+ connection)
		9	External reference+ (REFIN1+)
		10	External reference– (REFIN1−)
J2	Analog inputs Wire bridge	1	Ground/shield connection
		2	Excitation− (MOSFET)/power switch function (GPIO1) for wire bridge
		3	External reference−/sense−
		4	AIN6 (AINN) with DC filtering (DNI[1]) and noise test channel
		5	AIN5 (AINP) with DC filtering (DNI[1]) and noise test channel
		6	External reference+/sense+
		7	Excitation+ (MOSFET)/AVDD supply for wire bridge
		8	Ground/shield connection
J3	AC analog inputs	1	GPIO0
		2	GPIO1
		3	AIN8 with AC filtering
		4	AIN7 with AC filtering
		5	AIN4 with AC filtering
		6	AIN3 with AC filtering
		7	AIN2 with DC filtering
		8	DACOUT with 2kΩ load
J4	Digital outputs	1	DIGAUX1
		2	DIGAUX2
J5	External power	1	External AVDD connection
		2	External AVSS connection
		3	External IOVDD connection
		4	External GND connection
		5	External AVDD connection for amplifier
		6	External AVSS connection for amplifier
		7	External GND connection for amplifier
P1 to P5	Arduino connector	N/A[2]	N/A[2]
P6	PMOD connection	N/A[2]	N/A[2]

[1] DNI means do not install.

[2] N/A means not applicable.

EVALUATION BOARD HARDWARE

POWER SUPPLIES

The evaluation board receives power through the controller board when connected to the PC by USB. Linear regulators generate the required power supply levels from the applied USB voltage (see Table 3).

The block diagram of evaluation board power supplies is shown in Figure 6 and location of AVDD, AVSS, and IOVDD control links are shown in Figure 7.

Each regulator can be shut down using their shutdown links, as shown in Figure 7.

The AVDD (LK11) and AVSS (LK10) selections are as follows:

- 5V supply (default)
  - 5V regulator supplies AVDD.
  - AVSS connected to GND (LK21 to LK28, see Figure 7).
- ±2.5V split supply
  - +2.5V regulator supplies AVDD.
  - −2.5V regulator supplied AVSS.
- External AVDD/AVSS
  - Connections on Connector J5.

Table 3. AVDD/AVSS Regulators and Their Shutdown Links

Supply	Regulator	Shutdown Link
+7V regulator	LTC3129-1	LK16
+5V regulator	LT1962-5	LK15
+3.3V regulator	LT1962-3.3	LK29
+2.5V regulator	LT1962-2.5	LK17
−3.3V regulator	LTC1983	LK18
−2.5V regulator	ADP7182	LK19

IOVDD (LK12) selection is as follows:

- 3.3V supply (default)
  - 3.3V regulator supplies IOVDD.
  - GND connected to AVSS (LK21 to LK28, see Figure 7).
- External IOVDD
  - Connections on Connector J5.

Table 4. IOVDD Regulator and Shutdown Link

Supply	Regulator	Shutdown Link
3.3V regulator	LT1962	LK29

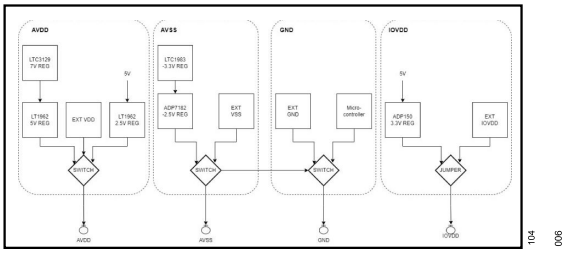


Figure 6. Block Diagram of Evaluation Board Power Supplies

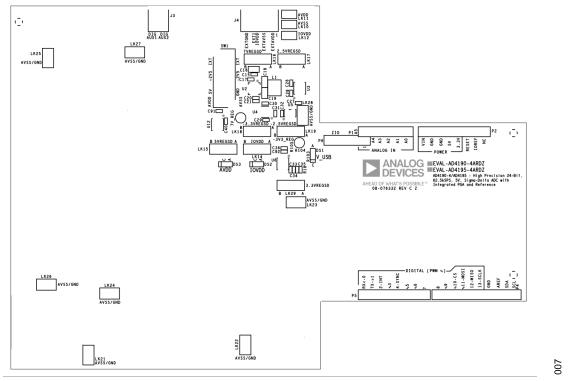


Figure 7. Power Supply Link Options

SERIAL INTERFACE

There are four primary signals: $\overline{CS}$, SCLK, SDI, and SDO (all are inputs, except for SDO, which is an output). By default, the $\overline{RDY}$ function is also available on the SDO pin.

These are the following serial communication options:

- Arduino connection SDP-K1
- PMOD connector
- Standalone mode
  - Removing the R92, R86, R88, and R90 jumper resistors, and mounting them on R93, R87, R89, and R91, respectively, give exposure to SPI signals on the P3 connector. Using the pins from these links can then be used to flywire the signals to an alternative digital capture setup.

For more details on SPI interface, refer to the *Introduction to SPI Interface*.

REFERENCE OPTIONS

The AD4195-4 reference can be selected to be internal or external. The user can select the preferred reference by register settings or jumper/switch options as follows:

- On-board external references as follows:
  - Default: LTC6655LN.
  - ADR4525.
- External reference Connector J1 as follows:
  - Option to use on-board PT1000 precision resistor (R3) insert LK3.
- External reference Connector J2.

EVALUATION BOARD HARDWARE

Selecting Reference Source

For software, to set reference for Channel 0 and for Channel n or go to the AFE[n] register, do the following steps:

1. The board must be connected to ACE.
2. Open the AD417x memory map window.
3. Search for the AFE[0] register.
4. Set the data (control) to the required reference source or the data (hex) to the relevant bits as follows:
   a. Dedicated reference pins REFIN1+/− (hex value 0).
   b. From GPIO0/1 REFIN2+/− (hex value 1).
   c. Internal reference REFIN_REFOUT (hex value 2).

For hardware, if REFIN1+/− is selected, the following options are available using SW2 (see Figure 9):

- LTC6655LN, REFIN− shorted to AVSS.
- External reference Connector J1 (see Figure 8).
- External reference Connector J2 (see Figure 8).

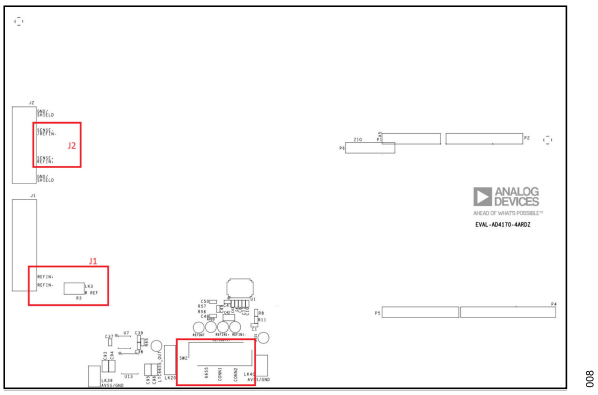


Figure 8. Reference Highlighted Silkscreen

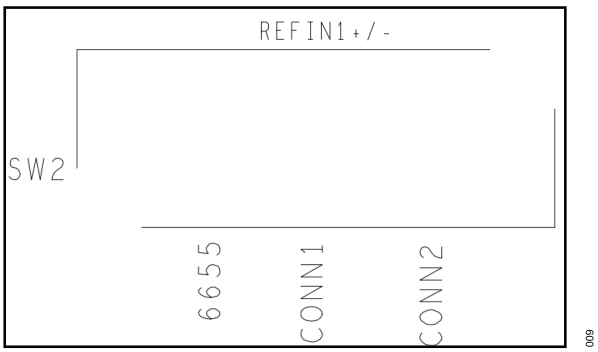


Figure 9. SW2 Reference Switch Zoomed in Silkscreen

EVALUATION BOARD SETUP PROCEDURE

After following the instructions in the EVAL-AD4195-4ARDZ Quick Start Guide section, set up the evaluation and SDP boards.

Warning

The evaluation software and drivers must be installed before connecting the EVAL-AD4195-4ARDZ evaluation board and the SDP-K1 board to the USB port of the PC to ensure the PC correctly recognizes the evaluation system.

EVALUATION BOARD SOFTWARE

SOFTWARE INSTALLATION PROCEDURES

Each software is explained as follows:

- Evaluation software: Plug and play board evaluation is provided by the ACE application. ACE is an evaluation platform and board specific support is installed as add-on called plug-ins from within the ACE software. For installation and documentation instructions, refer to the ACE. ACE can configure the embedded software on supported controller boards and provides a quick and easy way to set up, configure the board, and start capturing signals or generating waveforms.
- Embedded software: The embedded software used for evaluation is typically built using open-source firmware examples, drivers, and hardware description language (HDL), which a user can find in the software section on the relevant product page.

  Note that if the required software is not available, a user can submit a request on the product page.

  Evaluation boards using Linux-based controller boards run a version of Kuiper Linux. The evaluation kit ships with a fully configured SD card that can be used to set the system up and running. Note that in the event that there is an issue or updates are available for this SD card, a user can find the image in the **Software** section on the relevant evaluation board page.
- Host PC software: The firmware and Linux embedded software stacks are based on an IIO architecture (industrial I/O). This enables the use of other tools such as Python and MATLAB with the platform. A user can find these tools in the **Software** section of the product page. Other tools such as IIO oscilloscope and IIO command line tools that provide generic low level support and debug for an IIO-based platform are also available on the product page.

Detailed Description on Evaluation Board Usage with ACE Software

Download the ACE software from the ACE software page. Install ACE on a PC before using the EVAL-AD4195-4ARDZ.

The ACE installation process shown in the Installing the ACE Software section includes the ACE software installation and the SDP driver installation.

Install the ACE software and SDP drivers before connecting the EVAL-AD4195-4ARDZ and the SDP board to the USB port of the PC to ensure that the evaluation system is properly recognized when it is connected to the PC.

Installing the ACE Software

To install the ACE software, do the following steps:

1. Download the ACE software to a Windows-based PC.
2. Double-click the **ACEInstall.exe** file to begin the installation. By default, the software is saved to the following location: **C:\Program Files (x86)\Analog Devices\ACE**.
3. A dialog box appears asking for permission to allow the program to make changes to the PC. Click **Yes** to begin the installation process.
4. In the **ACE Setup** window, click **Next >** to continue the installation (see Figure 10).

Figure 10. ACE Software Installation Confirmation

5. Read the software license agreement and click **I Agree** (see Figure 11).

Figure 11. License Agreement

6. Click **Browse...** to choose the installation location and then click **Next >** (see Figure 12).

EVALUATION BOARD SOFTWARE

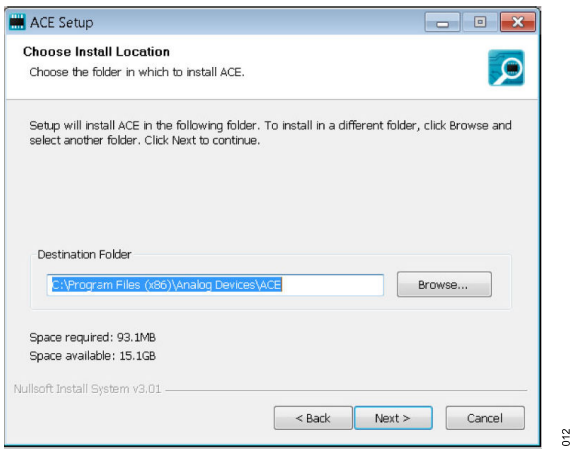


Figure 12. Choose Installation Location

7. The ACE software components to install are preselected (see Figure 13). Click **Install**.

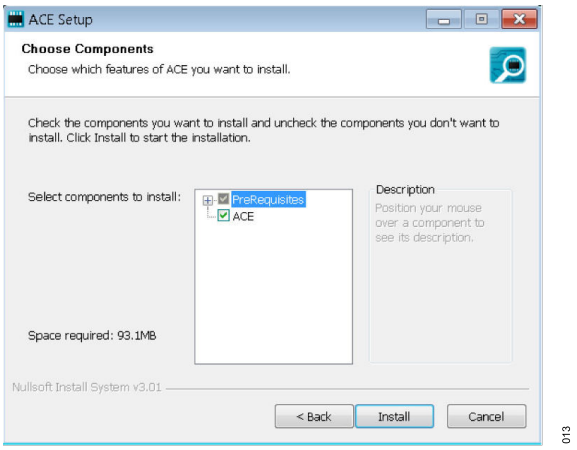


Figure 13. Choose Components

8. The **Windows Security** window appears (see Figure 14). Click **Install**. Figure 15 shows the installation in progress. No action is required.

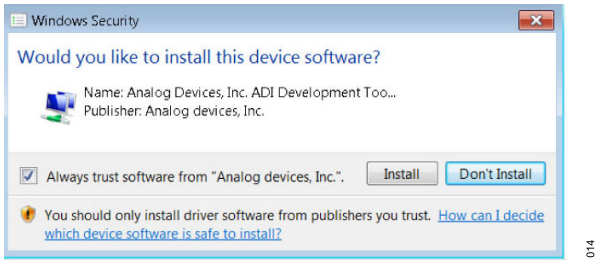


Figure 14. Windows Security Window

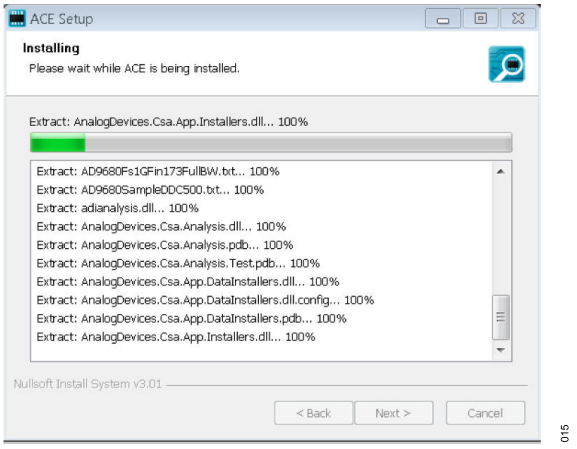


Figure 15. Installation in Progress

9. When the installation is complete, click **Next >** (see Figure 16), and then click **Finish** to complete the installation process.

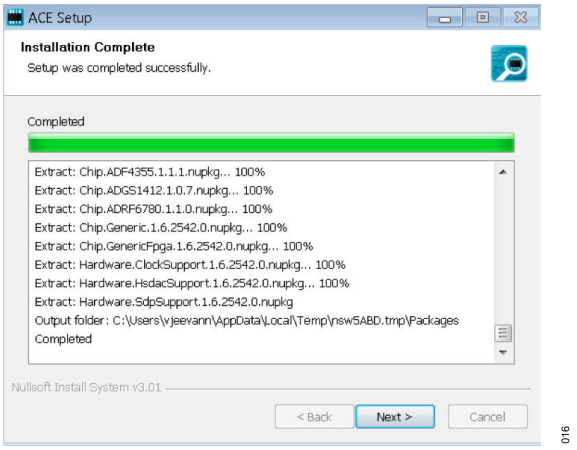


Figure 16. Installation Complete

EVALUATION BOARD SETUP PROCEDURES

The EVAL-AD4195-4ARDZ connects to the SDP-K1. The SDP-K1 is the communication link between the PC and the EVAL-AD4195-4ARDZ. Figure 3 shows a diagram of the connections between the EVAL-AD4195-4ARDZ and the SDP-K1.

Connecting the EVAL-AD4195-4ARDZ and the SDP-K1 to a PC

After the ACE software is installed, do the following steps to set up the EVAL-AD4195-4ARDZ and the SDP-K1:

1. Ensure that all configuration links are in the appropriate positions, as shown in Table 1.
2. Connect the EVAL-AD4195-4ARDZ to the Arduino header on the SDP-K1 (for more details, see the Evaluation Board Set-up Procedure section). The EVAL-AD4195-4ARDZ does not require an external power supply adapter.

EVALUATION BOARD SOFTWARE

3. Connect the SDP-K1 to the PC by the USB cable included in the SDP-K1 kit.

Verifying the Board Connection

After connecting the power and the USB cable from the SDP-K1 to the PC, do the following steps to verify the board connection:

1. After connecting the SDP-K1 to the PC, allow the **Found New Hardware Wizard** to run. Choose to automatically search for the drivers for the SDP-K1 if prompted by the operating system.
2. Navigate to the **Device Manager** window on the PC (see Figure 17).
3. A dialog box may appear asking for permission to allow the program to make changes to the computer. Click **Yes**.
4. The **Computer Management** window appears. From the list labeled **System Tools**, click **Device Manager**. If the SDP-K1 driver is installed and the board is properly connected to the PC, in the **Device Manager** window, **Analog Devices System Demonstration Platform SDP-K1** appears in the **ADI Development Tools** drop-down list, as shown in Figure 17.

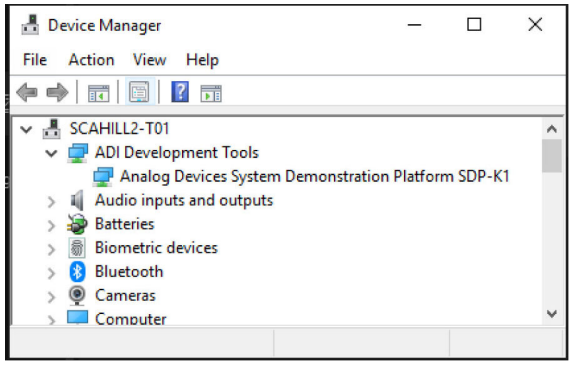


Figure 17. Device Manager Window

Disconnecting the EVAL-AD4195-4ARDZ

Disconnect the power from the SDP-K1, or press the reset tact switch on the SDP-K1, before removing the EVAL-AD4195-4ARDZ from the SDP-K1.

AD4195-4 ACE PLUG-IN DOWNLOAD AND INSTALL

To install the **Board.AD417x** plug-in, do the following steps:

1. From the **Start** menu of the PC, select **All Programs** > **Analog Devices** > **ACE** > **ACE.exe** to open the ACE software main window, as shown in Figure 18.
2. Click the **Plug-in Manager** tab on the top left panel in ACE.
3. Expand **Available Packages** and click **All**. In the search bar on the left side of the panel, enter **AD417x**.
4. Select **Board.AD417x** and click **Install Selected** at the bottom of the panel.
5. The plug-in for the EVAL-AD4195-4ARDZ evaluation board is installed.

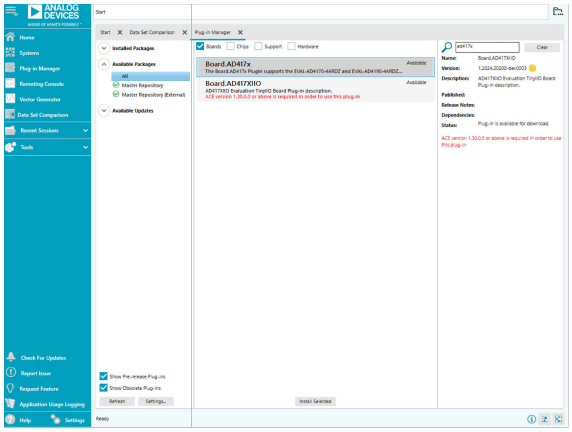


Figure 18. ACE Software Main Window

ACE SOFTWARE OPERATION

LAUNCHING THE SOFTWARE

After the EVAL-AD4195-4ARDZ and SDP-K1 are properly connected to the PC, then to launch the ACE software, do the following steps:

1. From the **Start** menu of the PC, select **All Programs** > **Analog Devices** > **ACE** > **ACE.exe** to open the ACE software main window, as shown in Figure 19.

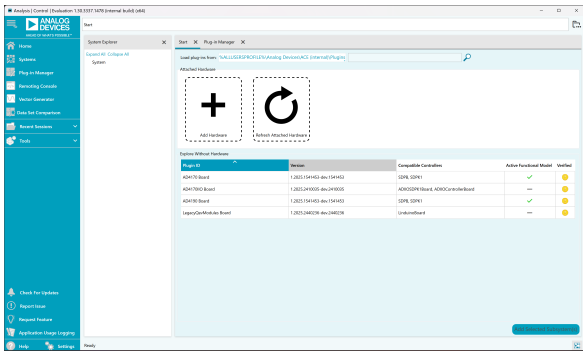


Figure 19. ACE Home Page

2. If the EVAL-AD4195-4ARDZ is not connected to the USB port by the SDP-K1 when the software launches, the **AD4195 Board** icon does not appear in the **Attached Hardware** section in ACE (see Figure 19). To make the **AD4195 Board** icon appear, connect the EVAL-AD4195-4ARDZ and the SDP-K1 to the USB port of the PC, click **Refresh Attached Hardware**, wait a few seconds, and then follow the instructions in the dialog box that opens.
3. Double-click the **AD4195 Board** icon to appear the **AD4195 Board** view window, as shown in Figure 20.

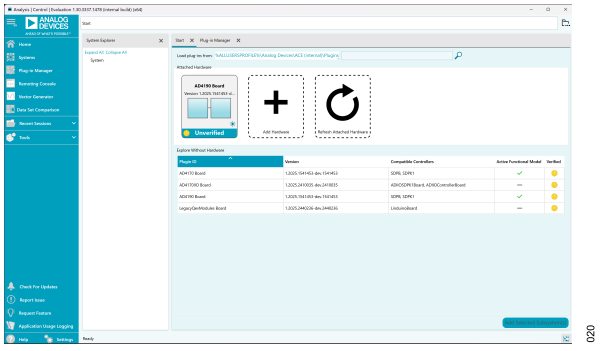


Figure 20. AD4195-4 Evaluation Board Connected

4. Double-click the **AD4195** chip icon in the **AD4195 Eval Board** view window to open the **AD4195** chip view window, as shown in Figure 21.

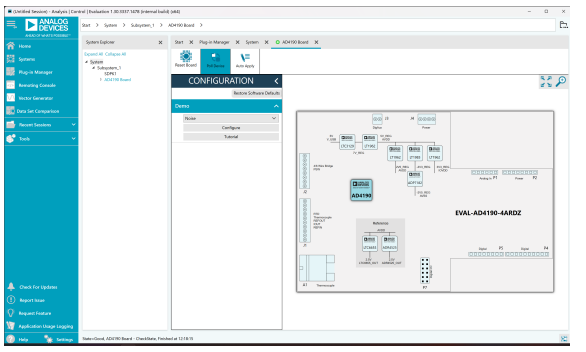


Figure 21. AD4195-4 Evaluation Board View

5. Click **Software Defaults** and then click **Apply Changes** to apply the default settings to the AD4195-4 (see Figure 22).

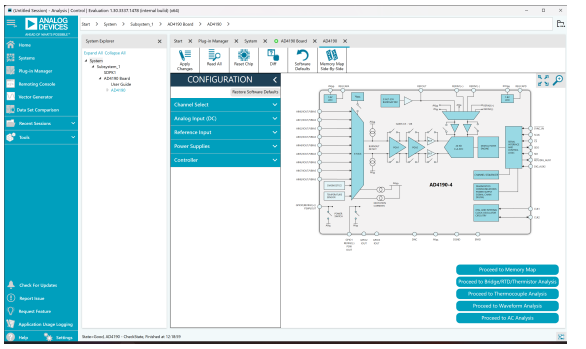


Figure 22. AD4195-4 Chip View

DESCRIPTION OF CHIP VIEW WINDOW

After completing the steps shown in the Software Installation Procedures and the Evaluation Board Setup Procedures sections, set up the system for data capture by using the following buttons:

- The **Proceed to Memory Map** button brings the user to the memory map of the AD4195-4. This allows the user to configure the AD4195-4.
- The **Proceed to Bridge/RTD/Thermistor Analysis**, **Proceed to Thermocouple Analysis**, and **Proceed to Waveform Analysis** buttons bring the user to the **Analysis** tab, which allows the user to see the performance results of the AD4195-4 and displays the data.

WAVEFORM TAB

The **Waveform** tab graphs the conversions gathered and processes the data, calculating the peak-to-peak noise, RMS noise, and resolution (see Figure 23).

Waveform Graph and Controls

The data waveform graph (Label 1, Figure 23) shows each successive sample of the ADC output. Zoom in on the data in the graph using the scroll wheel on PC mouse or by selecting the magnifying glass.

ACE SOFTWARE OPERATION

Analysis Channel

The **Results** section (Figure 23) shows the analysis of the channel selected (Label 2, Figure 23). A user can select or deselect the multiple channels as per requirements.

Samples

The **Sample Count** numeric control (Label 3, Figure 23) sets the number of samples gathered per batch. This control is unrelated to the ADC mode.

Capture

Click the **Run Once** button (Label 4, Figure 23) to start gathering ADC results. The number of samples in the batch is defined by the samples value set (Label 3, Figure 23). Click the **Run Continuously** button (Label 4, Figure 23) to start continuously gathering batches of ADC results. Results appear in the waveform graph (Label 1, Figure 23).

Display Units and Axis Controls

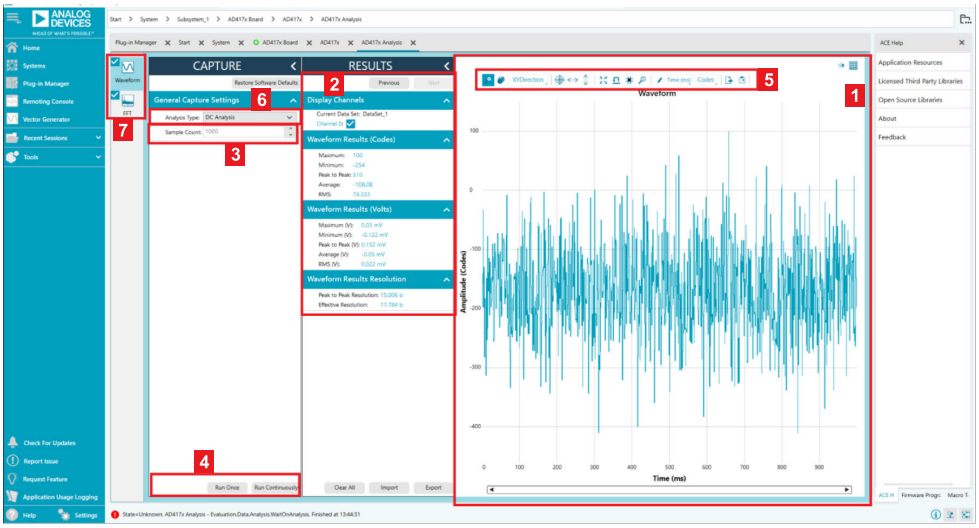
Click the **Codes** drop-down menu (Label 5, Figure 23) to select whether the data graph displays in units of voltages or codes. The axis controls are fixed. When selecting **Fixed**, the axis ranges can be programmed. However, these ranges do not automatically adjust after each batch of samples.

Noise Analysis

The noise analysis section (Label 2, Figure 23) displays the results of the noise analysis for the selected analysis channel, which includes both noise and resolution measurements.

AC Analysis

The **Analysis Type** drop-down menu (Label 6, Figure 23) controls the DC or AC analysis. **AC Analysis** allows for use of the **FFT** plot (Label 7, Figure 23).



023

Figure 23. Waveform Tab of the AD4195-4 ACE Plug-In

ACE SOFTWARE OPERATION

MEMORY MAP TAB

Use the **AD4194 Memory Map** tab to access the registers of the AD4195-4. Figure 24 shows the **AD4195 Memory Map** tab. This tab changes register settings and shows additional information about each bit in each individual register.

Export Button

The **Export** button (Label 1, Figure 24) on the **Registers** map tab allows the user to save and load register settings. Click **Save** to save all the current register settings to a file for later use. Click **Load** to load a previously saved register map.

Registers

The **Registers** section (Label 2, Figure 24) shows the value that is set in the selected register. Check the value of the register in this window by clicking on the bits.

Clicking any individual bit changes the bit from 1 to 0 or 0 to 1, which depends on the initial state of the bit. The register value can also be changed by writing the hexadecimal value in the input field to the right of the individual bits.

Bit Fields

The bit fields section (Label 3, Figure 24) shows the individual bit field of the selected register. The register is broken by name into its bit fields, name of the bit fields, a description of each bit field, and access information. To show each individual bit field, click the **Show Bit Fields** button (Label 4, Figure 24).

To apply these changes, click the **Apply Changes** button (Label 5, Figure 24). Search for specific registers using the **Registers** section (Label 6, Figure 24).

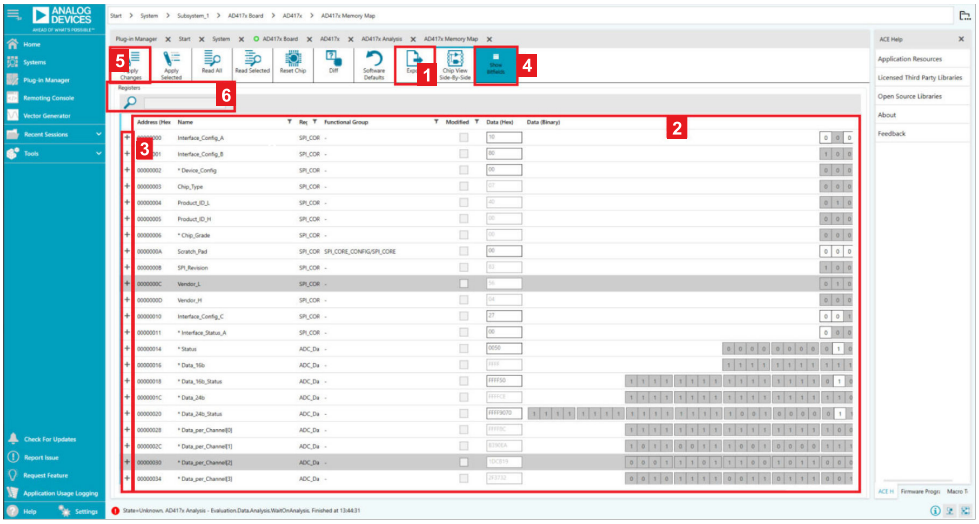


Figure 24. Register Map Tab of the AD4195-4 ACE Plug-In

NOISE TEST—QUICK START DEMONSTRATION

To perform a noise test, do the following steps:

1. Double-click the **AD4195 Board** icon to open the **AD4195 Board** view window. **CONFIGURATION** is on the left, either as shown in Figure 25 (Label 1) or already expanded. to expand **CONFIGURATION**, click the arrow (Label 2, Figure 25).

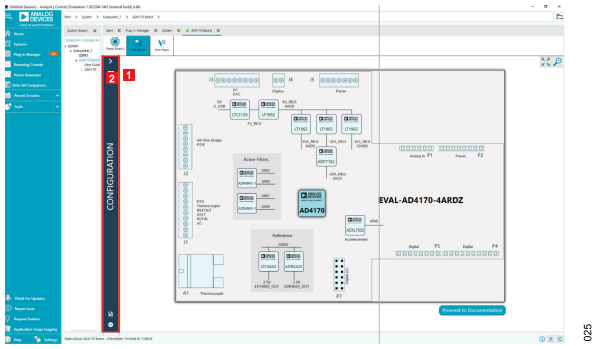


Figure 25. ACE Plug-In Configuration

2. To see the settings required for the demo, click **Tutorial** before writing to the AD4195-4 (Label 3, Figure 26). Click **Configure** (Label 2, Figure 26) to write these settings to the board.

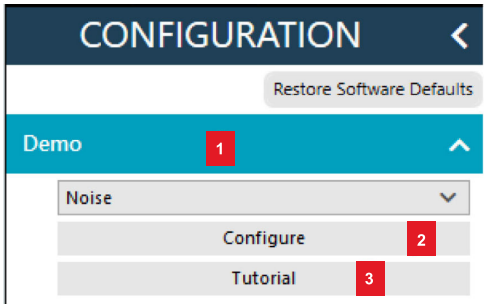


Figure 26. Configuration (Expanded View)

3. The summary is then displayed once the write is complete. From the displayed summary, to navigate to the chip view, double-click the **AD4195-4** chip (Figure 27). To make further changes to the configuration, double-click the **Proceed to Memory Map** button (Label 1, Figure 27). To begin capturing data, double-click the **Proceed to Waveform Analysis** button (Label 2, Figure 27).

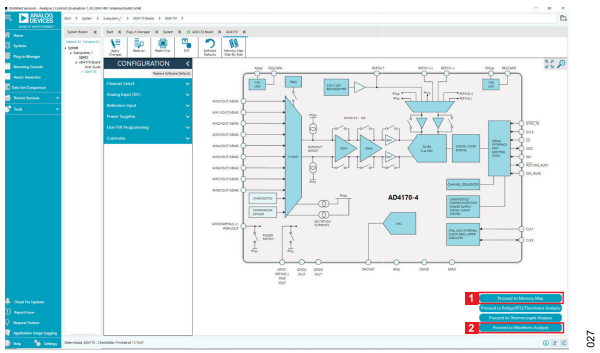


Figure 27. Chip View, Noise Test

4. To gather samples, change **Sample Count** (Label 1, Figure 28) to the number of samples required, then click the **Run Once** button (Label 2, Figure 28) to acquire the samples from the ADC. Figure 28 shows an example of the **Waveform Analysis** window after running a noise test.

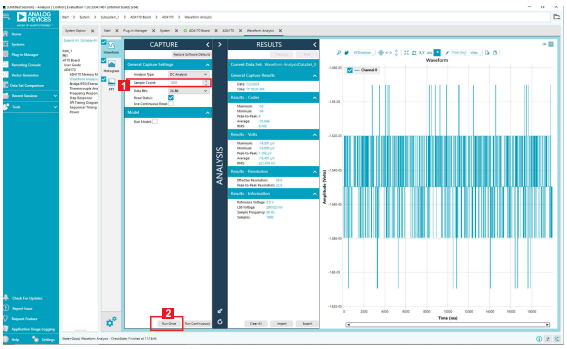


Figure 28. Noise Test Waveform Display

EVALUATION BOARD SCHEMATICS AND ARTWORK

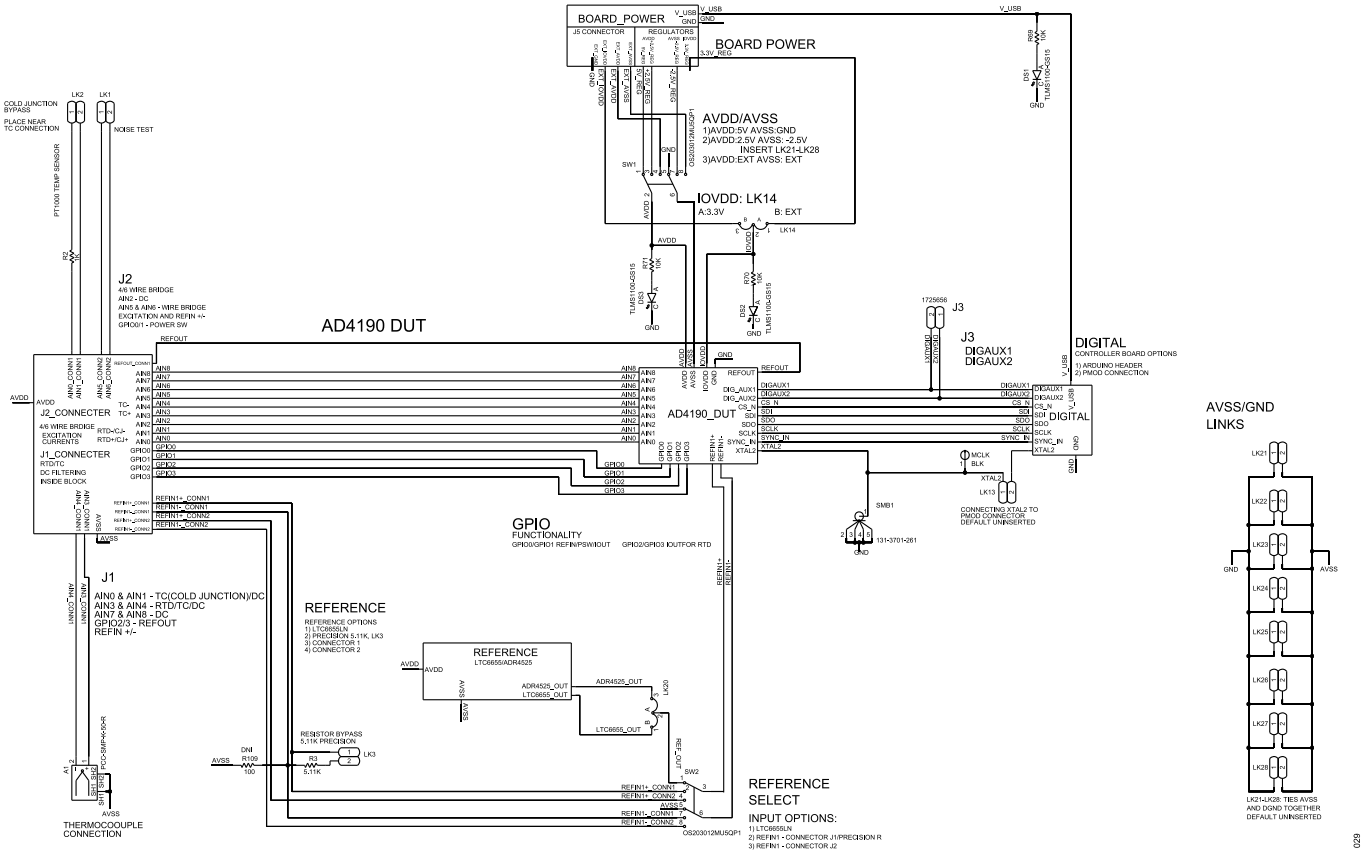


Figure 29. EVAL-AD4195-4ARDZ Schematic Part 1

EVALUATION BOARD SCHEMATICS AND ARTWORK

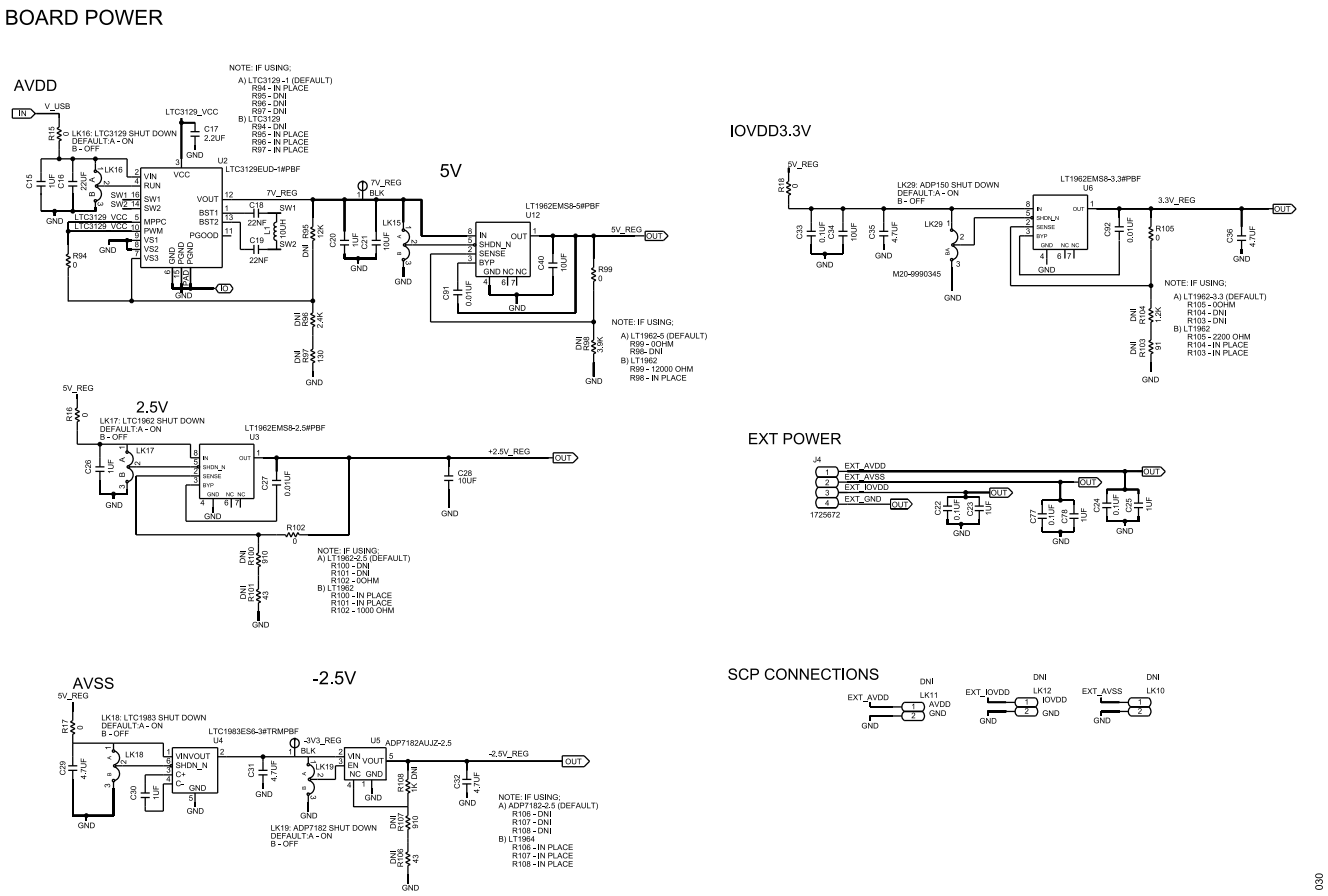


Figure 30. EVAL-AD4195-4ARDZ Schematic Part 2

EVALUATION BOARD SCHEMATICS AND ARTWORK

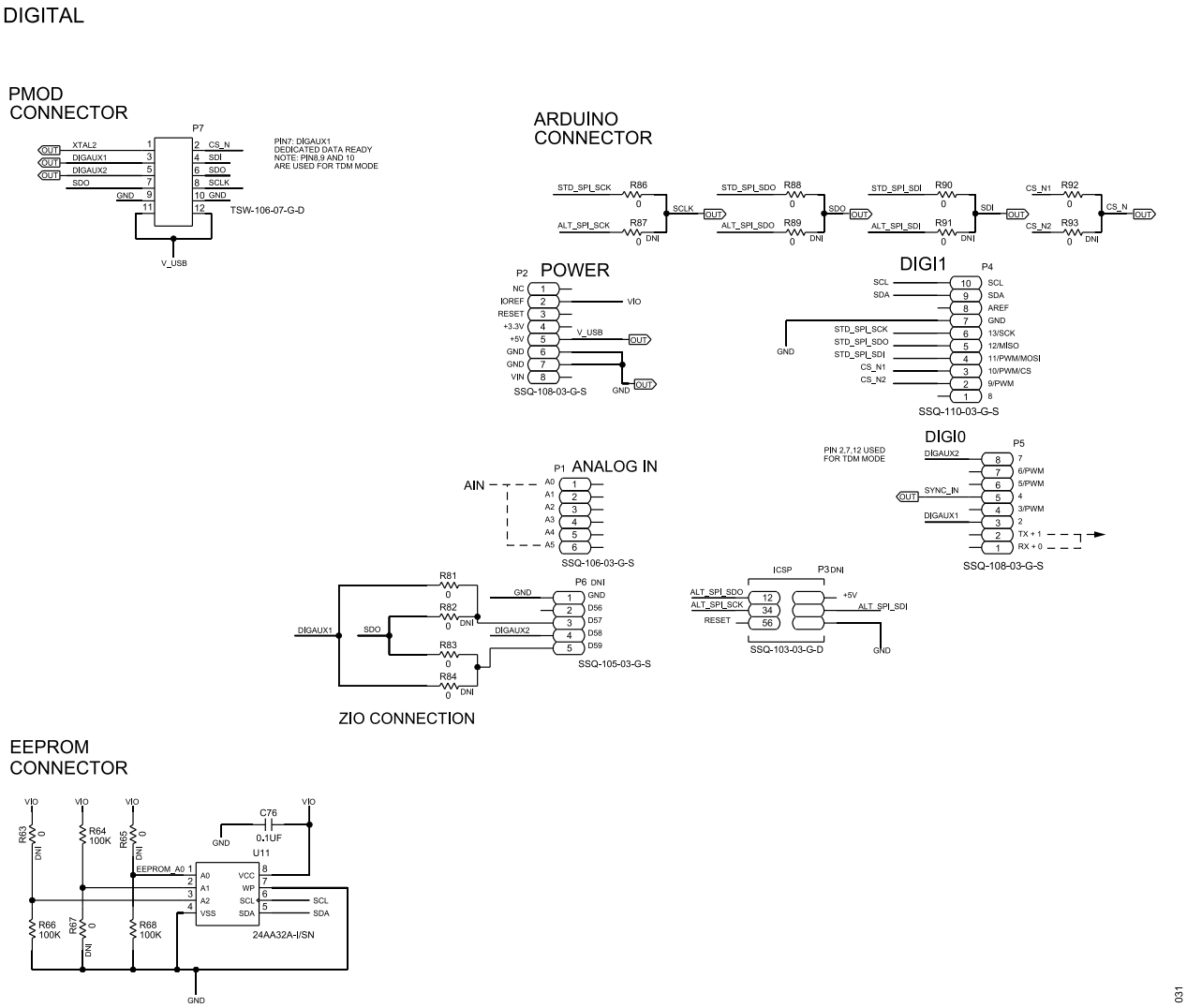


Figure 31. EVAL-AD4195-4ARDZ Schematic Part 3

EVALUATION BOARD SCHEMATICS AND ARTWORK

AD4190 DUT

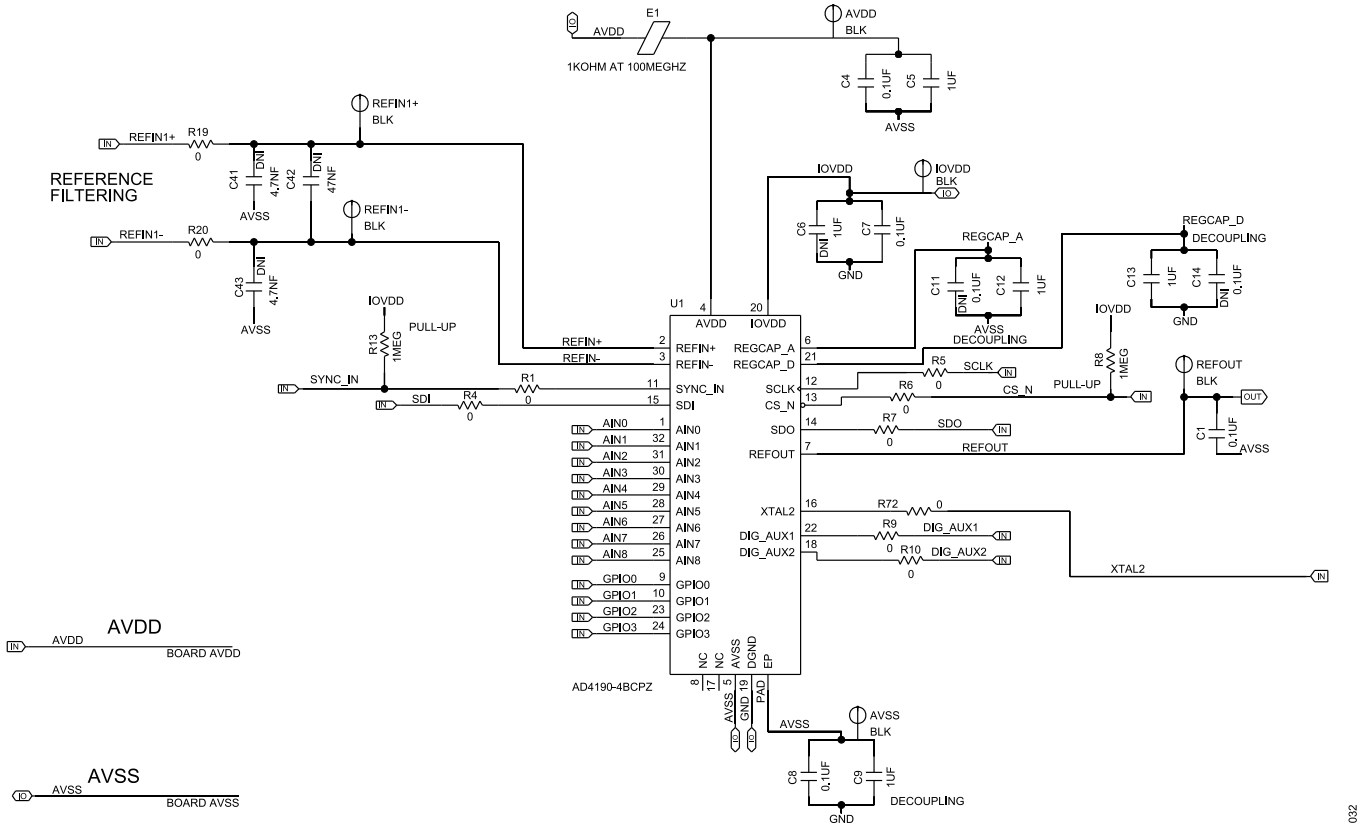


Figure 32. EVAL-AD4195-4ARDZ Schematic Part 4

EVALUATION BOARD SCHEMATICS AND ARTWORK

REFERENCE AND GPIO

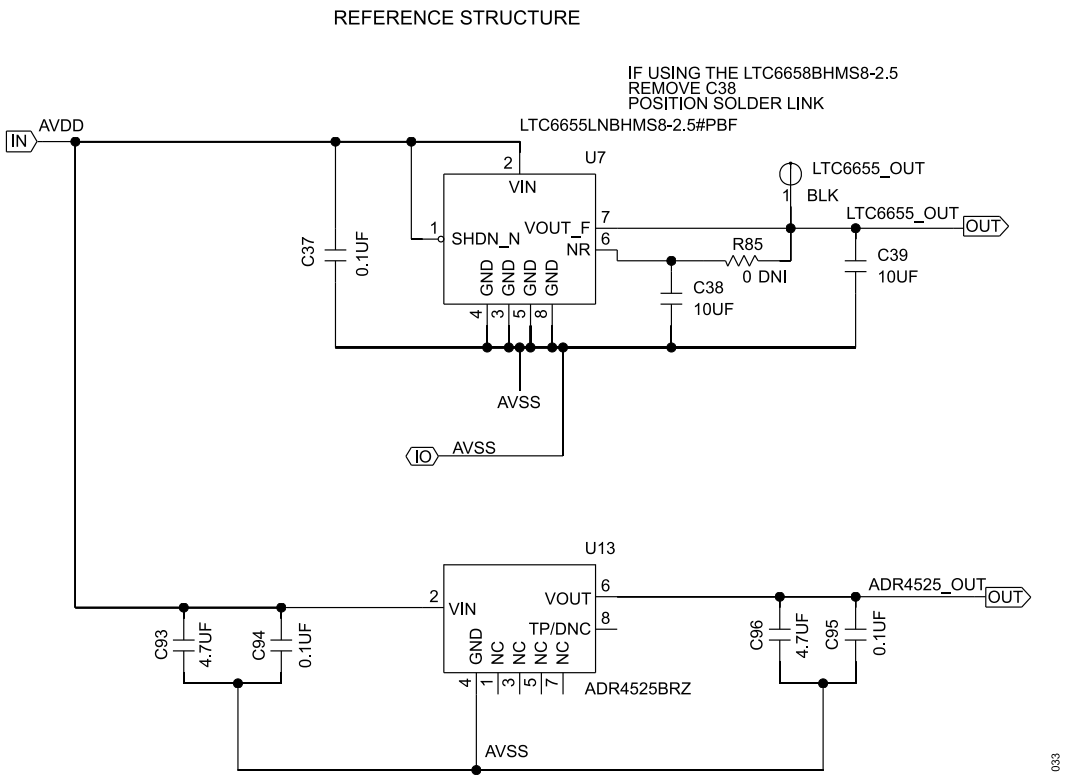


Figure 33. EVAL-AD4195-4ARDZ Schematic Part 5

EVALUATION BOARD SCHEMATICS AND ARTWORK

J2 CONNECTOR

4/6 WIIRE BRIDGE
GPIO 0/1 (PSW)

J1 CONNECTOR

RTD
THERMOCOUPLE
REFOUT
GPIO 2/3 (EXCITATION CURRENT)

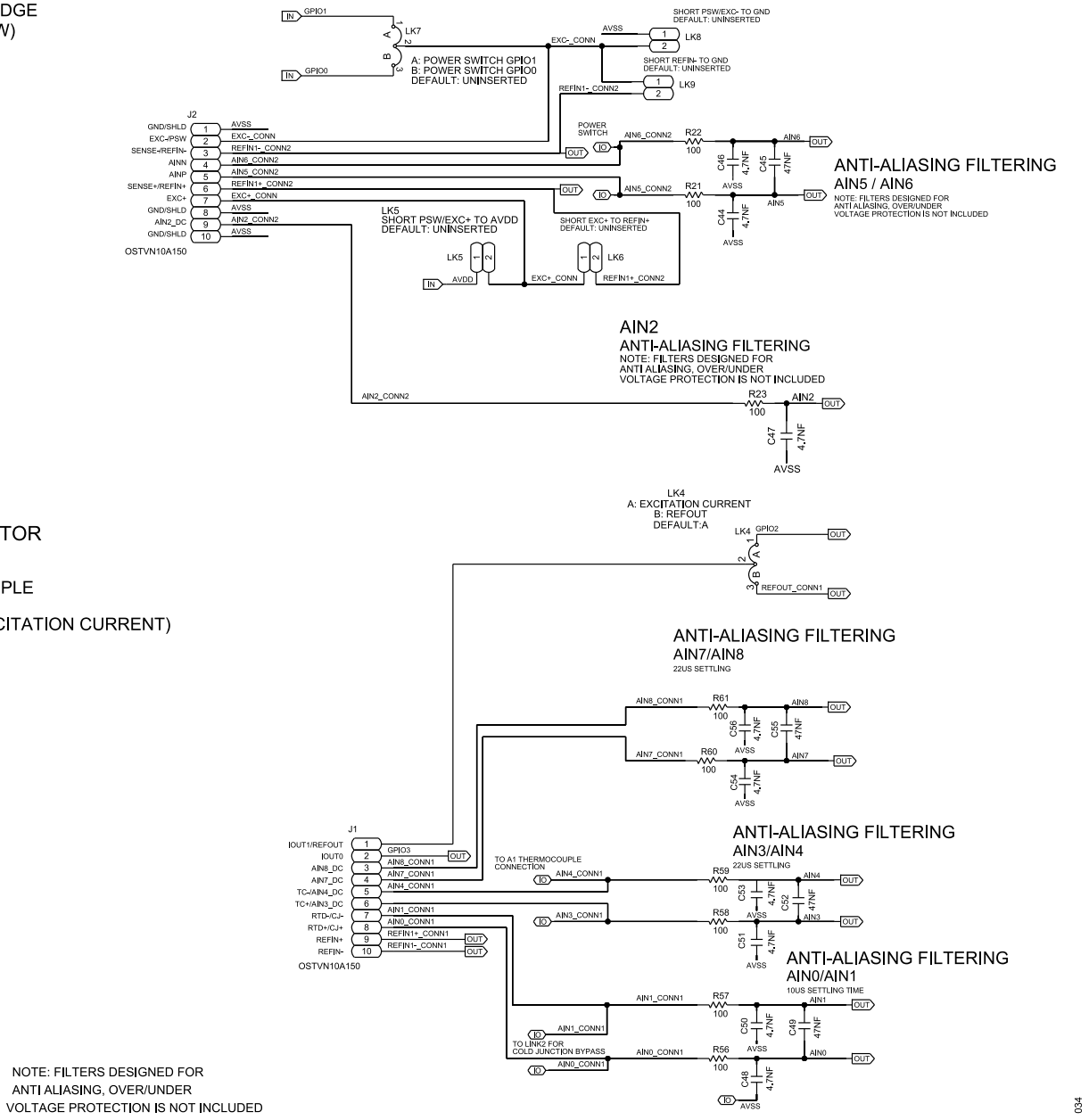


Figure 34. EVAL-AD4195-4ARDZ Schematic Part 6

EVALUATION BOARD SCHEMATICS AND ARTWORK

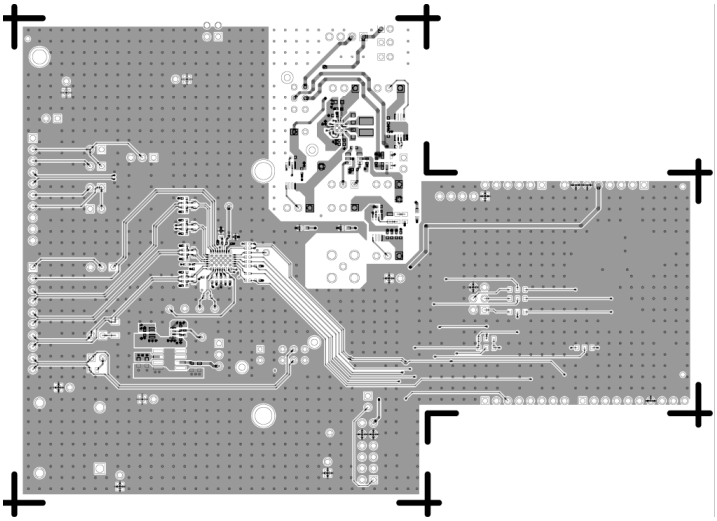


Figure 35. EVAL-AD4195-4ARDZ Layer 1 Primary

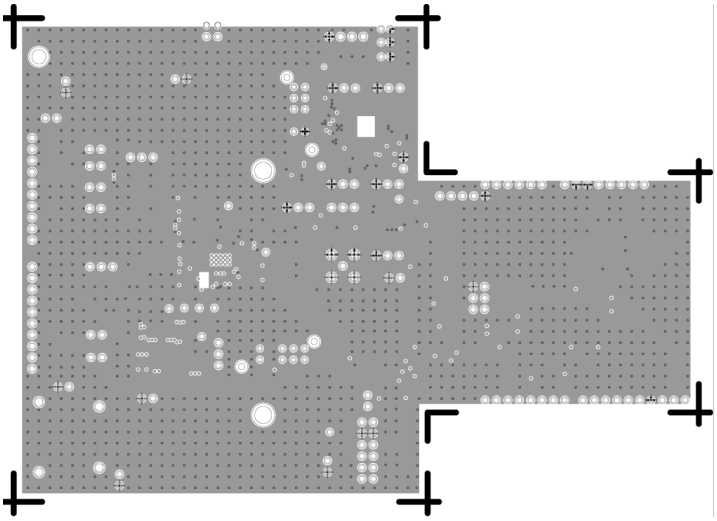


Figure 36. EVAL-AD4195-4ARDZ Layer 2 GND

EVALUATION BOARD SCHEMATICS AND ARTWORK

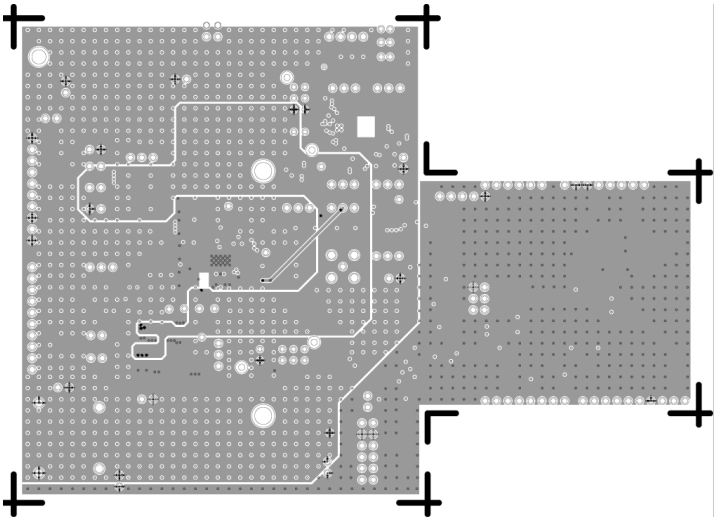


Figure 37. EVAL-AD4195-4ARDZ Layer 3 Power

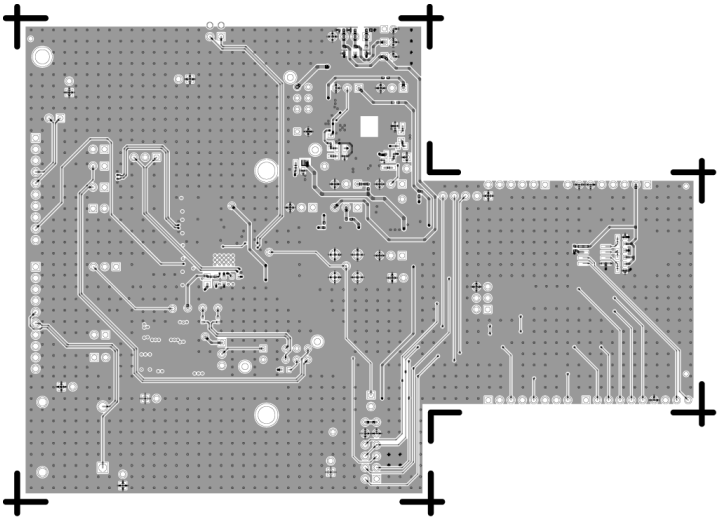


Figure 38. EVAL-AD4195-4ARDZ Layer 4 Secondary

EVALUATION BOARD SCHEMATICS AND ARTWORK

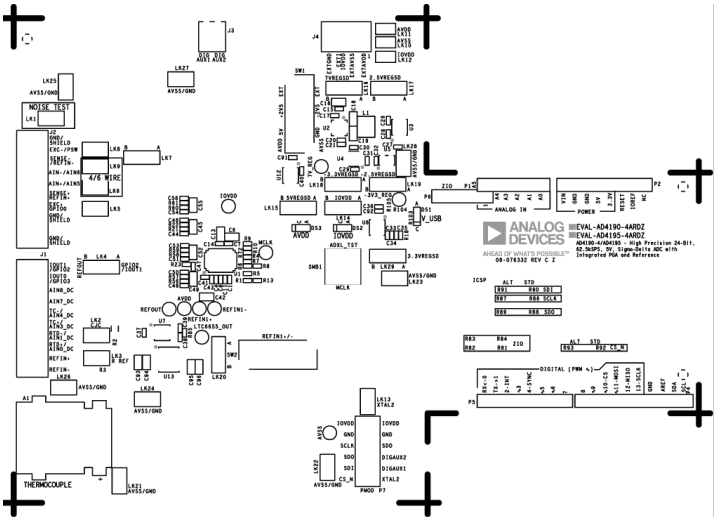


Figure 39. EVAL-AD4195-4ARDZ Silkscreen Primary

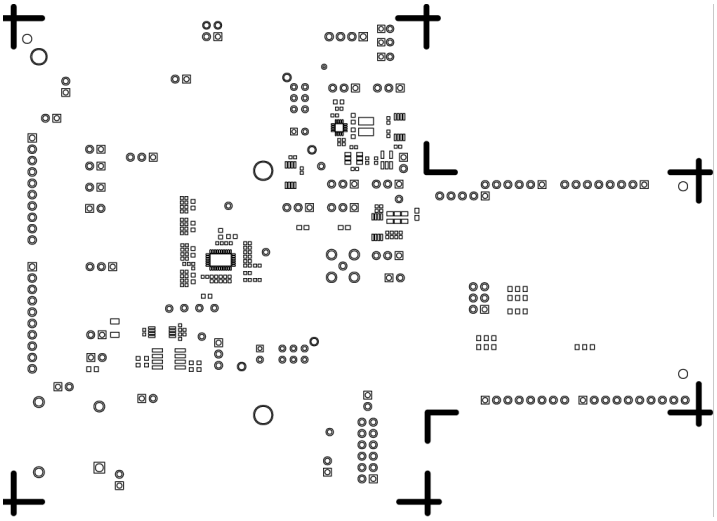


Figure 40. EVAL-AD4195-4ARDZ Soldermask Primary

EVALUATION BOARD SCHEMATICS AND ARTWORK

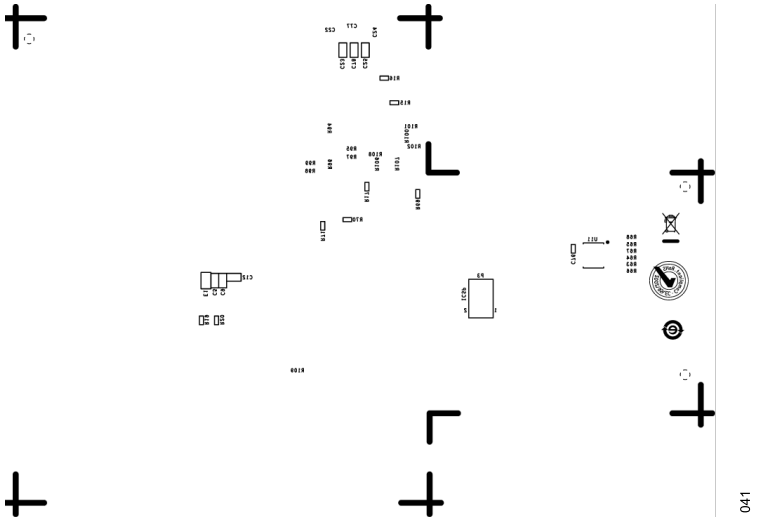


Figure 41. EVAL-AD4195-4ARDZ Silkscreen Secondary

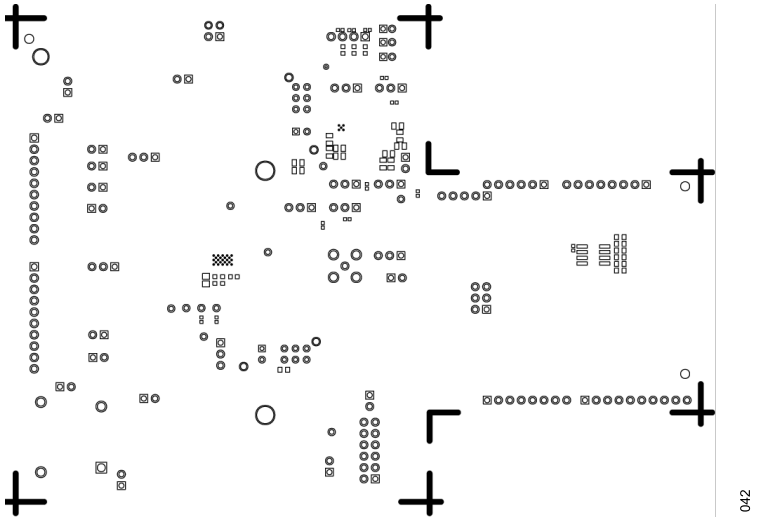


Figure 42. EVAL-AD4195-4ARDZ Soldermask Secondary

EVALUATION BOARD SCHEMATICS AND ARTWORK

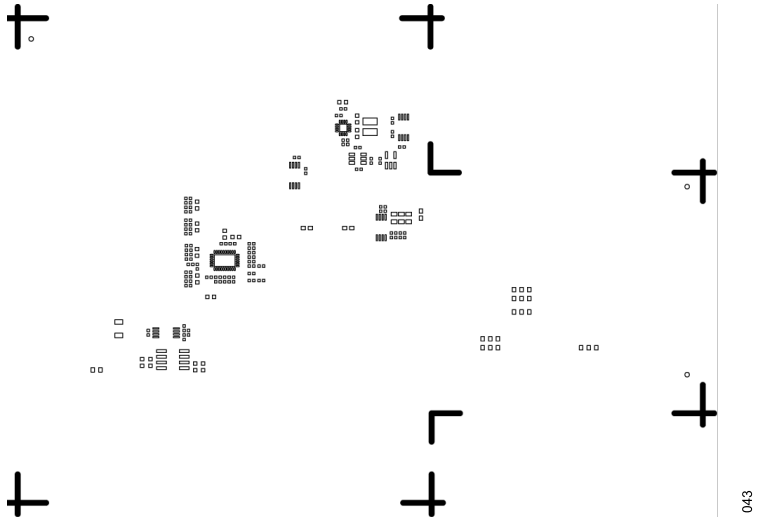


Figure 43. EVAL-AD4195-4ARDZ Pastemask Primary

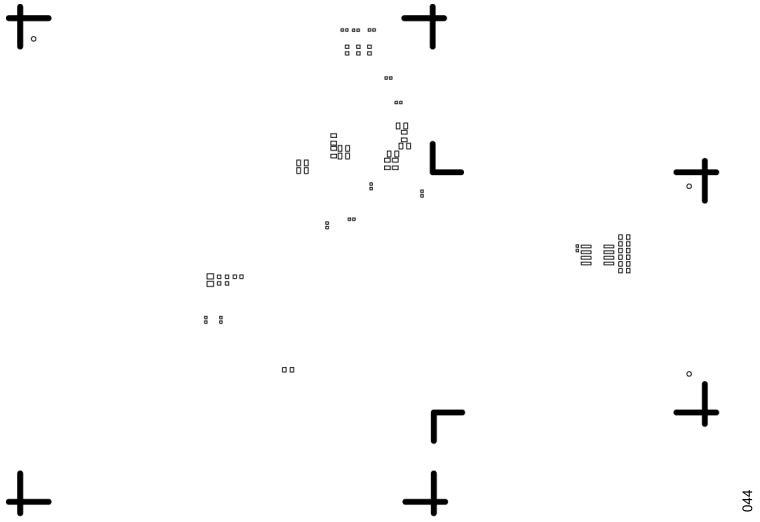


Figure 44. EVAL-AD4195-4ARDZ Pastemask Secondary

ORDERING INFORMATION

BILL OF MATERIALS

Table 5. Bill of Materials for EVAL-AD4195-4ARDZ

Quantity	Reference Designator	Description	Manufacturer	Part Number
1	PCB	PCB	Analog Devices, Inc. Supplied	08_076332c
10	−3V3_REG, 7V_REG, AVDD, AVSS, IOVDD, LTC6655_OUT, MCLK, REFIN1+, REFIN1−, REFOUT	PCB connectors, test points, black	Keystone Electronics	5001
1	A1	PCB connector, thermocouple miniature size, calibration type K, with transistor retainer clip, 1X M024043	Omega	PCC-SMP-K-50-R
9	C1, C4, C7, C8, C22, C24, C33, C37, C77	Ceramic capacitors, 0.1µF, 25V, 10%, X7R, 0402	AVX	04023C104KAT2A
7	C5, C9, C12, C13, C23, C25, C78	Ceramic capacitors, 1µF, 16V, 10%, X7R, 0603, AEC-Q200	Murata	GCM188R71C105KA64D
4	C15, C20, C26, C30	Ceramic capacitors, 1µF, 10V, 10%, X7S, 0402	TDK	C1005X7S1A105K050BC
1	C16	Ceramic capacitor, low ESR, 22µF, 6.3V, 20%, X5R, 0603	TDK	C1608X5R0J226M080AC
1	C17	Ceramic capacitor, 2.2µF, 16V, 10%, X5R, 0402	Murata	GRM155R61C225KE11D
2	C18, C19	Ceramic capacitors, 22NF, 25V, 5%, X7R, 0603	AVX	06033C223JAT2A
6	C21, C28, C34, C38, C39, C40	Ceramic capacitors, 10µF, 6.3V, 20%, X5R, 0402	Samsung	CL05A106MQ5NUNC
3	C27, C91, C92	Ceramic capacitors, 0.01µF, 25V, 10%, X5R, 0402	AVX	04023D103KAT2A
5	C29, C31, C32, C35, C36	Ceramic capacitors, low ESR, 4.7µF, 6.3V, 10%, X5R, 0402	TDK	C1005X5R0J475K050BC
9	C44, C46, C47, C48, C50, C51, C53, C54, C56	Ceramic capacitors, 4.7NF, 16V, 10%, X7R, 0402	AVX	0402YC472KAT2A
4	C45, C49, C52, C55	Ceramic capacitors, 4.7NF, 100V, 10%, X7R, 0603, AEC-Q200	Kemet	C0603C473K1RACAUTO
1	C76	Ceramic capacitor, 0.1µF, 16V, 10%, X7R, 0402, AEC-Q200	Murata	GCM155R71C104KA55D
2	C93, C96	Ceramic capacitors, 4.7µF, 16V, 10%, X6S, 0603	Murata	GRM188C81C475KE11D
2	C94, C95	Ceramic capacitors, 0.1µF, 10V, 10%, X7R, 0603	Kemet	C0603C104K8RACTU
3	DS1, DS2, DS3	Red LEDs, SMD, 0603, AEC-Q101	Vishay	TLMS1100-GS15
1	E1	Chip ferrite bead, multilayer, 0.5A, 0.280Ω maximum DC resistance (DCR)	Murata	BLM21AG102SN1D
2	J1, J2	PCB connectors, terminal blocks, 10 positions, 2.54mm pitch, 3.5mm solder tail, 125V AC, 6A, 20 to 30 AWG	On Shore Technology	OSTVN10A150
1	J3	PCB connector, terminal block, 2 positions	Phoenix Contact	1725656
1	J4	PCB connector, terminal block, single row ST, 4 positions, 2.54mm pitch, 3.5mm tail length	Phoenix Contact	1725672
1	L1	Inductor, power shielded, wire wound, 10µH, 20%, 1MHz, 1A, 0.346Ω, 1212, AEC-Q200	Coilcraft Inc.	EPL3015-103MLC
16	LK1, LK2, LK3, LK5, LK6, LK8, LK9, LK13, LK21, LK22, LK23, LK24, LK25, LK26, LK27, LK28	PCB connectors, header, 2 positions, single row	Harwin	M20-9990246
10	LK4, LK7, LK14, LK15, LK16, LK17, LK18, LK19, LK20, LK29	PCB connectors, 3 positions, male header, unshrouded, single row, 2.54mm pitch, 3mm solder tail	Harwin	M20-9990345
1	P1	PCB connector, receptacle, 25mil, square post, 2.54mm pitch	Samtec	SSQ-106-03-G-S
2	P2, P5	PCB connectors, receptacles, 25mil, square post, 2.54mm pitch	Samtec	SSQ-108-03-G-S
1	P4	PCB connector, receptacle, 25mil, square post, 2.54mm pitch	Samtec	SSQ-110-03-G-S

ORDERING INFORMATION

Table 5. Bill of Materials for EVAL-AD4195-4ARDZ (Continued)

Quantity	Reference Designator	Description	Manufacturer	Part Number
1	P7	PCB connector, header, 12 positions, dual ST	Samtec	TSW-106-07-G-D
14	R1, R4, R5, R6, R7, R9, R10, R15, R16, R17, R18, R19, R20, R72	Resistors, SMD, 0Ω, jumper, 1/10W, 0402, AEC-Q200	Panasonic	ERJ-2GE0R00X
4	R94, R99, R102, R105	Resistors, SMD, 0Ω, jumper, 1/8W, 0805, AEC-Q200	Vishay	CRCW08050000Z0EA
2	R8, R13	Resistors, SMD, 1MΩ, 1%, 1/10W, 0402, AEC-Q200	Panasonic	ERJ-2RKF1004X
1	R2	Resistor, SMD, temperature sensor, 1kΩ resistance at 0°C, 1206	IST	P1K0.1206.2P.B
9	R21, R22, R23, R56, R57, R58, R59, R60, R61	Resistors, SMD, 100Ω, 1%, 1/10W, 0402, AEC-Q200	Panasonic	ERJ-2RKF1000X
1	R3	Resistor, SMD, high reliability, 5.11kΩ, 0.1%, 1/10W, 0603, AEC-Q200	Panasonic	ERA-3ARB5111V
3	R64, R66, R68	Resistors, SMD, 100kΩ, 1%, 1/10W, 0603	Bourns	CR0603-FX-1003ELF
3	R69, R70, R71	Resistors, SMD, 10kΩ, 5%, 1/16W, 0402, AEC-Q200	Vishay	CRCW040210K0JNED
6	R81, R83, R86, R88, R90, R92	Resistors, SMD, jumper, 0Ω, 1%, 1/10W, 0603, AEC-Q200	Panasonic	ERJ-3GEY0R00V
1	SMB1	PCB connector, coaxial, SMB jack, RF vertical, housing color gold	Cinch Connectivity Solutions	131-3701-261
2	SW1, SW2	Switch miniature slide, DP3T	C&K Components	OS203012MU5QP1
1	U1	IC, 24-bit, 62.5kSPS, multichannel, low-noise precision sigma-delta ADC	Analog Devices, Inc.	AD4195-4BCPZ-RL7
1	U11	IC, 32k-bit, serial EEPROM	Microchip	24AA32A-I/SN
1	U12	IC, 300mA, low-noise micropower LDO regulators	Analog Devices, Inc.	LT1962EMS8-5#PBF
1	U13	IC, ultra-low noise, high-accuracy voltage references	Analog Devices, Inc.	ADR4525BRZ
1	U2	IC, 15V, 200mA, synchronous buck-boost DC/DC converter with 1.3µA quiescent current	Analog Devices, Inc.	LTC3129EUD-1#PBF
1	U3	IC, 300mA, low-noise micropower LDO regulators	Analog Devices, Inc.	LT1962EMS8-2.5#PBF
1	U4	IC, 100mA regulated charge-pump inverters ThinSOT	Analog Devices, Inc.	LTC1983ES6-3#TRMPBF
1	U5	IC, −28V, −200mA, low noise, linear regulator	Analog Devices, Inc.	ADP7182AUJZ-2.5-R7
1	U6	IC, 300mA, low-noise micropower LDO regulators	Analog Devices, Inc.	LT1962EMS8-3.3#PBF
1	U7	IC, 0.25ppm noise, low drift precision references	Analog Devices, Inc.	LTC6655LNBHMS8-2.5#PBF

ORDERING INFORMATION

NOTES

ESD Caution
ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.