

Evaluating the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) 16-Bit Simultaneous Sampling, 8-/6-/4-Channel, SAR ADC

FEATURES

Full featured evaluation board for the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#)

On-board power supplies

Standalone capability

System demonstration platform (SDP) compatible ([EVAL-SDP-CB1Z](#))

PC software for control and data analysis (download from [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) product pages)

EVALUATION KIT CONTENTS

[EVAL-AD7606SDZ/EVAL-AD7606-6SDZ/EVAL-AD7606-4SDZ/EVAL-AD7607SDZ/EVAL-AD7608SDZ](#) evaluation board

Evaluation software CD for the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#)

Mains power supply adapter

Screw/nut kit

ADDITIONAL EQUIPMENT NEEDED

[EVAL-SDP-CB1Z](#) system demonstration platform

PC running Windows® Vista or Windows 7 with USB 2.0 port

Signal source

SMB and USB cables

ONLINE RESOURCES

Documents Needed

[AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) data sheets

[EVAL-AD7606SDZ/EVAL-AD7606-6SDZ/EVAL-AD7606-4SDZ/EVAL-AD7607SDZ/EVAL-AD7608SDZ](#) user guide

Required Software

[AD7606](#) evaluation software

Design and Integration Files

Schematics, layout files, bill of materials

EVALUATION BOARD DESCRIPTION

The [EVAL-AD7606SDZ/EVAL-AD7606-6SDZ/EVAL-AD7606-4SDZ/EVAL-AD7607SDZ/EVAL-AD7608SDZ](#) are a full featured evaluation board that allows the user to easily evaluate all the features of the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) analog-to-digital converters (ADCs). The evaluation board can be controlled by the [EVAL-SDP-CB1Z](#) SDP board via a 120-way SDP connector (J102). The SDP board allows the evaluation board to be controlled through the USB port of a PC using the [AD7606](#) evaluation software, which is available for download from the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) product pages or from the installer CD included in the evaluation board kit.

On-board components include an [ADP7104ARDZ-5.0](#) 5 V, low noise LDO and [ADR421](#) high precision, band gap voltage reference.

TYPICAL SETUP

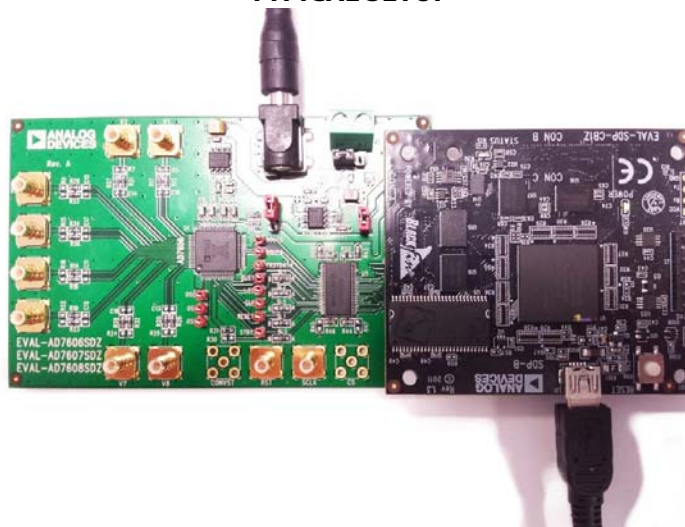


Figure 1.

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REVISION HISTORY

8/15—Revision 0: Initial Version

QUICK START GUIDE

Follow these steps to quickly evaluate the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) ADC. For detailed instructions, see the subsequent sections.

1. Install the evaluation software from the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) product pages or from the included CD. Ensure that the [EVAL-SDP-CB1Z SDP](#) board is disconnected from the USB port of the PC while installing the software. (The PC may need to be restarted after the installation.)
2. Ensure that the various link options are configured as outlined in Table 3.
3. Connect the [EVAL-SDP-CB1Z SDP](#) board to the evaluation board as shown in Figure 2. Screw the two boards together using the enclosed nylon screw/nut kit to ensure that the boards connect firmly together.
4. Connect a 5 V power supply to J1 and ensure LK1 is in Position A.
5. Connect the [EVAL-SDP-CB1Z SDP](#) board to the PC via the USB cable. Choose to automatically search for the drivers for the [SDP](#) board if prompted by the operating system.
6. Launch the evaluation software from the **Analog Devices** subfolder in the **Programs** menu.
7. Connect an input signal via V1 to V8.

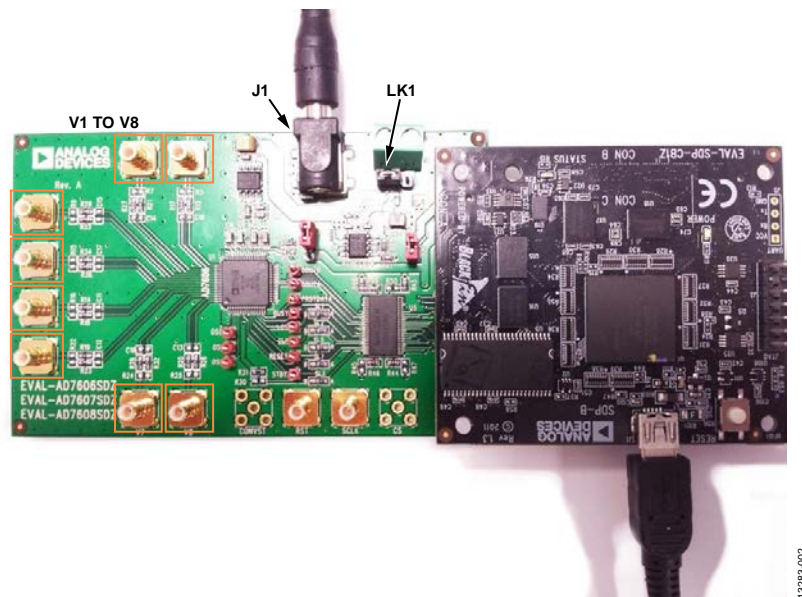


Figure 2. Evaluation Board (Left) Connected to the [SDP](#) Board (Right)

EVALUATION BOARD HARDWARE

DEVICE DESCRIPTION

The [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) ADCs are 16-bit, 8-/6-/4-channel, simultaneous sampling successive approximation ADCs. The devices operate from a single 2.7 V to 5.25 V power supply and feature throughput rates of up to 200 kSPS. The devices have on-board 1 M Ω input buffers meaning direct connection from sensor to ADC.

Full data on the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) is available in the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) data sheets, which should be consulted in conjunction with this user guide when using the evaluation board. Full details on the [EVAL-SDP-CB1Z](#) are available at the [SDP](#) board product page.

HARDWARE LINK OPTIONS

The functions of the link options are described in Table 3. The default setup is configured to operate the evaluation board with the main power supply or 9 V adapter and to interface to the [SDP](#) board.

POWER SUPPLIES

Before applying power and signals to the evaluation board, ensure that all link positions are set according to the required operating mode. See Table 3 for the complete list of link options.

The [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) evaluation board is supplied with a wall-mountable switching power supply that provides 9 V dc output. Connect the supply to a 100 V to 240 V ac wall outlet at 50 Hz to 60 Hz. The output from the supply is provided through a 2.0 mm inner diameter jack that connects to the evaluation board at J1. The 9 V supply is connected to the on-board, 5 V linear regulator that supplies the correct bias to each of the various sections on the evaluation board and on the [EVAL-SDP-CB1Z SDP](#) board.

When using the [EVAL-AD7606SDZ/EVAL-AD7606-6SDZ/EVAL-AD7606-4SDZ/EVAL-AD7607SDZ/EVAL-AD7608SDZ](#) evaluation board with the [EVAL-SDP-CB1Z SDP](#) board, power the evaluation board through the J1 connector.

If the evaluation board is used without the 9 V adapter, an external power supply in the range 7 V to 9 V must be connected to J3 to supply the [ADP7104](#) 5 V linear regulator.

Each supply is decoupled on this evaluation board using 10 μ F tantalum and 100 nF multilayer ceramic capacitors.

Table 1. External Power Supplies Required

Power Supply	Voltage Range	Description
DC Jack	7 V to 9 V \pm 5%	Supplies power to on-board power management devices
J3	7 V to 9 V	Digital logic supply

SOCKETS/CONNECTORS

The connectors and sockets on the evaluation board are outlined in Table 2.

Table 2. On-Board Connectors

Connector	Function
J1	7 V to 9 V, 2.0 mm dc jack connector
J2	120-way connector for EVAL-SDP-CB1Z interface
J3	External power connector, 7 V to 9 V dc input
V1 to V8	Analog input terminal block.

The default interface to this evaluation board is via the 120-way connector, which connects the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) evaluation board to the [EVAL-SDP-CB1Z SDP](#) board.

CHANNEL INPUT

Depending on the board, the external signal can be applied to V1 to V8.

AD7606/AD7607/AD7608

The [AD7606/AD7607/AD7608](#) are 8-channel data acquisition systems (DAS) with simultaneous sampling ADC. An external signal can be applied to V1 to V8.

AD7606-6

The [AD7606-6](#) is a 6-channel DAS with simultaneous sampling ADC. An external signal can be applied to V1 to V3 and V5 to V7. V5 to V7 match V4 to V6.

AD7606-4

The [AD7606-4](#) is a 4-channel DAS with simultaneous sampling ADC. An external signal can be applied to V1 to V2 and V5 to V6.

Table 3. Link Options

Link	Default Position	Function
LK1	A	This link is used to select the power supply source for the evaluation board. In Position A, the board is powered with the J1 wall mounted switching supply. In Position B, the J3 terminal block is the source.
LK2	Insert	This link is used to supply the SDP power supply form the evaluation board The EVAL-SDP-CB1Z is powered from the ADP7104 5 V linear regulator
LK3	B	LK3 is used to select the V _{DRIVE} source for the AD7606/AD7606-6/AD7606-4/AD7607/AD7608. In Position A, the AD7606/AD7606-6/AD7606-4/AD7607/AD7608 are supplied with 3.3 V V _{DRIVE} . In Position B, the AD7606/AD7606-6/AD7606-4/AD7607/AD7608 are supplied with 5 V V _{DRIVE} , 5 V V _{DRIVE} is needed to run the device at 200 kSPS in serial interface mode.
SL1	A	In Position A, the \overline{CS} signal is supplied from the SDP terminal, J2. In Position B, The \overline{CS} SMB is selected.
SL2	A	In Position A, the SCLK signal is supplied from the SDP terminal, J2. In Position B, the SCLK SMB is selected.
SL3	A	In Position A, the \overline{STBY} signal is supplied from the SDP terminal, J2. In Position B, the \overline{STBY} SMB is selected.
SL4	A	In Position A, the \overline{CS} signal is supplied from the SDP terminal, J2. In Position B, the \overline{CS} SMB is selected.
SL5	A	In Position A, the RESET signal is supplied from the SDP terminal, J2. In Position B, the RESET SMB is selected.
SL6	A	In Position A, the \overline{CS} signal is supplied from the SDP terminal, J2. In Position B, the \overline{CS} SMB is selected.
SL7	A	In Position A, the CONVST signal is supplied from the SDP terminal, J2. In Position B, the CONVST SMB is selected.
K0 to 15	Do not insert (DNI)	Solder links for bypassing the U level translator.

EVALUATION BOARD SOFTWARE

SOFTWARE INSTALLATION

The [EVAL-AD7606SDZ/EVAL-AD7606-6SDZ/EVAL-AD7606-4SDZ/EVAL-AD7607SDZ/EVAL-AD7608SDZ](#) kit includes the evaluation software on a CD; the software is also available for download from the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) product pages.

There are two parts to the installation:

- [AD7606](#) evaluation software installation
- [EVAL-SDP-CB1Z SDP](#) board drivers installation

Warning

The evaluation board software and drivers must be installed before connecting the evaluation board and [SDP](#) board to the USB port of the PC to ensure that the evaluation system is correctly recognized when it is connected to the PC.

Installing the Evaluation Software

To install the [AD7606](#) evaluation board software

1. Insert the included evaluation software installation CD into the CD drive of a Windows-based PC, and open the contents of the CD.
2. Double-click the **setup.exe** file to begin the installation. By default, the software is saved to the following location: **C:\Program Files\Analog Devices\AD7606**.
3. A dialog box appears asking for permission to allow the program to make changes to your computer. Click **Yes** to begin the installation process.

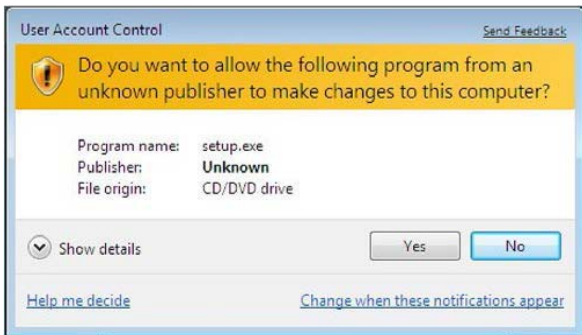


Figure 3. Evaluation Software Installation—User Account Control

4. Select the location to install the software, and then click **Next**.

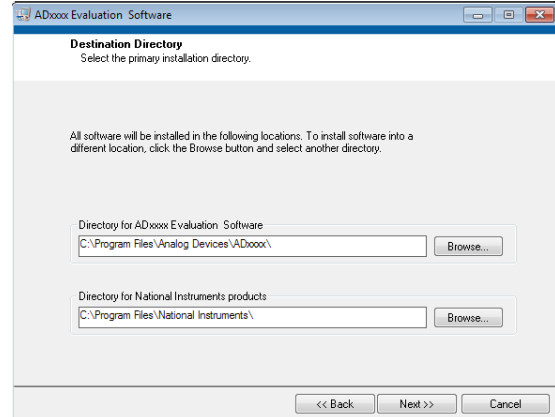


Figure 4. Evaluation Software Installation—Destination Directory

5. A license agreement appears. Read the agreement, select **I accept the License Agreement**, and then click **Next**.
6. A summary of the installation is displayed. Click **Next** to continue.

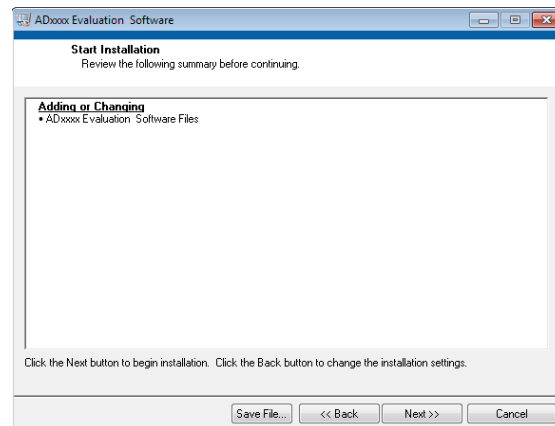


Figure 5. Evaluation Software Installation—Start Installation

7. A dialog box informs you when the evaluation software installation is complete. Click **Next** to proceed with the installation of the [SDP](#) drivers.

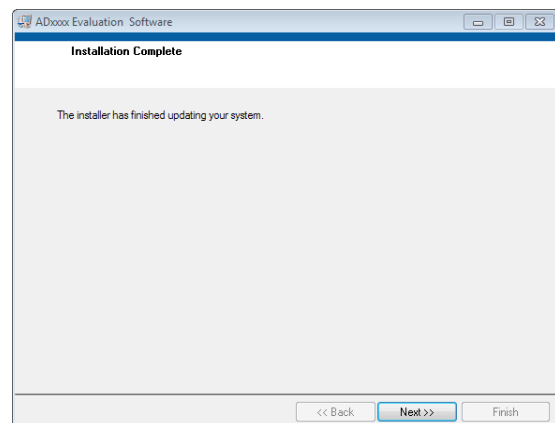


Figure 6. Evaluation Software Installation—Installation Complete

8. The installation of the evaluation software completes.

Installing the SDP Board Drivers

After the AD7606 evaluation board software installation is complete, the ADI SDP Drivers Setup wizard window opens for the installation of the EVAL-SDP-CB1Z SDP board drivers.

1. The ADI SDP Drivers Setup Wizard opens. Click **Next** to begin the driver installation process.



Figure 7. EVAL-SDP-CB1Z Drivers Installation—Setup Wizard

2. Select a destination folder for the SDP drivers, and click **Install**.

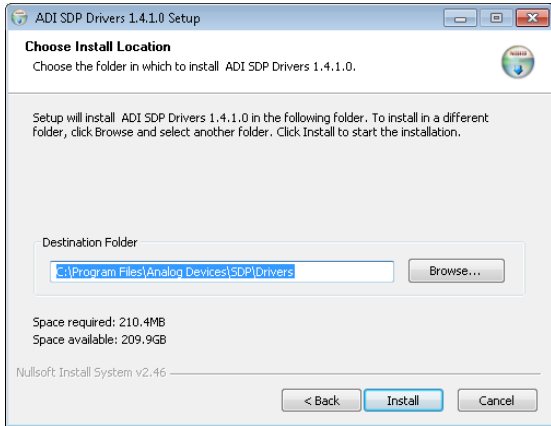


Figure 8. EVAL-SDP-CB1Z Drivers Installation—Choose Install Location

3. Click **Install** to proceed with the installation.

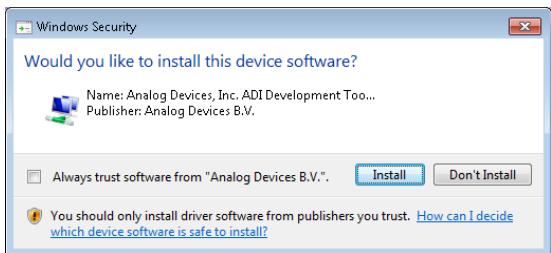


Figure 9. EVAL-SDP-CB1Z Drivers Installation—Windows Security

4. The SDP drivers installation completes. Click **Finish**.

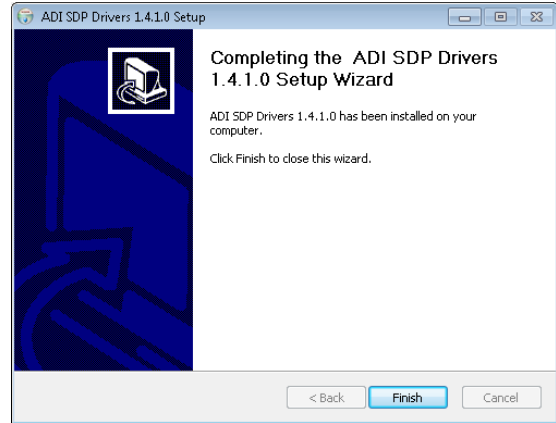


Figure 10. EVAL-SDP-CB1Z Drivers Installation—Complete

After the evaluation software installation is complete, connect the EVAL-AD7606SDZ/EVAL-AD7606-6SDZ/EVAL-AD7606-4SDZ/EVAL-AD7607SDZ/EVAL-AD7608SDZ evaluation board to the EVAL-SDP-CB1Z SDP board as described in the Evaluation Board Hardware section.

When you first plug in the EVAL-SDP-CB1Z SDP board via the USB cable provided, allow the **Found Hardware Wizard** to run. After the drivers are installed, check that the board is connected correctly by looking at the **Device Manager** of the PC. The **Device Manager** can be found by right-clicking **My Computer > Manage > Device Manager** from the list of **System Tools**.

The EVAL-SDP-CB1Z SDP board appears under **ADI Development Tools**, as shown in Figure 11.

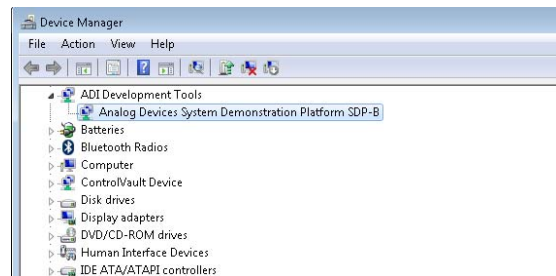


Figure 11. Device Manager

DESCRIPTION OF MAIN WINDOW

The following tools allow user control of the different chart displays. When the software is launched, the main [AD7606](#) evaluation software window opens (see Figure 12).

The main evaluation software window, as shown in Figure 12, has the following features:

- Menu bar
- Control buttons
- Configuration display
- Data capture display

Menu Bar

The menu bar, Label 1 in Figure 12, consists of the **File** and **Help** menus.

File Menu

- **Save Data.** Saves captured data in comma separated values (CSV) format for future analysis.
- **Load Data.** Loads previously captured data in CSV format for analysis.
- **Print Front Panel.** Prints out the front panel.
- **Save As Picture.** Saves current tab image as a JPEG file.
- **Exit.** Exits the program.

Help Menu

- **Analog.com.** Links to the Analog Devices, Inc., website.

Control Buttons, Drop-Down Boxes, and Indicators

The **Configuration**, **Waveform**, **Histogram**, **FFT**, and **Summary** tabs control which tab is displayed. In each of these tabs, device configuration and data analysis results can be set and viewed, respectively.

CONFIGURATION TAB

The configuration tab contains control to configure the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#). Available controls are sampling rate, oversampling, range, and convert start pulse width.

Sampling Rate

The sampling rate control (Label 3 in Figure 12) is used to increase the rate of convert start pulses to the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#). The control accepts values from 769 Hz to 200,000 Hz. If oversampling is enabled the maximum limit of sampling is decreases.

Oversampling

The oversampling drop-down menu (Label 4 in Figure 12) is used to enable and disable oversampling and choose from rates of oversample by 2, 4, 8, 16, 32, and 64. See the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) data sheets for more information on the digital filter profile. The maximum output data rate of the [AD7606/AD7606-6/AD7606-4/AD7607/AD7608](#) is limited by the selected oversampling rate.

Range

The **5V / 10 V Range** drop-down menu (Label 5 in Figure 12) is used to alter the signal analysis calculations for the Histogram, Waveform, and FFT windows. The RANGE pin is not hardwired to a GPIO pin. The range is selected by inserting either the R1 or R2 resistor to tie the pin to DGND or V_{DRIVE}. The default range is ± 10 V.

Convst Pulse Width

The **Convst Pulse Width** control (Label 6 in Figure 12) is used to vary the convert start pulse width and is set to 50 ns by default.

Samples

The user can select the number of samples to be captured from the **# Samples** drop-down menu (Label 7 in Figure 12). The default number of samples is 4096; you are free to change this as required.

Taking Samples

To initiate a conversion and capture the sample data, click the **Sample** button or the **Continuous** button. Both the **Sample** and the **Continuous** buttons are located at the top of the window (Label 8 in Figure 12). When you click the **Sample** button, the software instructs the [EVAL-SDP-CB1Z](#) board to take the required number of samples at the required frequency from the evaluation board. The [EVAL-AD7606SDZ/EVAL-AD7606-6SDZ/EVAL-AD7606-4SDZ/EVAL-AD7607SDZ/EVAL-AD7608SDZ](#) runs with sampling speeds less than or equal to 200 kSPS. You can choose the sampling frequency up to this rate and the number of samples to be taken.

The samples taken are then uploaded and displayed. An FFT and/or histogram can be calculated and displayed. If you click the **Continuous** button, the software repeats the process indefinitely until you click **Stop**. (The **Continuous** button switches to **Stop** when clicked).

Note that no data appears on the screen if the channels are not selected. Set the **ADC 1 ON/OFF** to **ADC 8 ON/OFF** buttons in the **Part Information** section to **ON** to select the desired channel.

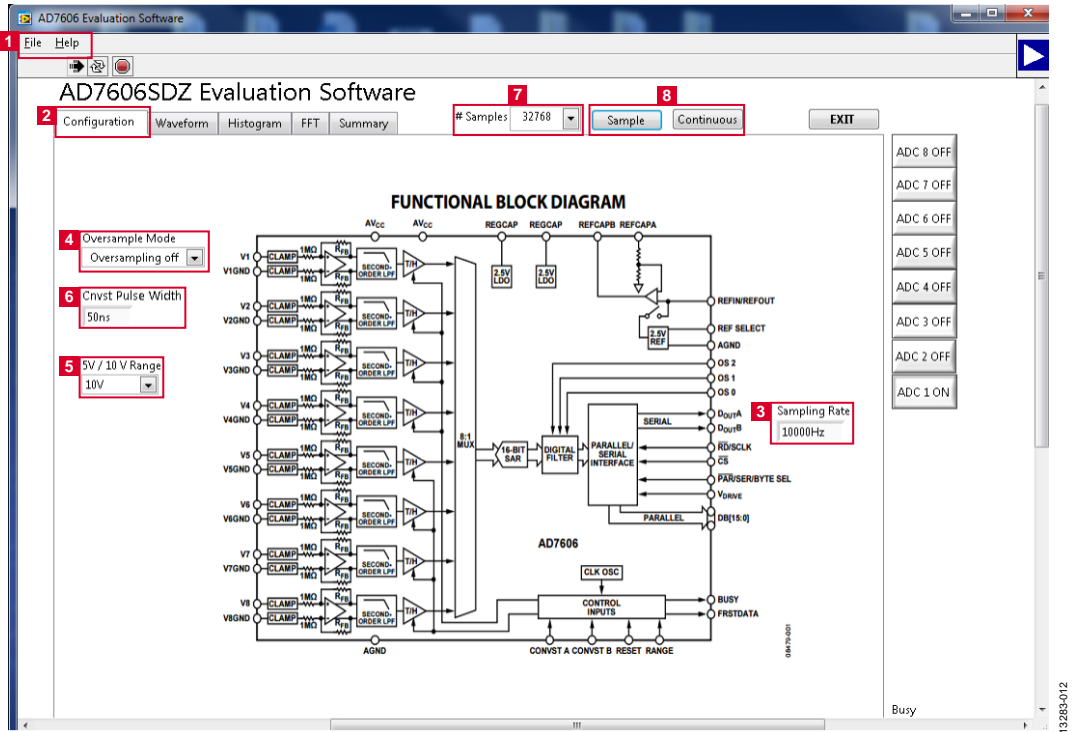


Figure 12. AD7606 Evaluation Software Main Window

WAVEFORM CAPTURE TAB

The **Waveform** tab, as shown in Figure 14, is used for waveform capture.

The waveform analysis reports the amplitudes recorded from the captured signal as well as the frequency of the signal tone. The analysis report is generated for the ADC channel selected via the menu down the right hand side (Label 1 in Figure 14).

At the bottom right of the graph are the zoom options. These allow you to zoom in and out to get a closer look at a sample. The **Waveform Analysis** section (Label 2 in Figure 14), which is located beneath the waveform graph, contains information about the samples taken; for example, minimum/maximum position or velocity, the spread, the standard deviation, and the mean.

The waveform graph displays the information for all eight input channels or as many channels as desired. Eight buttons located to the right hand side of the graph, labeled **ADC 1 ON/OFF** to

ADC 8 ON/OFF are used to select which channel's data is displayed (Label 1 in Figure 14). An indicator, located to the right of the graph (Label 3 in Figure 14), shows what color graph represents each channel when the data from several channels is displayed.

Data Capture Display

Four tabs display the conversion data in different formats: **Waveform**, **Histogram**, **FFT**, and **Summary**.

The tools shown in Figure 13 allow user control of the different chart displays within the four tabs.

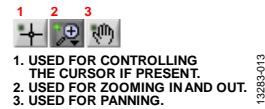


Figure 13. Chart Tools

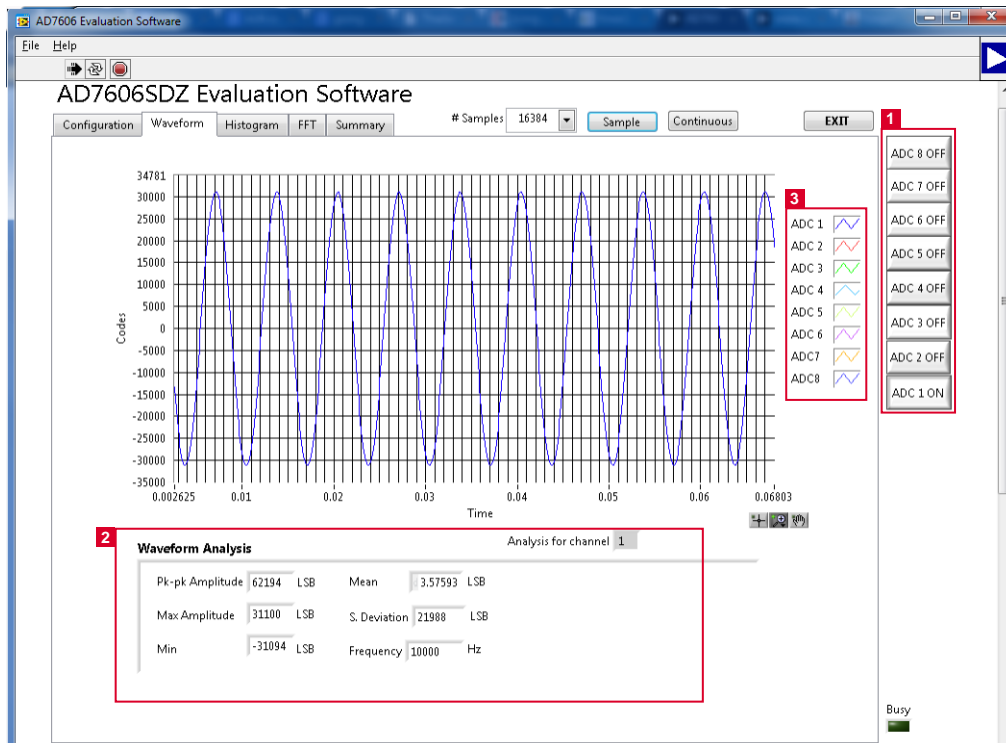


Figure 14. **Waveform** Tab

HISTOGRAM TAB

Figure 15 shows the **Histogram** tab. Raw data is captured and passed to the PC for statistical computations. To perform a histogram test, select the **Histogram** tab in the [AD7606](#) evaluation software main window and click **Sample** or **Continuous**. Note that a histogram requires a quality signal source applied to at least one of the inputs (V1 to V8).

The **Histogram** tab displays a histogram of the captured ADC codes. It can be used to give an indication of the performance of the ADC in response to dc inputs. The **Histogram Analysis** section contains information about the samples taken; for example, maximum and minimum codes captured.

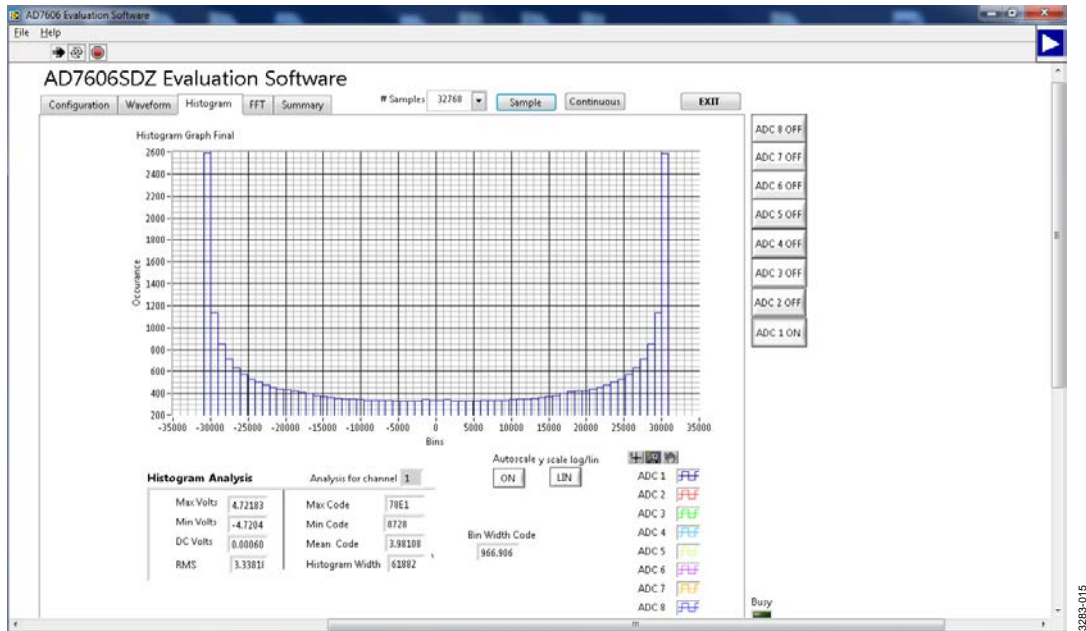


Figure 15. Histogram Tab

AC TESTING—FFT CAPTURE

Figure 16 shows the FFT capture tab. The FFT tests the traditional ac characteristics of the converter and displays a fast Fourier transform (FFT) of the results. As in the histogram test, raw data is captured and passed to the PC, where the FFT is performed, displaying the signal-to-noise ratio (SNR), signal-to-noise-and-distortion (SINAD), and total harmonic distortion (THD).

The FFT is typically used for examining the performance of the ADC in the frequency domain. The **Spectrum Analysis** section contains information about the samples taken, such as ac specifications (see Figure 16).

You can choose whether to display the information for one, several, or all eight channels in the window using the ADC 1 to ADC 8 push buttons.

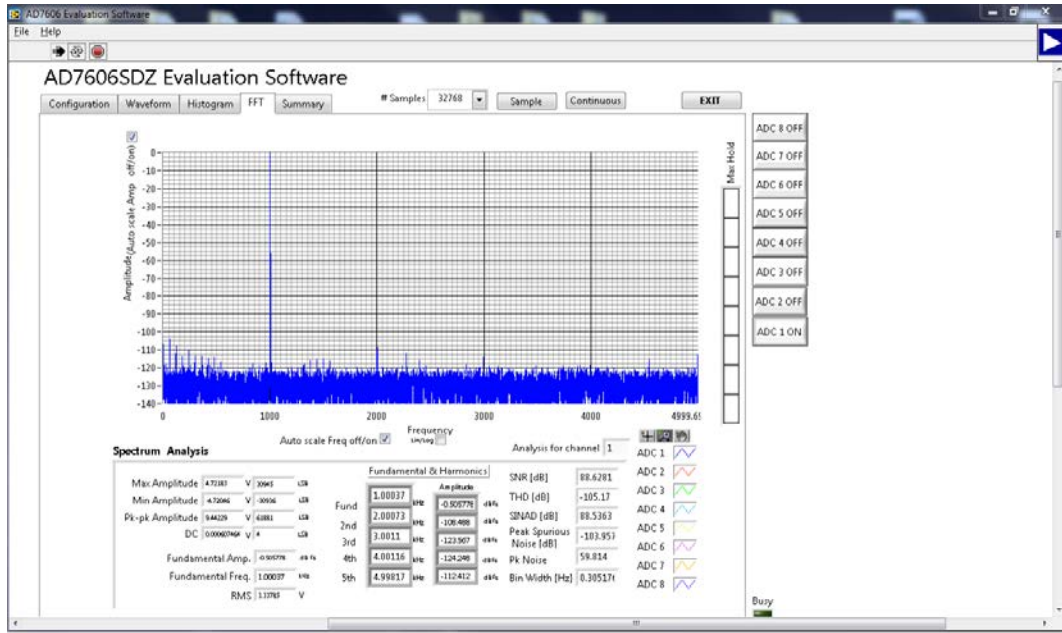


Figure 16. FFT Tab

SUMMARY TAB

Figure 17 shows the **Summary** tab. This tab captures and displays all of the information in one panel with a synopsis of the information, including key performance parameters,

such as **SNR**, **THD**, **S/N +D**, and **Dynamic Range** (see Label 1 in Figure 17). Waveform, histogram, and FFT plots are also displayed in the summary tab.

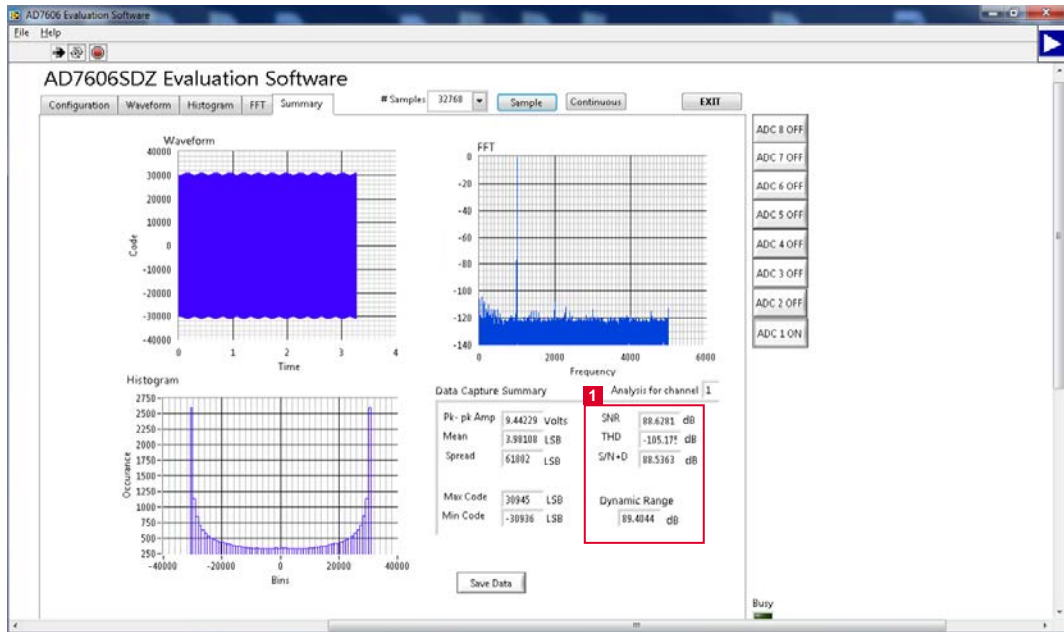


Figure 17. Summary Tab

SAVING FILES

The software can save the current captured data for future analysis. The software can capture the current plot images and the current device configuration, as well as the raw waveform data, histogram data, and ac spectrum data.

Saving Data

To save data, go to the **File** menu and click **Save Data**. This action saves the raw data captured as seen in the **Waveform** tab in TSV format.

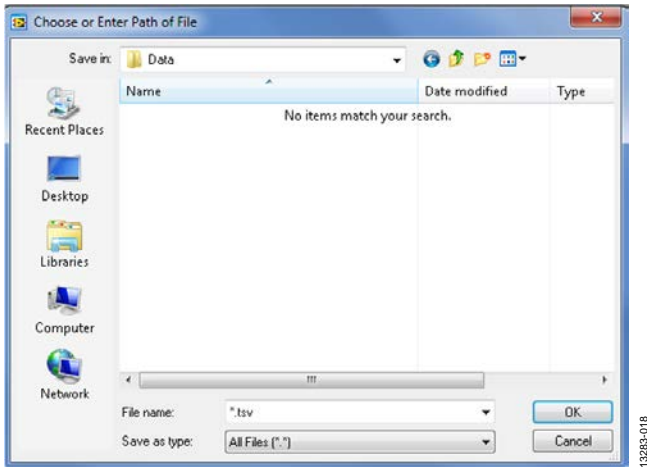


Figure 18. **Save As Data** Dialog Box

Saving Plot Images

To save plot images, go to the desired analysis tab, click the **File** menu, and then click **Save As Picture**.

The images are saved in JPEG format and do not contain any raw data information. Plots saved as images cannot be loaded back into the evaluation environment.

OPENING FILES

Loading Captured Data

The software can load previously captured data for analysis.

Go to the **File** menu, click **Load Data**, and select waveform data previously saved in TSV format. The waveform data is a raw data capture that rebuilds the histogram and ac spectrum analyses upon being loaded into the evaluation platform.

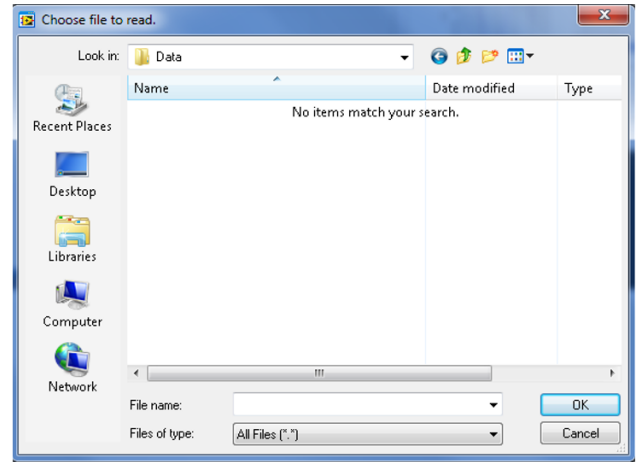


Figure 19. **Open File** Dialog Box

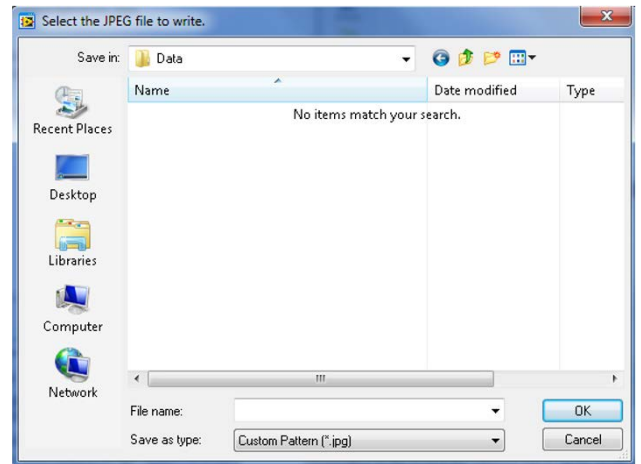


Figure 20. **Save As Picture** Image Dialog Box

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.

Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.

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