

Evaluating the **AD7606** 16-Bit simultaneous sampling, 8-Channel, SAR ADC

FEATURES

Full featured evaluation board for the **AD7606**
On-board power supplies
Standalone capability
System demonstration platform (SDP) compatible
(**EVAL-SDP-CB1Z**)
PC software for control and data analysis (download from
AD7606 product page)

EVALUATION KIT CONTENTS

EVAL-AD7606SDZ evaluation board
Evaluation software CD for the **AD7606**
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 cables
USB cable

ONLINE RESOURCES

Documents Needed
AD7606 data sheet

EVAL-AD7606SDZ user guide

Required Software

AD7606 evaluation software

Design and Integration Files

Schematics, layout files, bill of materials

EVALUATION BOARD DESCRIPTION

The **EVAL-AD7606SDZ** is a full featured evaluation board that allows the user to easily evaluate all the features of the **AD7606** analog-to-digital converter (ADC). 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 product page or from the installer CD included in the evaluation board kit.

On-board components include the following:

- **ADP7104ARDZ-5.0**: 5 V, low noise LDO
- **ADR421**: high precision, band gap voltage reference

TYPICAL SETUP

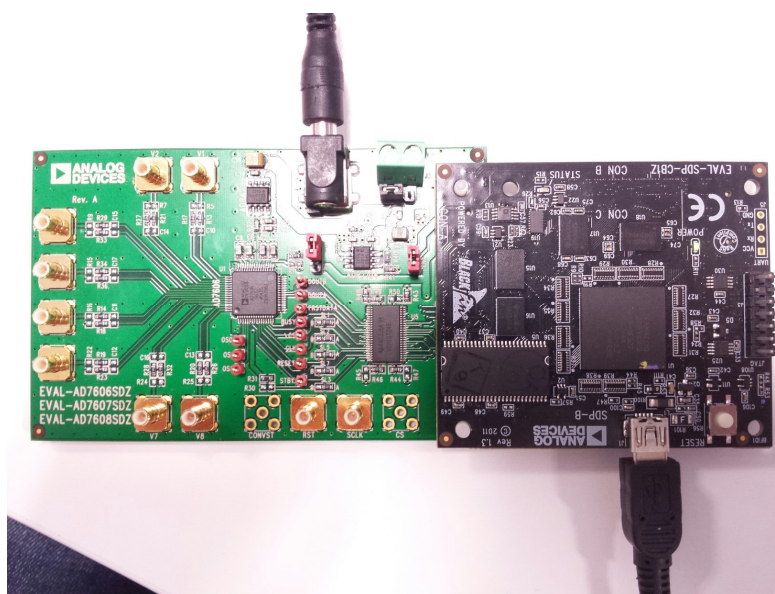


Figure 1.

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REVISION HISTORY

1/15—Revision Pr.A: Initial Version

QUICK START GUIDE

Follow these steps to quickly evaluate the [AD7606](#) ADC. For detailed instructions, see the subsequent sections.

1. Install the evaluation software from the [AD7606](#) product page 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 2.
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 set to ensure that the boards connect firmly together.
4. Connect a 5V 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 V1-8.

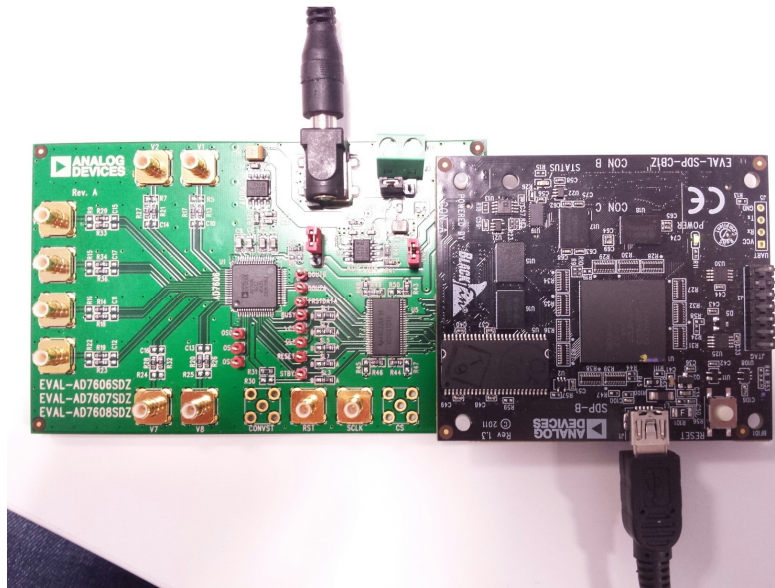


Figure 2. Evaluation Board (Left) Connected to the SDP Board (Right)

EVALUATION BOARD HARDWARE

DEVICE DESCRIPTION

The [AD7606](#) ADC is a 16-bit, , 8-channel, simultaneous sampling successive approximation ADC. The device operates from a single 2.7 V to 5.25 V power supply and features throughput rates of up to 200 KSPS. The device has onboard 1MΩ input buffers meaning direct connection from sensor to ADC.

Full data on the [AD7606](#) is available in the [AD7606](#) data sheet, 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 2. 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 2 for the complete list of link options.

The [AD7606](#) 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](#) 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](#) 5V linear regulator. Each supply is decoupled on this evaluation board using 10 μF 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 ± 5% | Supplies power to on-board power management devices |
| J3 | 7 V to 9 V | Digital logic supply |

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Table 2. Link Options

| Link | Default Position | Function |
|-------|------------------|--|
| LK1 | A | This link is used to select the power supply source for the EVAL-AD7606SDZ. In Position A, the board is powered with the J1 wall wart connector. In Position B, The J3 terminal block s the source. |
| LK2 | INSERT | This link is used to supply the SDP power supply form the AD7606SDZ board Inserted the EVAL-SDP-CB1Z is powered from the ADP7104 5V linear regulator |
| LK3 | B | LK3 is used to select the VDrive source for the AD7606. In Position A: The AD7606 is supplied with 3.3V Drive In Position B, the AD7606 is supplied with 5V VDrive, 5V VDrive is needed to run the device at 200KSPS in serial interface mode. |
| SL1 | A | In Position A, the CS signal is supplies from the SDP terminal J2. In Position B, The CS SMB is selected. |
| SL2 | A | In Position A, the SCLK signal is supplies from the SDP terminal J2. In Position B, The SCLK SMB is selected. |
| SL3 | A | In Position A, the STANDBY signal is supplies from the SDP terminal J2. In Position B, The STANDBY SMB is selected. |
| SL4 | A | In Position A, the CS signal is supplies from the SDP terminal J2. In Position B, The CS SMB is selected. |
| SL5 | A | In Position A, the RESET signal is supplies from the SDP terminal J2. In Position B, The RESET SMB is selected. |
| SL6 | A | In Position A, the CS signal is supplies from the SDP terminal J2. In Position B, The CS SMB is selected. |
| SL7 | A | In Position A, the CONVST signal is supplies from the SDP terminal J2. In Position B, The CONVST SMB is selected. |
| K0-15 | DNI | Solder links for bypassing U5 level translator. In the |

SOCKETS/CONNECTORS

The connectors and sockets on the [AD7606](#) evaluation board are outlined in Table 3.

Table 3. 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 |
| J1-8 | Analog input terminal block. |

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

EVALUATION BOARD SOFTWARE

SOFTWARE INSTALLATION

The [EVAL-AD7606SDZ](#) kit includes the evaluation software on a CD; the software is also available for download from the [AD7606](#) product page.

There are two parts to the installation:

- [EVAL-AD7606SDZ](#) 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 [EVAL-AD7606SDZ](#) 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.

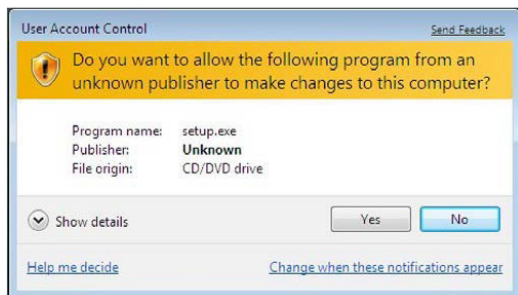


Figure 3. Evaluation Software Installation—User Account Control

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

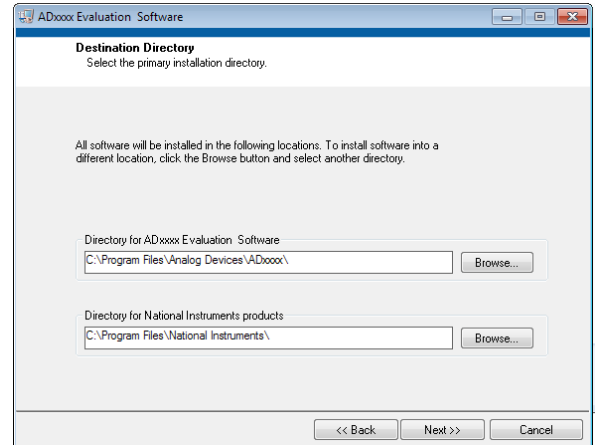


Figure 4. Evaluation Software Installation—Destination Directory

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.

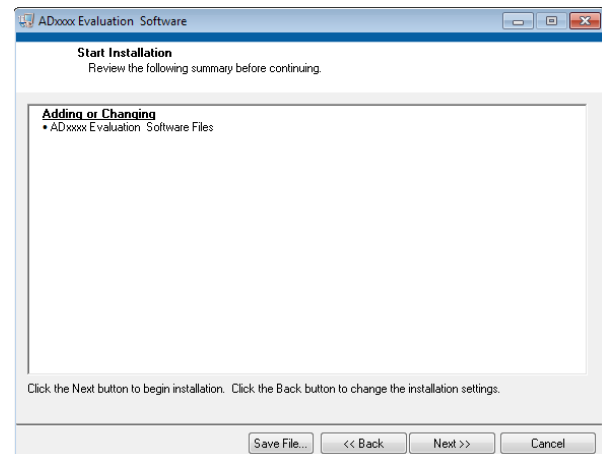


Figure 5. Evaluation Software Installation—Start Installation

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

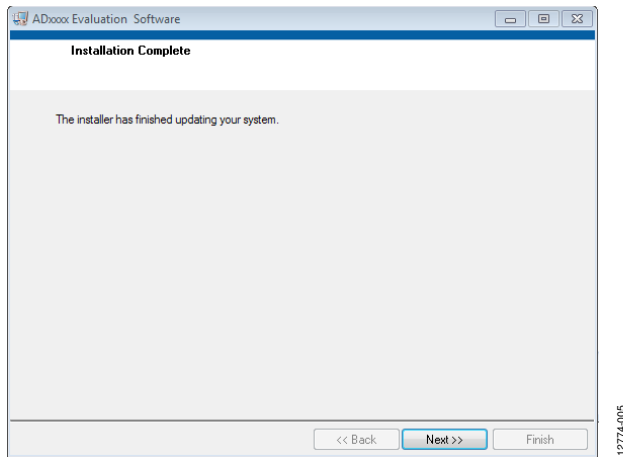


Figure 6. Evaluation Software Installation—Installation Complete

8. The installation of the evaluation software completes.

Installing the SDP Board Drivers

After the 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.

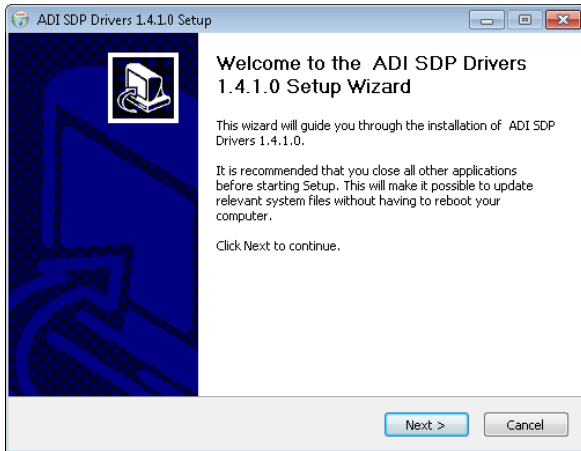


Figure 7. EVAL-SDP-CB1Z Drivers Installation—Setup Wizard

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

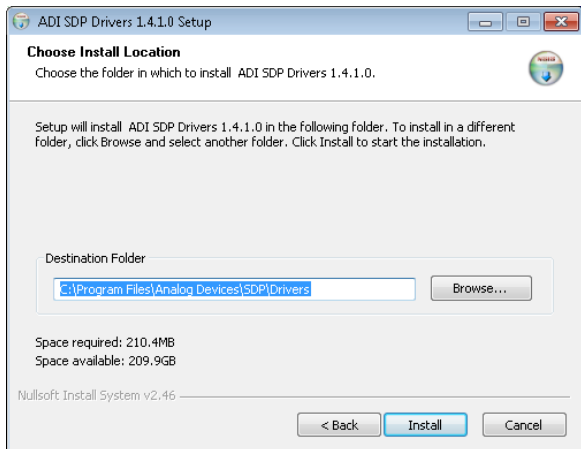


Figure 8. EVAL-SDP-CB1Z Drivers Installation—Choose Install Location

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

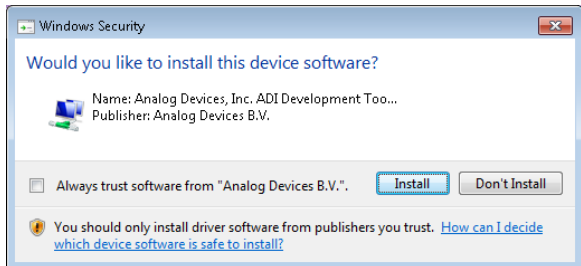


Figure 9. EVAL-SDP-CB1Z Drivers Installation—Windows Security

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

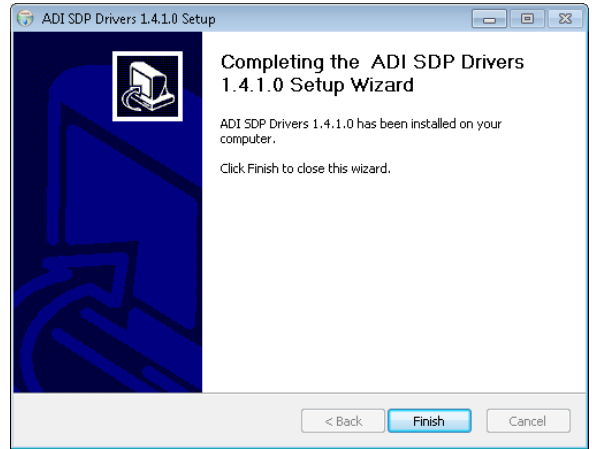


Figure 10. EVAL-SDP-CB1Z Drivers Installation—Complete

After the evaluation software installation is complete, connect the **EVAL-AD7606SDZ** 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.

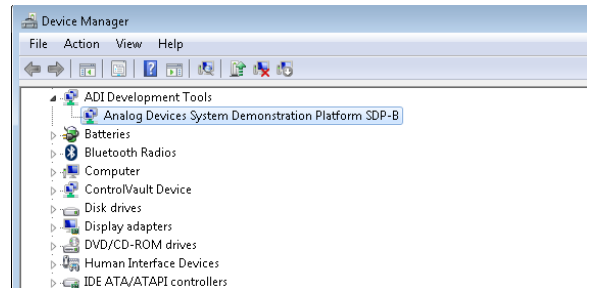


Figure 11. Device Manager

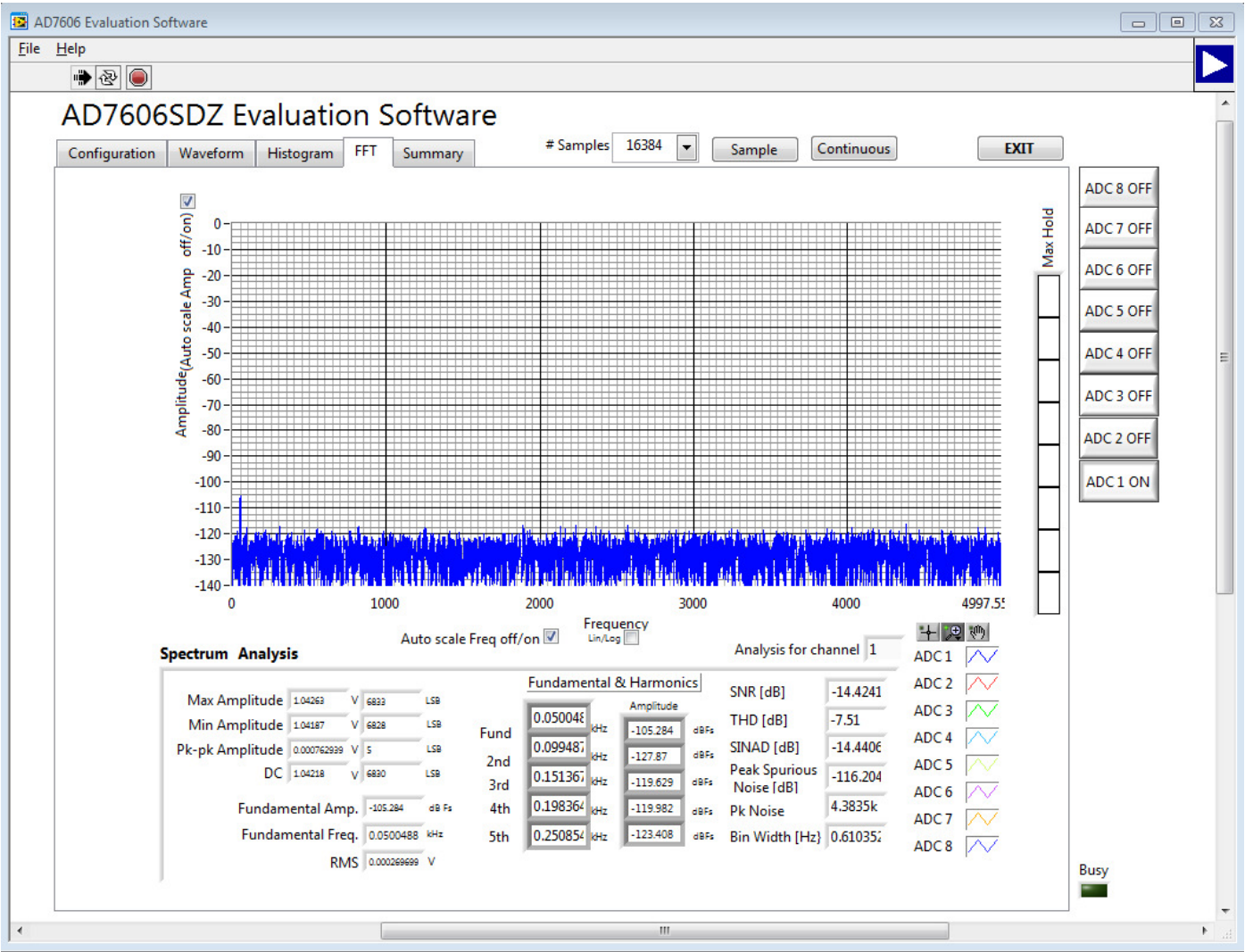


Figure 12. AD7606/7/8 Main Window

SOFTWARE OPERATION

The main function of this window is to allow you to read a predetermined number of samples from the evaluation board and display them in both the time and frequency domain. The

top portion of the screen contains the menu bar and the screen can be divided into three main sections: **Part Information**, **Data Capture**, and **Linearity**. The **Data Capture** tab consists of four subtabs: **Waveform**, **Histogram**, **FFT**, and **Summary**.

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USING THE SOFTWARE

CONFIGURATION TAB

The configuration tab contains control to configure the AD7606. Options available to the user are Sampling Rate, oversampling, range, and convert start pulse width.

Sampling rate

This control is used to increase the rate of convert start pulses to the AD7606. The control will accept values from 769-200000 Hz. If oversampling is enabled the maximum limit of sampling is decreases.

Oversampling

The oversampling checkbox is used to enable and disable oversampling and choose from rates of oversample by 2, 4, 8, 16, 32 & 64. See the datasheet for more information on the digital filter profile. The maximum output data rate of the AD7606 is limited by the selected oversampling rate

Range

The range check box 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 R1 or R2 resistor to tie the pin to DGND or VDRIVE. The default range is $\pm 10V$.

Convst

The Convst control is used to vary the convert start pulse width. This is set to 50ns default.

DATA CAPTURE TAB

In the **Data Capture** tab, the user can select the number of samples to be captured from the drop-down menu. The default number of samples is 4096; you are free to change this as required. The desired display option is selected by clicking any one of the **Waveform**, **Histogram**, or **FFT** tab.

Waveform Tab

The **Waveform** tab displays a digital storage oscilloscope (DSO) that allows you to display a waveform. Samples are displayed here when uploaded from the **EVAL-SDP-CB1Z** board. The samples are displayed as integer code values.

At the bottom left 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, 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 8 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. An indicator, located beneath the graph, shows what color graph represents each channel when the data from several channels is displayed.

Histogram Tab

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.

FFT Tab

The FFT tab displays an fast Fourier transform (FFT) plot. 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 12).

You can choose whether to display the information for one, several or all eight channels in the window using the **ADC 1 On/ Off** to **ADC 8 On/Off** buttons, as explained in the **Waveform Tab** section.

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 on the top right hand corner of the **Data Capture** tab. 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-AD7606 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 indefi-

nately 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. The **ADC 1 On/ Off** to **ADC 8 On/Off** buttons in the **Part Information** section should be set to **ON** to select the desired channels.

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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