

Evaluating the AD7124-4/AD7124-8, 4-/8-Channel, Low Noise, Low Power, 24-Bit, Sigma-Delta ADC with PGA and Reference

FEATURES

- ▶ Fully-featured evaluation board for the [AD7124-4/AD7124-8](#)
- ▶ On-board 2.5V [ADR4525](#) reference
- ▶ PC control with [EVAL-SDP-CB1Z \(SDP-B\)](#)
- ▶ PC software for control and data analysis (time domain and frequency domain)
- ▶ Compatible interface with [AD7124-4/AD7124-8 Eval+ Software](#), IIO Scope, Python, and MATLAB

EVALUATION KIT CONTENTS

- ▶ EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation board

ONLINE RESOURCES

- ▶ Documents needed
 - ▶ [AD7124-4/AD7124-8](#) data sheet
 - ▶ [Evaluation board schematics](#)
 - ▶ [Bill of materials](#)
- ▶ Legacy user guides
 - ▶ [EVAL-AD7124-4SDZ](#)
 - ▶ [EVAL-AD7124-8SDZ](#)
- ▶ Required software
 - ▶ [AD7124-4/AD7124-8 Eval+ Software](#)

EQUIPMENT NEEDED

- ▶ EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation board
- ▶ [EVAL-SDP-CB1Z \(SDP-B\)](#) system demonstration platform
- ▶ DC signal source
- ▶ USB cable
- ▶ PC running Windows® with USB 2.0 port

EVALUATION BOARD PHOTOGRAPH

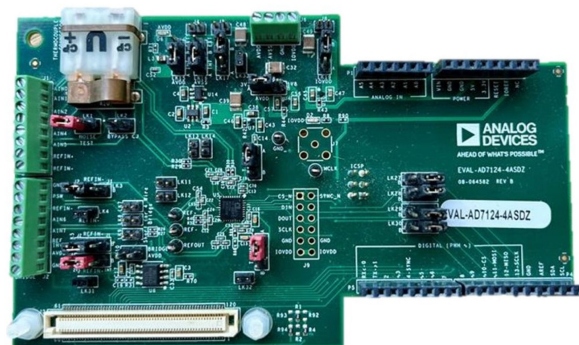


Figure 1. EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ Evaluation Board Photograph

GENERAL DESCRIPTION

The EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation kit features the [AD7124-4/AD7124-8](#), which is a 24-bit, low power, multichannel, low-noise precision sigma-delta analog-to-digital converter (ADC).

The EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ connects to the USB port of the PC by connecting to the [EVAL-SDP-CB1Z \(SDP-B\)](#) motherboard. A 5V USB supply via the PC is regulated to supply the [AD7124-4/AD7124-8](#) and support all necessary components.

The [AD7124-4/AD7124-8 Eval+ Software](#) fully configures the [AD7124-4/AD7124-8](#) device register functionality and provides DC time domain analysis in the form of waveform graphs and associated noise analysis for ADC performance evaluation.

The EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ is an evaluation board that allows the user to evaluate the features of the ADC. The user PC software executable controls the [AD7124-4/AD7124-8](#) over the USB through the [EVAL-SDP-CB1Z \(SDP-B\)](#) system demonstration platform (SDP) board.

Full specifications on the [AD7124-4/AD7124-8](#) are available in the [AD7124-4/AD7124-8](#) data sheets, available from Analog Devices, Inc., and must be consulted with this user guide when using the EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation board.

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REVISION HISTORY

10/2025—Revision 0: Initial Version

EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ QUICK START GUIDE

To use the evaluation board, do the following steps:

1. With the [EVAL-SDP-CB1Z \(SDP-B\)](#) board disconnected from the USB port of the PC, install the [AD7124-4/AD7124-8 Eval+ Software](#). Restart the PC after the software installation is complete. For the complete software installation instructions, see the [Evaluation Board Software](#) section.
2. Connect the [EVAL-SDP-CB1Z \(SDP-B\)](#) board to the EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ board.
3. Screw the two boards together using the plastic screw and washer set included in the evaluation board kit to connect the boards firmly together (see [Figure 2](#) bottom image).
4. Connect the [EVAL-SDP-CB1Z \(SDP-B\)](#) board to the PC using the supplied USB cable. For the Windows XP operating system, search for the [EVAL-SDP-CB1Z](#) drivers. Choose to automatically search for the drivers for the [EVAL-SDP-CB1Z \(SDP-B\)](#) board if prompted by the operating system.
5. From the **Programs** menu, go to the **Analog Devices** subfolder, and click **AD7124 EVAL+** to launch the Eval+ Software (for more details, see the [Launching the Software](#) section).

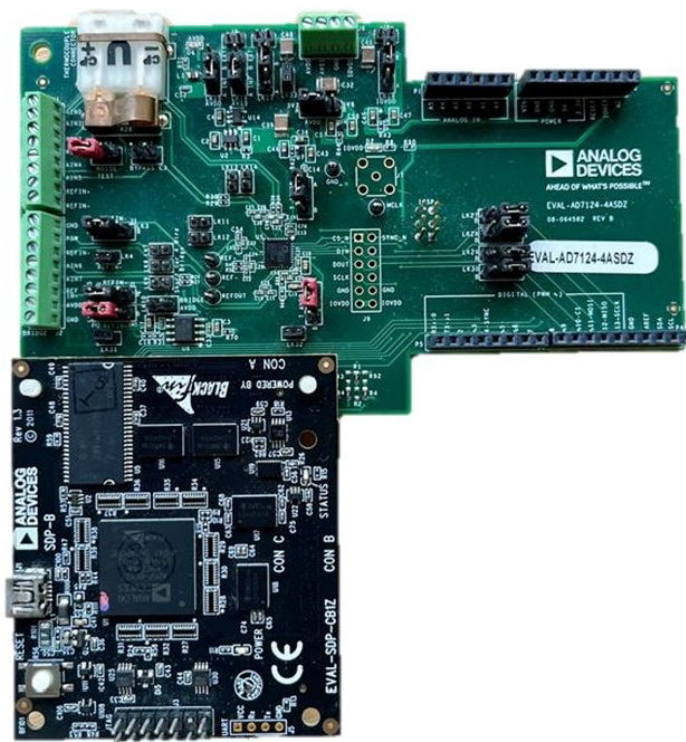


Figure 2. Hardware Configuration, Setting Up the EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ Evaluation Board

EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ BLOCK DIAGRAM

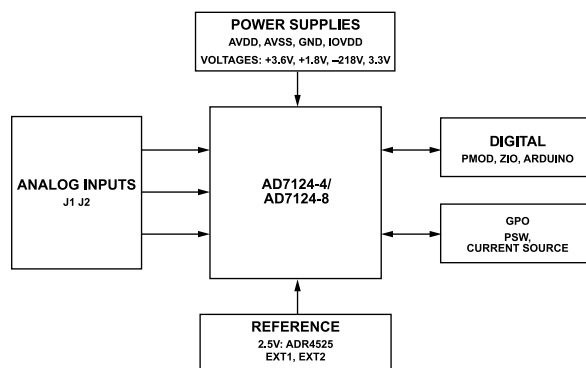


Figure 3. EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ Block Diagram

EVALUATION BOARD HARDWARE

DEVICE DESCRIPTION

The [AD7124-4/AD7124-8](#) 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 [AD7124-4/AD7124-8](#) 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 on the [AD7124-4/AD7124-8](#) are available in the [AD7124-4/AD7124-8](#) data sheets available from Analog Devices,

Inc., and must be consulted with this user guide when using the EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation board. Full details on the EVAL-SDP-CB1Z (SDP-B controller board) are available at [EVAL-SDP-CB1Z \(SDP-B\)](#).

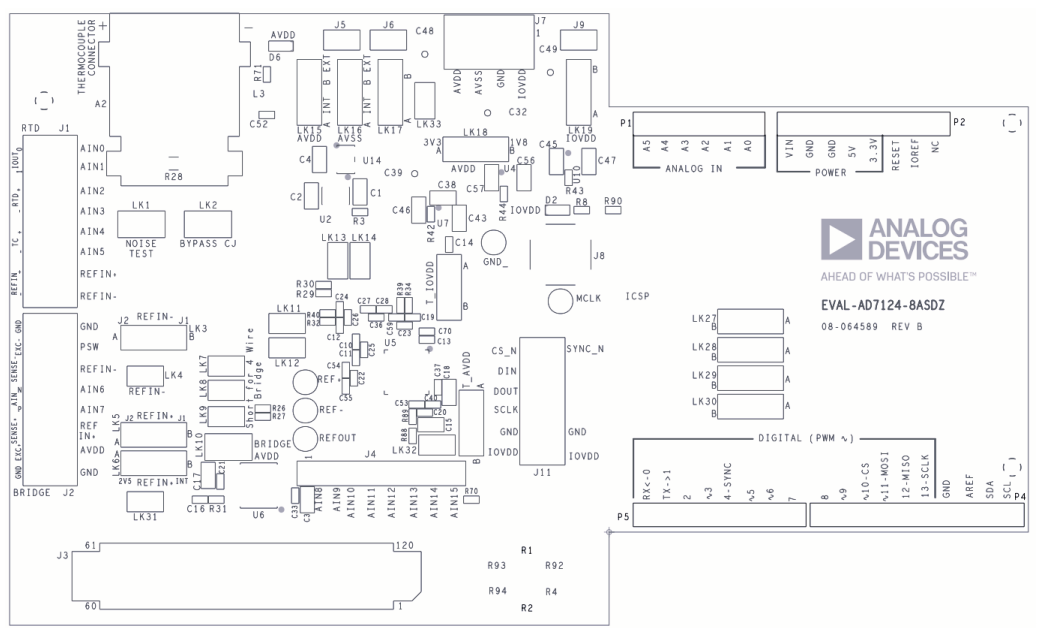
HARDWARE LINK OPTIONS

The default link options are listed in [Table 1](#). By default, the board operates from the USB power supply via the [EVAL-SDP-CB1Z \(SDP-B\)](#). The 5V default supply required for the [AD7124-4/AD7124-8](#) comes from the on-board [ADP150](#) low-dropout regulators (LDOs), which generate its voltages from the [EVAL-SDP-CB1Z \(SDP-B\)](#).

Table 1. Default Link and Solder Link Options

Link Number	Color	Default Option	Description	Pitch (mm)
LK1	Red	Inserted	Noise test, Channel AIN0 + Channel AIN1	2.54
LK2	Red	1 Pin	Thermocouple, cold junction resistor bypass	2.54
LK3	Black	A	Position (Pos) A: REFIN+ to J2, Pos B: REFIN+ to J1	2.54
LK4	Red	Inserted	Short REFIN- to AVSS	2
LK5	Black	A	Pos A: REFIN+ to J2, Pos B: REFIN+ to J1	2.54
LK6	Black	A	Pos A: REFIN+ to ADR4525 , Pos B: REFIN+ to INTREF	2.54
LK7	Red	1 Pin	Short REFIN-/AVSS: Pos inserted = 4-wire bridge	2
LK8	Red	1 Pin	Short REFIN-/PSW: Pos inserted = 4-wire bridge	2
LK9	Red	1 Pin	Short REFIN+/AVDD: Pos inserted = 4-wire bridge	2
LK10	Black	Inserted	Short EXC+/AVDD: Pos inserted = 4-wire bridge	2.54
LK11 to LK12	Black	1 Pin	Inserts R97 into AVDD path: Pos inserted = AVDD current test	2
LK13 to LK14	Black	1 Pin	Inserts R96 into IOVDD path: Pos inserted = IOVDD current test	2
LK15	Black	A	Pos A: AVDD to 3.3V LDO, Pos B: AVDD to external(EXT) AVDD	2.54
LK16	Black	A	Pos A: AVSS to -1.8V LDO, Pos B: AVSS to EXT AVSS	2.54
LK17	Black	B	Pos A: AVSS to -1.8V LDO, Pos B: AVSS to DGND (Disconnect the LK31 to LK33 for Pos A)	2.54
LK18	Black	A	Pos A: AVDD to 3.3V LDO, Pos B: AVDD to +1.8V LDO (If LK15 is in Pos A)	2.54
LK19	Black	B	Pos A: IOVDD to EXT IOVDD, Pos B: AVDD to LDO supply	2.54
LK27 to LK30	Black	A	Pos A: Arduino communication to P4, Pos B: Arduino communication to P3	2.54
LK31 to LK33	Black	Inserted	Short AVSS/DGND	2
T_AVDD	Black	A	Pos A: AVDD to AVDD pin directly, Pos B: AVDD to AVDD pin through R97 (for Pos B, insert the LK11 and LK12)	2.54
T_IOVDD	Black	A	Pos A: IOVDD to IOVDD pin directly, Pos B: IOVDD to IOVDD pin through R97 (for Pos B, insert the LK11 and LK12)	2.54

EVALUATION BOARD HARDWARE



EVALUATION BOARD HARDWARE

On-Board Connectors

Table 2 provides information about the external connectors on the EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ.

Table 2. On-Board Connectors

Connector	Function	Pin Number	Pin Function
A2	Thermocouple	1	AIN2, TC+
		2	AIN3, TC-
J1	Analog inputs RTD and Thermocouple	1	AIN0, Excitation current IOUT0, noise test
		2	AIN1, -Excitation current IOUT1, noise test
		3	AIN2, RTD+
		4	AIN3, RTD-
		5	AIN4, TC+
		6	AIN5, TC-
		7	External reference+ (REFIN1+)
		8	External reference- (REFIN1-)
J2	Analog inputs Wire bridge	1	Ground/shield connection
		2	Excitation-/power switch function for wire bridge
		3	External reference-/sense-
		4	AIN6 (AINN) with DC filtering
		5	AIN5 (AINP) with DC filtering
		6	External reference+/sense+
		7	Excitation+/AVDD supply for wire bridge
		8	Ground/shield connection
J3	SDP-120	N/A ¹	N/A ¹
J4	Analog inputs Only for the AD7124-8	1	AIN8
		2	AIN9
		3	AIN10
		4	AIN11
		5	AIN12
		6	AIN13
		7	AIN14
		8	AIN15
J5		1	DGND
		2	External AVSS
J6		1	External AVDD
		2	DGND
J7	External power	1	External IOVDD connection
		2	External GND connection
		3	External AVSS connection
		4	External AVDD connection
J8	External MCLK	1	External MCLK
		2, 3, 4, 5	DGND
J9		1	External IOVDD
		2	DGND
P1 to P5	Arduino connector	N/A ¹	N/A ¹
J11	PMOD connection	N/A ¹	N/A ¹

¹ N/A means not applicable.

EVALUATION BOARD HARDWARE

POWER SUPPLIES

The EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation board receives power through the controller board when connected to the PC via USB. Linear regulators generate the required power supply levels from the applied USB voltage (see [Table 3](#)).

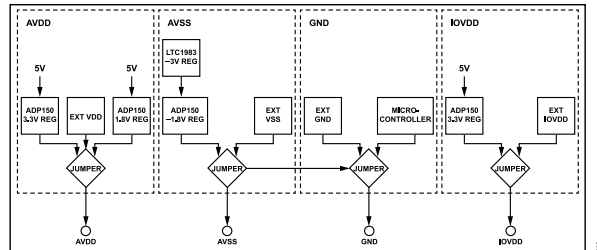


Figure 5. Block Diagram of Evaluation Board Power Supplies

AVDD (LK18) and AVSS (LK16) selections are as follows:

- ▶ 3.3V supply (default)
 - ▶ 3.3V regulator supplies AVDD
 - ▶ AVSS connected to GND (LK31 to LK33)
- ▶ $\pm 1.8V$ split supply
 - ▶ +1.8V regulator supplies AVDD
 - ▶ -1.8V regulator supplied AVSS
- ▶ External AVDD/AVSS
 - ▶ Connections on connector J7

Table 3. AVDD/AVSS Regulators and Their Shutdown Links

Supply	Regulator	Shutdown Resistor
+3.3V regulator	ADP150A	R42
+1.8V regulator	ADP150A	R44
-1.8V regulator	ADP7182	R3

IOVDD (LK19) selection is as follows:

- ▶ 3.3V supply (default)
 - ▶ 3.3V regulator supplies IOVDD
 - ▶ GND connected to AVSS (LK31 to LK33)
- ▶ External IOVDD
 - ▶ Connections on connector J7

Table 4. IOVDD Regulator and Shutdown Link

Supply	Regulator	Shutdown Resistor
3.3V regulator	ADP150A	R43

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:

- ▶ SDP-120 pin connection [EVAL-SDP-CB1Z](#) (SDP-B)

- ▶ PMOD connector
- ▶ Standalone mode
 - ▶ Moving LK27, LK28, LK29 and LK30 jumpers from Pos A to Pos B gives exposure to serial-peripheral interface (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, refer to the [Introduction to SPI Interface](#).

REFERENCE OPTIONS

The EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ include an external 2.5V reference (the [ADR4525](#)) and an internal 2.5V reference. The default operation uses the external reference input, which accepts the 2.5V [ADR4525](#) on the evaluation board.

Select the reference used for a conversion by choosing the reference in the configuration registers associated with Setup 0 to Setup 7. Switch between using the internal reference and external reference by accessing the [AD7124-8](#) registers through the pop-up windows (for more details, see the [Evaluation Board Software](#) section) via the evaluation software. [Figure 6](#) shows how to select the reference source for Setup 0 to Setup 7. [Figure 7](#) shows the ADC Control register setting that enables the internal reference.

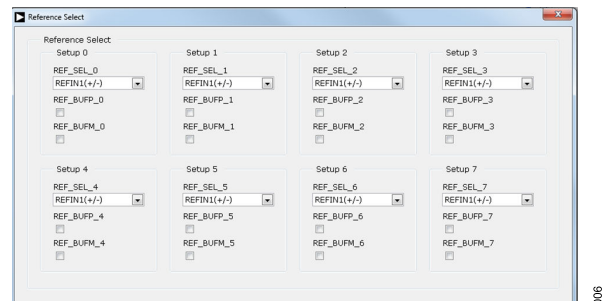


Figure 6. Selecting the Reference Source Using Pop-Up Windows

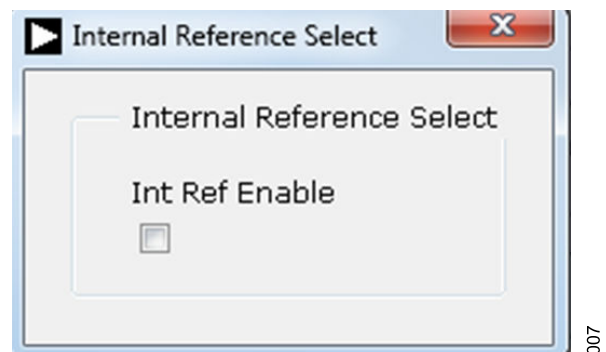


Figure 7. Enabling the Internal 2.5V Reference Using Pop-Up Windows

EVALUATION BOARD HARDWARE

EVALUATION BOARD SETUP PROCEDURE

After following the instructions in the [EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ Quick Start Guide](#) section, set up the evaluation and SDP boards.

Warning

The evaluation software and drivers must be installed before connecting the EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation board and the [EVAL-SDP-CB1Z \(SDP-B\)](#) board to the USB port of the PC to ensure the PC correctly recognizes the evaluation system.

EVALUATION BOARD SOFTWARE

SOFTWARE INSTALLATION PROCEDURES

The EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation kit includes a CD, which contains a software that a user must install before using the EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation board.

There are two parts to the installation:

- ▶ [AD7124-4/AD7124-8 Eval+ Software](#) installation.
- ▶ [EVAL-SDP-CB1Z](#) SDP board drivers installation.

Warning

The evaluation software and drivers must be installed before connecting the EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ evaluation board and [EVAL-SDP-CB1Z](#) board to the USB port of the PC to ensure the PC correctly recognizes the evaluation system.

Installing the AD7124-4/AD7124-8 Eval+ Software

To install the [AD7124-4/AD7124-8 Eval+ Software](#):

1. With the [EVAL-SDP-CB1Z](#) disconnected from the USB port of the PC, insert the installation CD into the CD-ROM drive.
2. Double-click the **setup.exe** file to begin the evaluation board software installation. The software then installs to the following default location: **C:\Program Files\Analog Devices\AD7124 EVAL+.**
3. A dialog box appears asking for permission to allow the program to make changes to the PC. Click **Yes**.

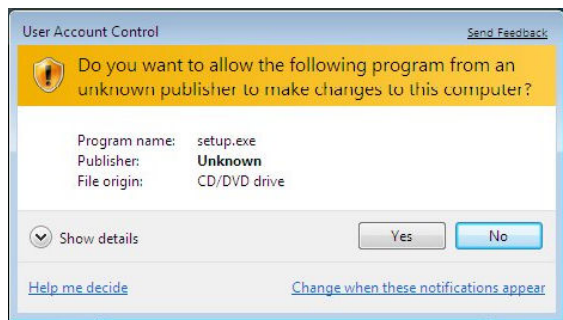


Figure 8. AD7124-4/AD7124-8 Eval+ Software Installation: Granting Permission for the Program to Make Changes to PC

4. Select a location to install the software, and then click **Next**. [Figure 9](#) shows the default locations, which are displayed when the dialogue box appears, but a user can select another location by clicking **Browse**.

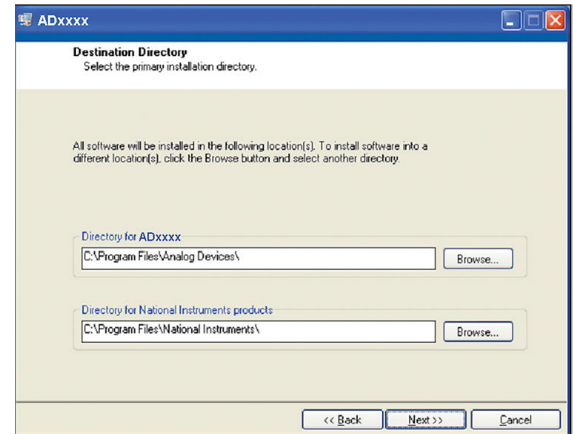


Figure 9. AD7124-4/AD7124-8 Eval+ Software Installation: Selecting the Location for Software Installation

5. A license agreement appears. Read the agreement and then select **I accept the License Agreement**, and click **Next**.

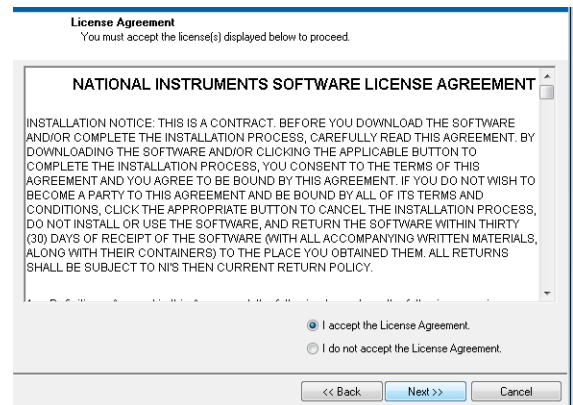


Figure 10. AD7124-4/AD7124-8 Eval+ Software Installation: Accepting the License Agreement

6. A summary of the installation displays. Click **Next** to continue.

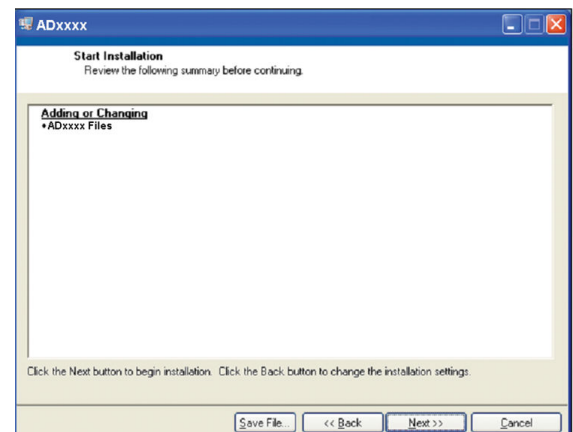


Figure 11. AD7124-4/AD7124-8 Eval+ Software Installation: Reviewing a Summary of the Installation

EVALUATION BOARD SOFTWARE

- The message in Figure 12 appears when the installation is complete. Click **Next**.

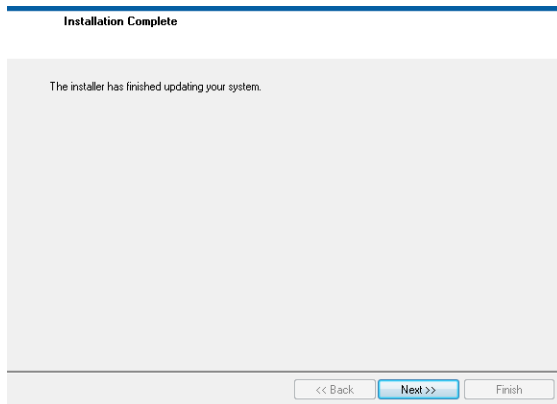


Figure 12. AD7124-4/AD7124-8 Eval+ Software Installation: Indicating When the Installation is Complete

Installing the EVAL-SDP-CB1Z System Demonstration Platform Board Drivers

After the installation of the evaluation software is complete, a welcome window appears for the installation of the EVAL-SDP-CB1Z SDP board drivers.

- With the EVAL-SDP-CB1Z board still disconnected from the USB port of the PC, make sure that all other applications are closed, and then click **Next** (see Figure 13).

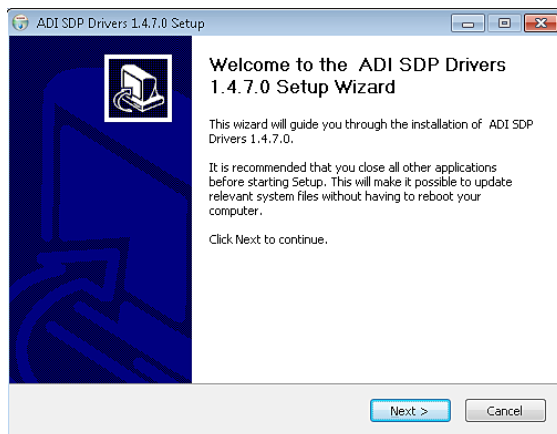


Figure 13. EVAL-SDP-CB1Z Drivers Setup: Beginning the Drivers Installation

- Select the location to install the drivers, and then click **Next** (see Figure 14).

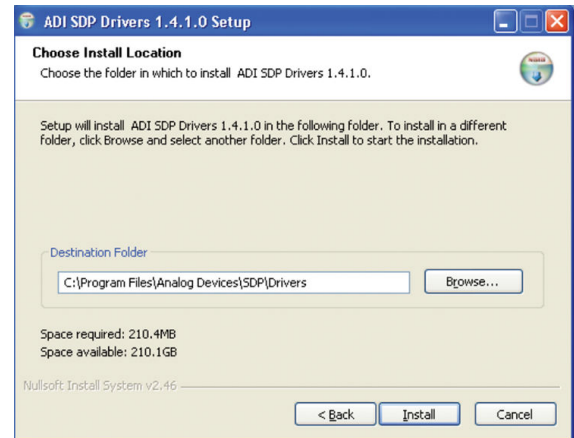


Figure 14. EVAL-SDP-CB1Z Drivers Setup: Selecting the Location for Drivers Installation

- Click **Install** to install the drivers (see Figure 15).

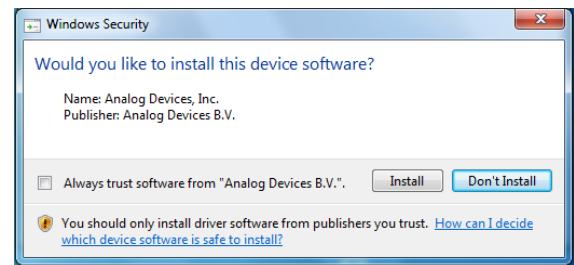


Figure 15. EVAL-SDP-CB1Z Drivers Setup: Granting Permission to Install Drivers

- To complete the drivers installation, click **Finish**, which closes the installation Setup Wizard (see Figure 16).

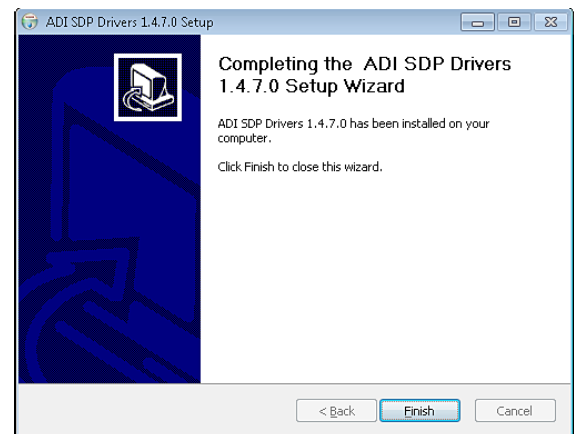


Figure 16. EVAL-SDP-CB1Z Drivers Setup: Completing the Drivers Setup Wizard

EVALUATION BOARD SOFTWARE

- Before using the evaluation board, restart the PC (see [Figure 17](#)).

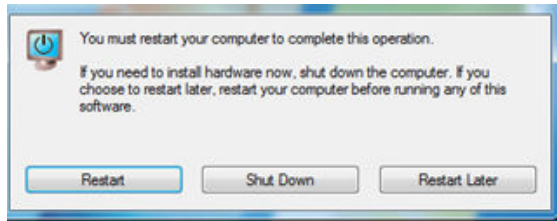


Figure 17. EVAL-SDP-CB1Z Drivers Setup: Restarting the PC

Setting Up the System for Data Capture

After completing the steps in the [Software Installation Procedures](#) and the [Evaluation Board Hardware](#) sections, set up the system for data capture as follows:

- Allow the Found New Hardware Wizard to run after connecting the [EVAL-SDP-CB1Z](#) board to the PC. Note that for the Windows XP, search for the [EVAL-SDP-CB1Z](#) drivers. Choose to automatically search for the drivers for the [EVAL-SDP-CB1Z](#) board if prompted by the operating system.
- Check the board is connecting to the PC correctly using the **Device Manager** of the PC.
- Access the **Device Manager** as follows:
 - Right-click **My Computer**, and then click **Manage**.
 - A dialog box appears asking for permission to allow the program to make changes to the PC. Click **Yes**.
 - The **Computer Management** box appears. Click **Device Manager** from the list of **System Tools** (see [Figure 18](#)).
 - The [EVAL-SDP-CB1Z](#) board then appears under **ADI Development Tools**. This indicates the driver software is installed and the board is connecting to the PC correctly.

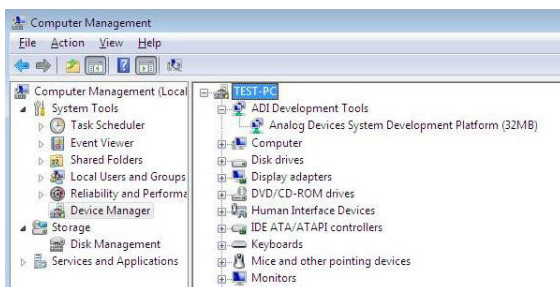


Figure 18. Device Manager: Checking the Board is Connected to the PC Correctly

Launching the Software

After completing the steps in the [Setting Up the System for Data Capture](#) section, launch the [AD7124-4/AD7124-8 Eval+ Software](#) as follows:

- From the Start menu, click **Programs > Analog Devices > AD7124 Eval+ > AD7124 Eval+**. The dialog box in [Figure 22](#)

appears, select **EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ**, and the main window of the software then displays, as shown in [Figure 23](#).

- If the [AD7124-4/AD7124-8](#) evaluation system is not connected to the USB port via the [EVAL-SDP-CB1Z](#) when the software is launched, a connectivity error appears, as shown in [Figure 19](#). Connect the evaluation board to the USB port of the PC, wait a few seconds, click **Rescan**, and then follow the on-screen instructions.

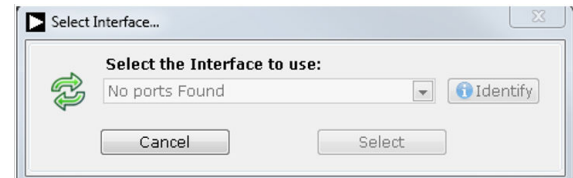


Figure 19. Connectivity Error Alert

- When the software starts running, it searches for hardware connected to the PC. A dialog box indicates when the generic SDP attached to the PC is detected, the main window appears (see [Figure 21](#)). Press the **RESET** button on the SDP board, as highlighted in [Figure 20](#).

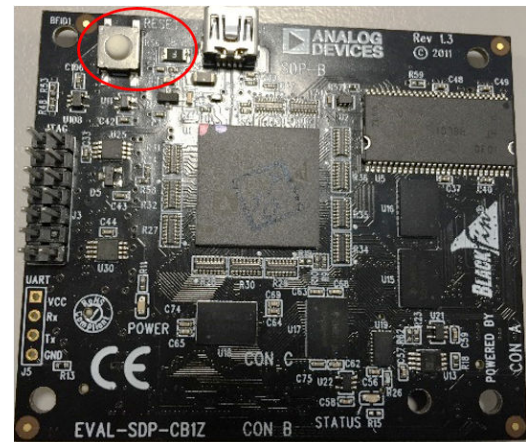


Figure 20. SDP Connectivity Board—RESET Button

- Pressing the **RESET** button enables the software to rescan for a connected SDP board. If the board is connected correctly, the message appears, as shown in [Figure 21](#).



Figure 21. Connectivity when SDP and Evaluation Boards are Found

EVALUATION BOARD SOFTWARE

SOFTWARE OPERATION

Overview of the Main Window

The evaluation software supports both the [AD7124-4](#) and the [AD7124-8](#) devices.

When running the software, select the specific evaluation board connected to the PC, as shown in [Figure 22](#). For the [AD7124-4/AD7124-8](#), select the **AD7124-4 Evaluation Board/AD7124-8 Evaluation Board** from the **Select Evaluation Hardware** area, as shown in [Figure 22](#).

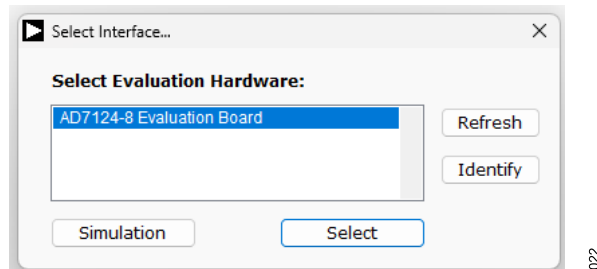


Figure 22. AD7124 Evaluation Board Selection

When selecting the EVAL-AD7124-4ASDZ/EVAL-AD7124-8ASDZ, the main window of the evaluation software appears, as shown in [Figure 23](#). [Figure 23](#) shows the control buttons and analysis indicators of the [AD7124-4/AD7124-8 Eval+ Software](#). The main window of the [AD7124-4/AD7124-8 Eval+ Software](#) contains four tabs:

- ▶ Configuration
- ▶ Waveform
- ▶ Histogram
- ▶ Register Map

CONFIGURATION TAB

The **Configuration** tab shows a block diagram of the [AD7124-8](#). It allows the user to set up the ADC, reset the ADC, read the diagnostics to view errors present, as well as configure the device for different demo modes. [Figure 23](#) shows the **Configuration** tab in more detail, and the following sections discuss the different elements on the **Configuration** tab of the software window.

ADC RESET Button

Click **ADC RESET** (Label 2) to perform a software reset of the [AD7124-8](#). There is no hardware reset pin on the [AD7124-8](#).

To perform a hard reset, remove power from the board. However, the software reset has the same effect as a hard reset.

Selecting External Reference

There are two options to select the external reference on the [AD7124-4/AD7124-8 Eval+ Software](#): **AVdd** and **Refin1(+/-)** (La-

bel 3). The **Refin1(+/-)** field sets the external reference voltage that is connected between REFIN1+ and REFIN1-. The **AVdd** field sets the AV_{DD} voltage level for the [AD7124-8](#). Using EVAL-AD7124-8ASDZ evaluation board, the AV_{DD} voltage is 3.3V. Either of these voltage levels can be used to calculate the results on the **Waveform** and **Histogram** tabs. The evaluation board has an external 2.5V [ADR4525](#) reference, this reference selection can be bypassed on the evaluation board. If bypassing the [ADR4525](#) on board, change the external reference voltage value in **Refin1(+/-)** to ensure correct calculation of results in the **Waveform** and **Histogram** tabs.

TUTORIAL Button

Click the **TUTORIAL** button (Label 4) to open a tutorial on using the software and additional information on using the [AD7124-4/AD7124-8 Eval+ Software](#).

Functional Block Diagram

The functional block diagram of the ADC (Label 5) shows each of the functional blocks within the ADC. Clicking a configuration button on this graph opens the configuration pop-up window for that block.

Configuration Pop-Up Button

Each configuration pop-up button (Label 6) opens a different window to configure the relevant functional block.

CONFIG SUMMARY Button

Clicking the **CONFIG SUMMARY** button (Label 7) displays the channel configuration information on each of the individual setups as well as information on any error present. These tabs can be used to quickly check how the ADC channels are configured, as well as any errors that are present.

DEMO MODES

The [AD7124-4/AD7124-8 Eval+ Software](#) supports a number of demo modes (Label 8). These demo modes configure the [AD7124-8](#) for each of the modes shown. A help file is available for each demo mode, to access this help file, click the question mark button.

Status Bar

The status bar (Label 9) displays the status updates such as **Analysis Completed**, **Reset Completed**, and **Configuring Demo Mode** during software use, as well as the software version and the **Busy** indicator.

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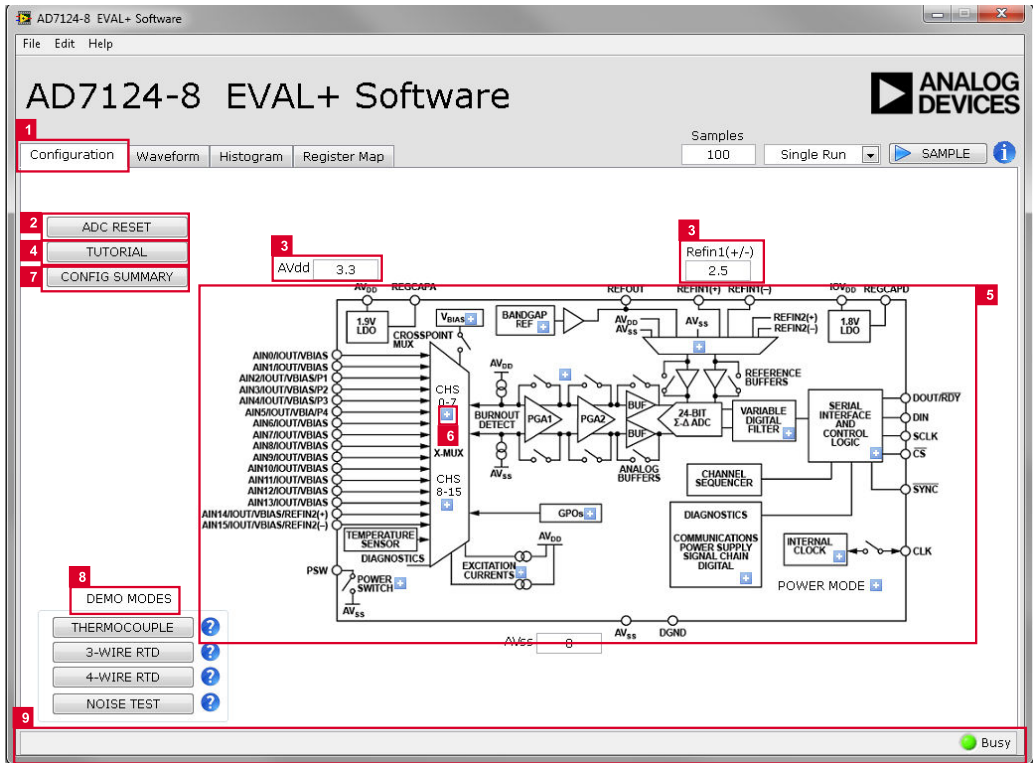


Figure 23. Configuration Tab of the AD7124-8 Eval+ Software

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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 24](#)).

Waveform Graph and Controls

The data waveform graph (Label 1) shows each successive sample of the ADC output. Zoom in on the data in the graph using the control toolbar (Label 2). Change the scales on the graph by typing values into the x-axis and y-axis.

Analysis Channel

The **Noise Analysis** (Label 10) section and histogram graph show the analysis of the channel selected via the **Analysis Channel** control (Label 3).

Samples

The **Samples** numeric control (Label 4) and batch control (Label 5) set the number of samples gathered per batch. Batch control sets whether a single batch or multiple batches of samples are gathered. This control is unrelated to the ADC mode. A user can capture a defined sample set or continuously gather batches of samples. In both cases, the number of samples set in the **Samples** (Label 4) numeric input shows the number of samples.

SAMPLE Button

Click the **SAMPLE** button (Label 6) to start gathering ADC results. Results appear in the waveform graph (Label 1).

Channel Selection

The channel selection control (Label 7) selects which channels display on the data waveform and shows the analog inputs for the channel labeled next to the on and off controls.

These controls only affect the display of the channels and have no effect on the channel settings in the ADC register map.

Display Units and Axis Controls

Click the **Display Units** drop-down menu (Label 8) to select whether the data graph displays in units of voltages or codes. This control affects both the waveform graph and the histogram graph. The axis controls switch between dynamic and fixed. When **Dynamic** is selected, the axis automatically adjusts to show the entire range of the ADC results after each batch of samples. A user can program the axis ranges when selecting **Fixed**, however, these ranges do not automatically adjust after each batch of samples.

CRC Error and Overall Error

The **CRC Error** LED indicator (Label 9) illuminates on the **Waveform** tab when a cyclic redundancy check (CRC) error is detected in the communications between the software and the [AD7124-8](#). The CRC functionality on the [AD7124-8](#) is disabled by default and must be enabled for this indicator to work. The **Error Present** LED (Label 9) indicates if an overall error is present in the diagnostics register. For this indicator to work, the check for the different diagnostic errors must be enabled in the Error_EN register.

Noise Analysis

The **Noise Analysis** (Label 10) section displays the results of the noise analysis for the selected analysis channel, which includes both noise and resolution measurements.

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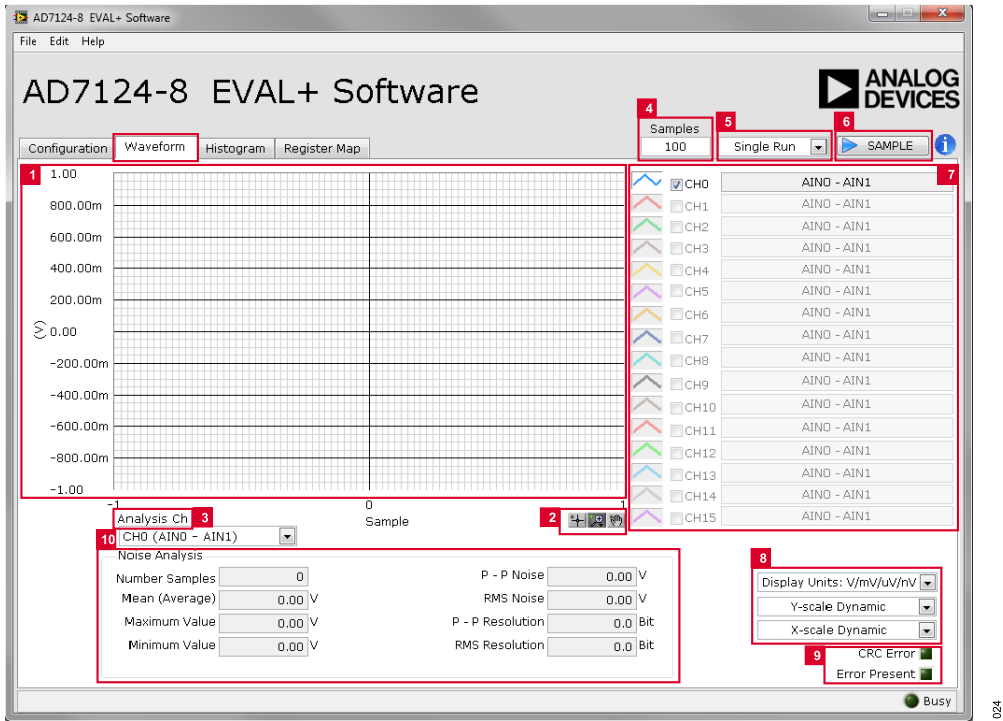


Figure 24. Waveform Tab of the AD7124-8 Eval+ Software

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HISTOGRAM TAB

The **Histogram** tab generates a histogram using the gathered samples and processes the data, calculating the peak-to-peak noise, rms noise, and resolution (see [Figure 25](#)).

Histogram Graph and Controls

The data histogram graph (Label 1) shows the number of times each sample of the ADC output occurs. Zoom in on the data using the control toolbar (Label 6) in the graph. Change the scales on the graph by typing values into the x-axis and y-axis.

Analysis Channel

The **Noise Analysis** (Label 3) section and histogram graph show the analysis of the channel selected via the **Analysis Channel** (Label 2) control.

Noise Analysis

The **Noise Analysis** (Label 3) section displays the results of the noise analysis for the selected analysis channel, which includes both noise and resolution measurements.

Display Units and Axis Controls

Click the **Display Units** drop-down menu (Label 4) to select whether the data graph displays in units of voltages or codes. This control affects both the waveform graph and the histogram graph. The axis controls can be used to switch between dynamic and fixed range. When **Dynamic** is selected, the axis automatically adjusts to show the entire range of the ADC results after each batch of samples. A user can program the axis ranges when selecting **Fixed**, however, these ranges do not automatically adjust after each batch of samples.

CRC Error and Overall Error

The **CRC Error** LED indicator (Label 5) illuminates on the **Histogram** tab when a CRC error is detected in the communications between the software and the [AD7124-8](#). The CRC functionality on the [AD7124-8](#) is disabled by default and must be enabled for this indicator to work. The **Error Present** LED (Label 5) indicates if an overall error is present in the diagnostics register. For this indicator to work, the check for the different diagnostic errors must be enabled in the Error_EN register.

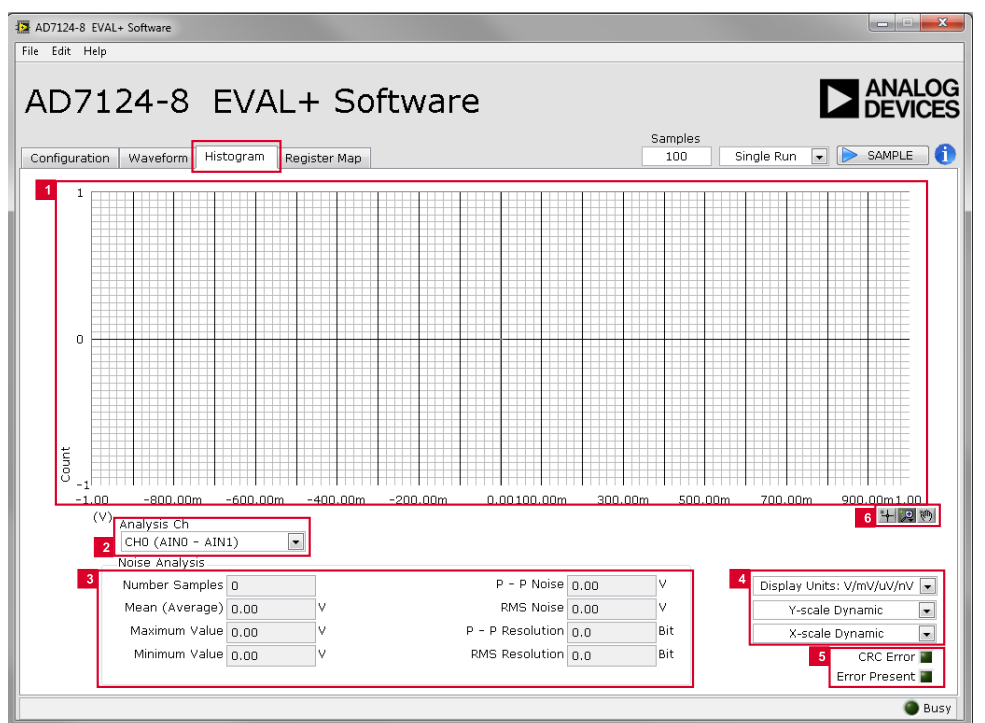


Figure 25. Histogram Tab of the AD7124-8 Eval+ Software

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REGISTER MAP TAB

Use the **Register Map** tab to access the registers of the AD7124-8. Figure 26 shows the **Register Map** tab. This tab changes register settings and shows additional information about each bit in each individual register.

Register Map

On the top of Figure 26, there are the registers of the AD7124-8. Click any register to read the register value. Access each register of the AD7124-8 using the register map (Label 1).

Save and Load Buttons

The **Save** and **Load** buttons (Label 2) on the **Register Map** tab allow 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.

Register

The **Register** section (Label 3) 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 4) 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. View the options for the individual bit fields by clicking on the arrow next to the bit field. Change the bit field value through this drop-down menu or by writing the appropriate hexadecimal value in the associated **Value** input field on the far right of the bit field.

Documentation

The **Documentation** section (Label 5) shows information relating to the different bit fields when selected from the register map section on the left. This information is similar to the information mentioned in the AD7124-8 data sheet.

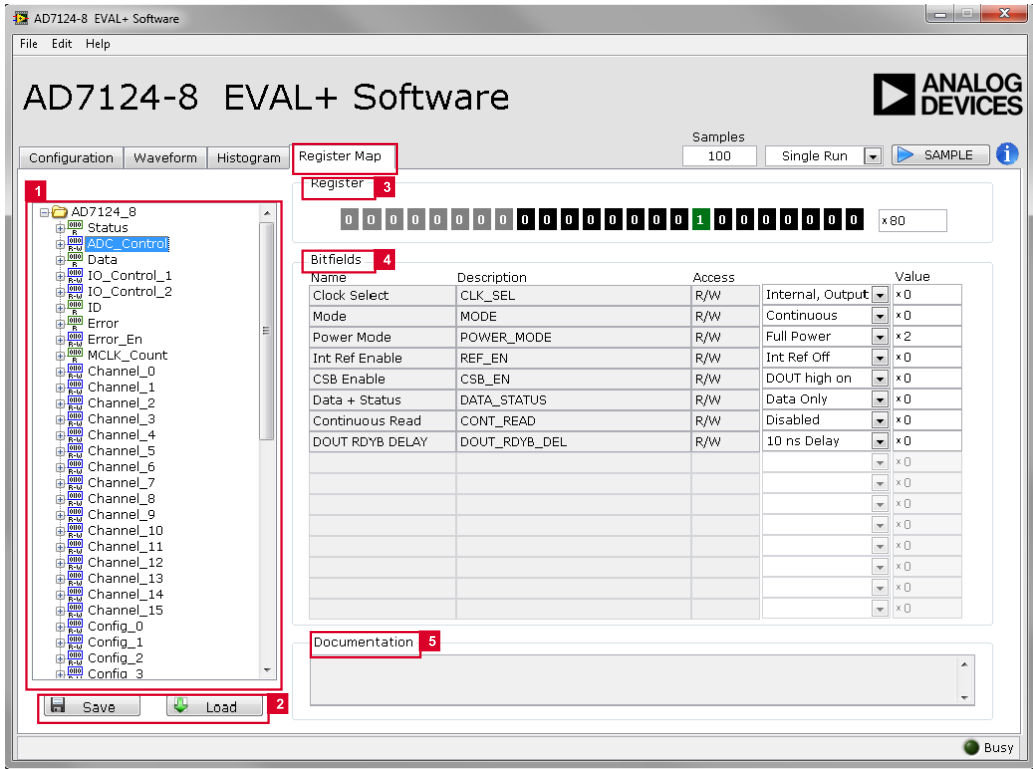


Figure 26. Register Map Tab of the AD7124-8 Eval+ Software

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NOISE TEST—QUICK START DEMONSTRATION

Click the **NOISE TEST** demo button (see [Figure 23](#)) to configure the device for the noise test. The [AD7124-8](#) is now configured for the noise test demo, where the output data rate is 9.38SPS, where the sinc⁴ digital filter, full power mode of operation, and external reference REFIN1(±) is selected. Gain and offset are the default factory values following a reset.

To gather samples, change the **Samples** field to the number of samples required, then click the **SAMPLE** button to acquire the samples from the ADC. [Figure 27](#) shows an example of the main window after running a noise test.

Reading Samples From the ADC

The evaluation board is set up to use the external 2.5V on-board reference ([ADR4525](#)). To read samples from the ADC, do the following steps (see [Figure 23](#)):

1. The value in the **Refin1(+/-)** field on the **Configuration** tab is set to 2.5V by default to use the external 2.5V on-board reference ([ADR4525](#)). If a different reference is used to the [AD7124-8](#), the **Refin1(+/-)** field must be updated accordingly. The analysis results are based on the value set in this input field.
 - a. When selecting **Single Run**, a batch of samples is read when clicking the **SAMPLE** button, the batch size is set by the value in the **Samples** field.
 - b. When selecting **Continuous Read**, the software performs a continuous capture from the ADC by clicking the **SAMPLE** button. Click the **SAMPLE** button again to stop capturing data.
2. Use the navigation tools within each graph to control the cursor, zooming, and panning.

Waveform

Find the waveforms resulting from the gathered samples in the **Waveform** tab (see [Figure 27](#)). The waveform graph shows each successive sample of the ADC output (input referred). The indicators beside this graph show the channels converting. The navigation tools allow a user to control the cursor, zooming, and panning. A user can also display the conversions as voltages or codes.

Below the graph are parameters, such as peak-to-peak noise and rms noise, in the **Analysis** section for the current batch of samples. If there are several enabled analog input channels, then a user can select each enabled channel and the conversions through the analyzed channel using the **Analysis Channel**.

Save the conversion data in a text file using **File** at the top of the window. To save the data into an Excel file, right-click the waveform graph and select **Export Data** from the drop-down menu that appears. A **Save** dialog box appears, which prompts the user to save the data to an appropriate folder location.

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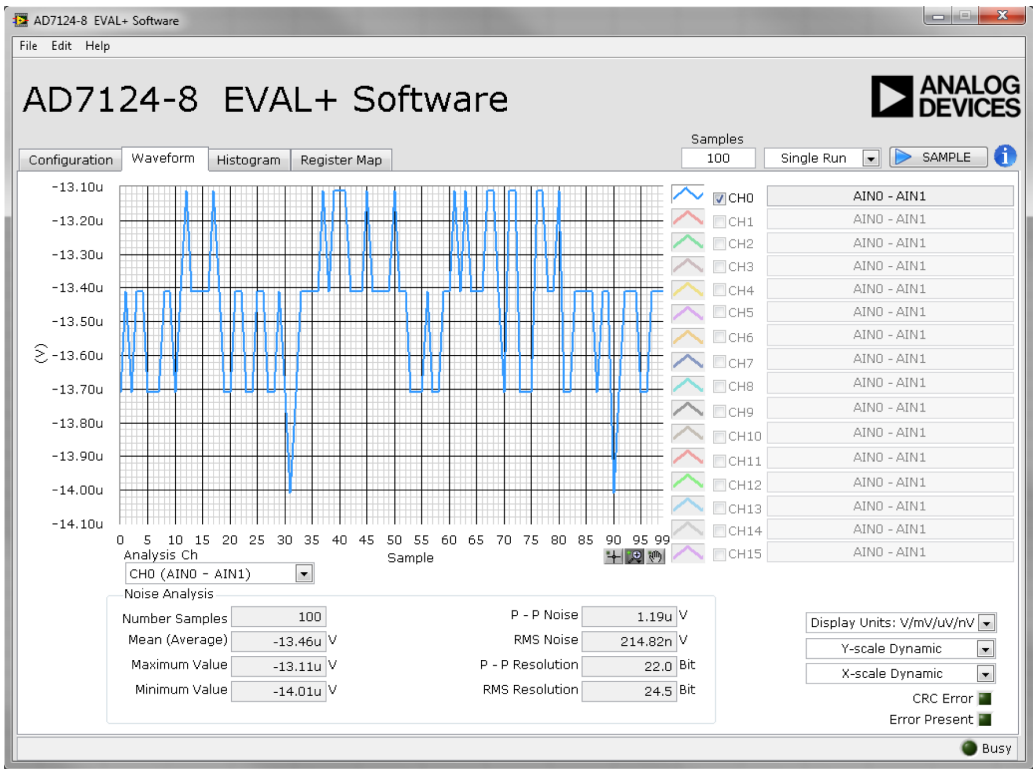


Figure 27. Example of the Waveform Tab after Running a Noise Test

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Histogram

This tab shows the histogram analysis (see Figure 28). The indicators beside this graph show the channels converting. The navigation tools allow a user to control the cursor, zooming, and panning. A user can also display the conversions as voltages or codes.

Parameters such as peak-to-peak noise and rms noise are displayed in the **Analysis Results** section for the current batch of samples.

Save the conversion data in a text file using **File** at the top of the window. To save the data into an Excel file, right-click the waveform graph and select **Export Data** from the drop-down menu that appears. A **Save** dialog box appears, which prompts the user to save the data to an appropriate folder location.

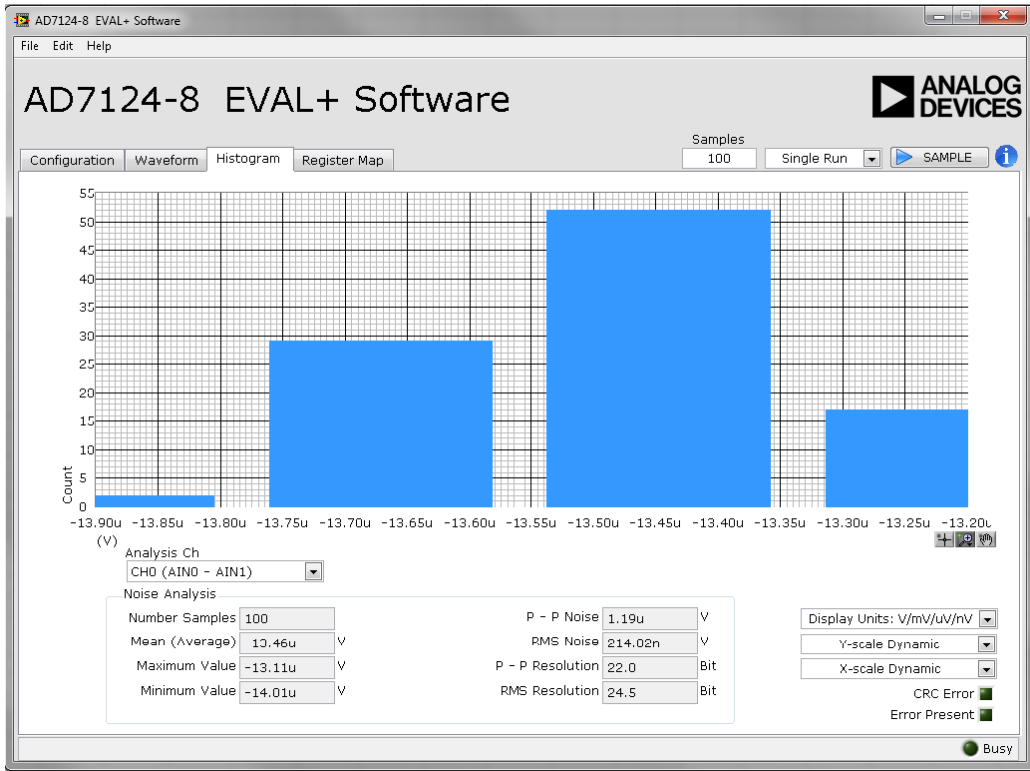


Figure 28. Example of the Histogram Tab after Running a Noise Test

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.

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