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Evaluating the AD7616/AD7616-P 16-Channel DAS with 16-Bit, Bipolar Input, Dual Simultaneous Sampling ADC

FEATURES

Full featured evaluation board for the AD7616 and AD7616-P
On-board power supplies
Standalone capability
SDP-B controller board-compatible
PC software for control and data analysis

EVALUATION KIT CONTENTS

EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board
DC power supply

ADDITIONAL EQUIPMENT NEEDED

EVAL-SDP-CB1Z; includes a USB cable
Signal source
PC running Windows XP SP3, Windows Vista, or Windows 7 with a USB 2.0 port

ONLINE RESOURCES

AD7616 and AD7616-P data sheets
EVAL-AD7616SDZ/EVAL-AD7616-PSDZ user guide
AD7616 evaluation software

GENERAL DESCRIPTION

The EVAL-AD7616SDZ/EVAL-AD7616-PSDZ is a single, full featured evaluation board designed to easily evaluate all features of both the AD7616 and AD7616-P analog-to-digital converters (ADCs). The evaluation board can be controlled by the EVAL-SDP-CB1Z via the 120-way high speed system demonstration platform (SDP-B) connector (J10). The EVAL-SDP-CB1Z SDP-B board controls the evaluation board through a USB port of a PC using the evaluation board software, which is available for download from the AD7616 and AD7616-P product pages.

Complete specifications for the AD7616 and AD7616-P devices are provided in the AD7616 and AD7616-P data sheets and should be consulted in conjunction with this user guide when using the evaluation boards. Full details on the EVAL-SDP-CB1Z are available on the SDP-B product page.

Table 1. EVAL-AD7616SDZ/EVAL-AD7616-PSDZ On-Board Components

Component	Description
ADP7118	Low noise, low dropout regulator (LDO)
ADP7104ARDZ-5.0	5 V low noise LDO
ADR421	Ultraprecision, low noise, 2.5 V XFET® voltage reference

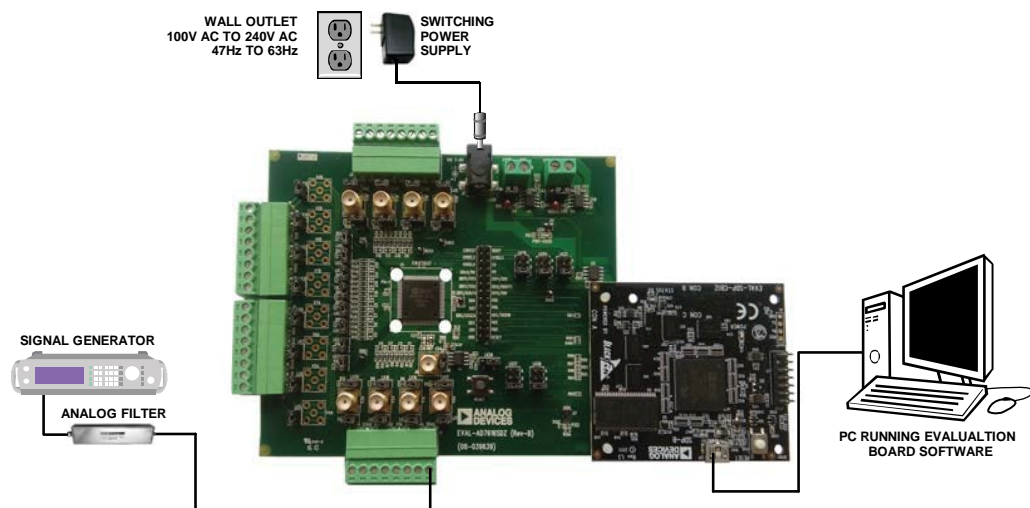## TYPICAL SETUP OF THE EVAL-AD7616SDZ/EVAL-AD7616-PSDZ

Figure 1. Typical Setup of the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ (Left) and the EVAL-SDP-CB1Z (Right)

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REVISION HISTORY

QUICK START GUIDE

Follow these steps to evaluate the AD7616 and AD7616-P ADC:

1. Download and install the AD7616 evaluation software, available on the AD7616 and AD7616-P product pages; note that the AD7616 software is used for both devices.
2. Ensure the EVAL-SDP-CB1Z board is disconnected from the USB port of the PC during software installation. The PC may need to be restarted after the installation.
3. Ensure the various link options are configured as outlined in Table 3.
4. Connect the EVAL-SDP-CB1Z board to the evaluation board, shown in Figure 2.
5. Connect the EVAL-SDP-CB1Z board to the PC via the USB cable.

   a. For Windows® XP, search for the EVAL-SDP-CB1Z drivers.
   b. Choose to automatically search for the drivers for the EVAL-SDP-CB1Z board if prompted by the operating system.
6. Power up the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board by inserting the 7 V to 9 V dc barrel jack, included in the evaluation kit, into the 7 V to 9 V barrel connector, labeled J7.
7. Launch the AD7616 evaluation software from the **Analog Devices** subfolder in the **All Programs** menu.
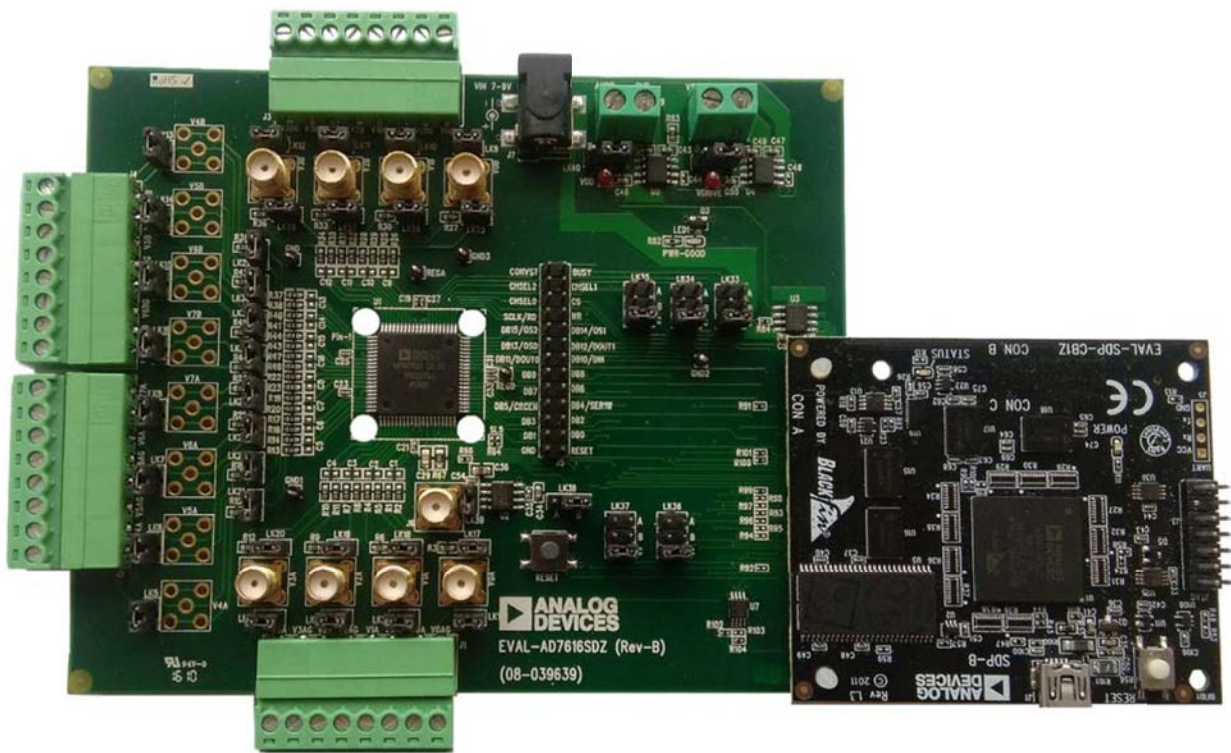8. Connect an input signal via the V0A connector.

Figure 2. *EVAL-AD7616SDZ/EVAL-AD7616-PSDZ Evaluation Board (Left) Connected to the EVAL-SDP-CB1Z Board (Right)*

EVALUATION BOARD HARDWARE

AD7616/AD7616-P DESCRIPTION

This user guide describes the evaluation board for the AD7616/AD7616-P dual, simultaneous sampling ADCs. The AD7616/AD7616-P are 16-channel, 16-bit, bipolar input ADCs with independently selectable channel input ranges. The AD7616/AD7616-P operates from a single 5 V analog power supply with a 2.3 V to 3.6 V V_{DRIVE}. The device features analog input clamp protection, a high impedance analog input, a first-order antialiasing filter, and an on-chip accurate reference.

The AD7616/AD7616-P can achieve throughput rates up to 1 MSPS per channel pair with 90.5 dB signal-to-noise ratio (SNR). The AD7616/AD7616-P features oversampling capability with a digital filter that can achieve 92 dB SNR for an oversampling ratio of 2. The device also features a flexible channel sequencer with burst mode.

The AD7616 has a flexible parallel/serial interface that is SPI-/QSPI-/MICROWIRE™-/DSP-compatible whereas the AD7616-P has a parallel interface only. It also features optional cyclical redundancy check (CRC). The AD7616/AD7616-P comes in an 80-lead LQFP package.

The AD7616/AD7616-P is ideally suited to applications such as power-line monitoring, multiphase motor control, instrumentation and control systems, and data acquisition systems (DAS).

POWER SUPPLIES

Take care before applying power and signals to the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board to ensure that all link positions are set according to the required operating mode. See Table 3 for the complete list of link options.

The EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board is supplied by an included 7 V to 9 V power supply; alternatively, separate V_{DRIVE} and V_{CC} supplies can be supplied to the AD7616 (or AD7616-P) via the J8 and J9 connectors, respectively.

INPUT SIGNALS

The analog input range to the AD7616/AD7616-P is independently selectable with an absolute maximum input voltage range of ±16.5 V, which must not be exceeded. An input signal in the range of ±2.5 V, ±5 V, or ±10 V must be connected to the evaluation board via any of the analog input connecters.

Table 2. Optional External Power Supplies

Power Supply	Connector	Voltage Range	Description
V_{CC}	J9	5 V ± 10%	Analog supply rail
V_{DRIVE}	J8	2.3 V to 3.6 V	Digital supply rail without EVAL-SDP-CB1Z connected
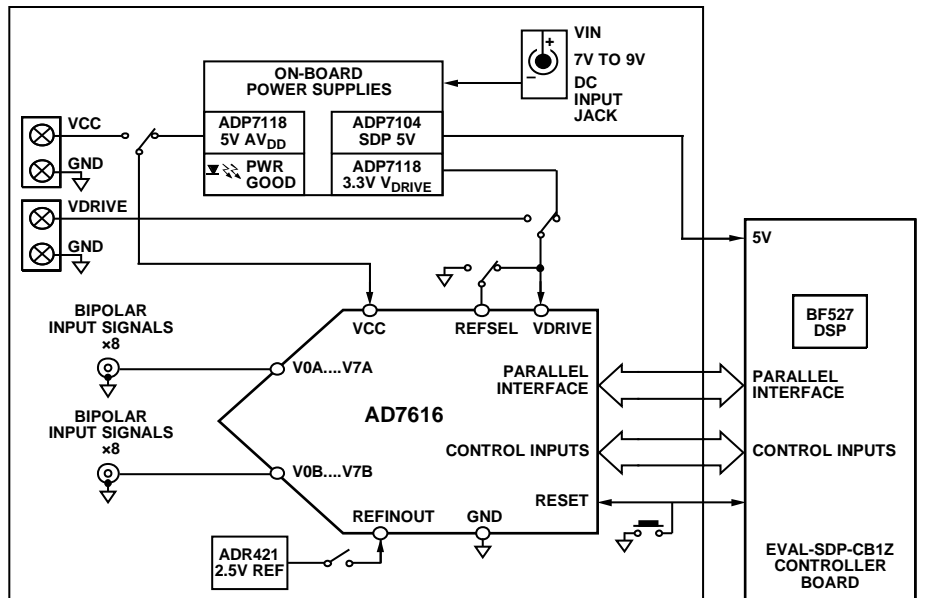
Figure 3. EVAL-AD7616SDZ/EVAL-AD7616-PSDZ Functional Block Diagram

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LINK CONFIGURATION OPTIONS

There are multiple link options that must be set correctly to select the appropriate operating setup before using the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ. The functions of these options are outlined in Table 3.

Setup Conditions

Take care before applying power and signals to the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ to ensure that all link positions are set as required by the selected operating mode.

There are two modes to operate the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board. SDP-B controlled mode used with the EVAL-SDP-CB1Z board or standalone mode.

Table 3 shows the default positions of the links when the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ is packaged. It is set up to operate in conjunction with the SDP-B via the parallel interface with the power supplied from the VIN 7 V to 9 V barrel connector, J7.

Table 3. Link Options

Category	Link	Default Position	Function
Power Supplies	LK38	B	This link selects the reference source for the AD7616/AD7616-P. Position A—internal reference selected. Position B—external reference selected.
	LK39	Inserted	When LK39 is inserted, REFINOUT is connected to the ADR421 external reference. When LK39 is removed, REFINOUT is disconnected from the ADR421 and an external reference can be supplied via the SMA connector, J6.
	LK40	A	This link selects the VCC supply source for the AD7616/AD7616-P. Position A—VCC supply is derived from the VIN 7 V to 9 V connector, J7. Position B—VCC supply is sourced from the terminal connector, J9.
	LK41	A	This link selects the V_{DRIVE} supply source for the AD7616/AD7616-P. Position A—V_{DRIVE} supply is derived from the VIN 7 V to 9 V connector, J7. Position B—V_{DRIVE} supply is sourced from the terminal connector, J8.
Analog Input	LK1 to LK16	Inserted	When these links are inserted, the VxxGND pin for each channel is connected to the board ground. Remove these links if the VxxGND pin for a channel is to be sensed from the signal source.
	LK17 to LK32	Removed	When these links are inserted, the analog inputs are connected to the respective VxxGND through a 270 Ω resistor. Remove the respective link if an analog input is applied to a channel.
Channel Selection	LK33 to LK35	C	In Hardware Mode, these links select the input channels for next conversion for the ADC A channels and the ADC B channels. In software mode, these pins must connect to AGND, Position C. Position A—The CHSELx pins are controlled via the SDP interface. Position B—CHSELx pins are connected to V_{DRIVE}. Position C—CHSELx pins are connected to AGND.
Hardware/ Software Mode Range Select	LK36 to LK37	C	These pins are dual-purpose. With the HW_RNGSELx pins tied to ground, the AD7616/AD7616-P operates in Software mode. In hardware mode, these links select the analog input range. Refer to the AD7616/AD7616-P data sheet for detailed range selection instructions. Position A—The HW_RNGSELx pins are controlled via the SDP interface. Position B—HW_RNGSELx pins are connected to V_{DRIVE}. Position C—HW_RNGSELx pins are connected to AGND.

EVALUATION BOARD CIRCUITRY

SOCKETS/CONNECTORS

The connectors and sockets on the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ are described in Table 4.

The default interface to this evaluation board is via the 120-way connector, which connects the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ to the EVAL-SDP-CB1Z. If using the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board in standalone mode, communication is achieved via the J5 single-inline (SIL) header pins.

TEST POINTS

There are several test points and SIL headers on the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ. These test points provide easy access to the signals from the evaluation board for probing, evaluation, and debugging.

Table 4. On-Board Connectors

Connector	Function
J1	Analog inputs (V0A to V3A)
J2	Analog inputs (V4A to V7A)
J3	Analog inputs (V0A to V3B)
J4	Analog inputs (V4B to V7B)
J5	Digital input/output pins for debug/standalone mode
J6	External reference SMA input
J7	External power connector, 7 V to 9 V dc input
J8	External V_{DRIVE} power connector
J9	External VCC power connector
J10	120-way connector for the EVAL-SDP-CB1Z

EVALUATION BOARD SOFTWARE

SOFTWARE INSTALLATION PROCEDURES

Download the AD7616/AD7616-P evaluation software from the AD7616 or the ADP7616-P evaluation board product page to install on a PC before using the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board.

There are two steps to the installation process:

- AD7616/AD7616-P evaluation software installation
- EVAL-SDP-CB1Z driver installation

Warning

The evaluation board software and drivers must be installed before connecting the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ and EVAL-SDP-CB1Z to the USB port of the PC to ensure the evaluation system is correctly recognized when it is connected to the PC.

Installing the AD7616/AD7616-P Evaluation Board Software

To install the AD7616/AD7616-P evaluation board software,

1. Download the AD7616/AD7616-P evaluation software to a Windows-based PC and unzip the file.
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\AD7616**.
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.
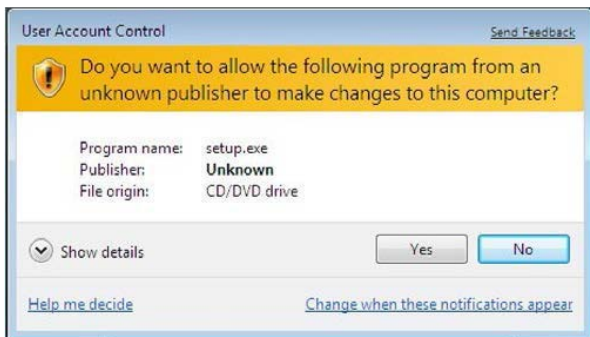
Figure 4. Evaluation Software Installation—**User Account Control** Dialog Box

4. Select the location to install the software and click **Next**.
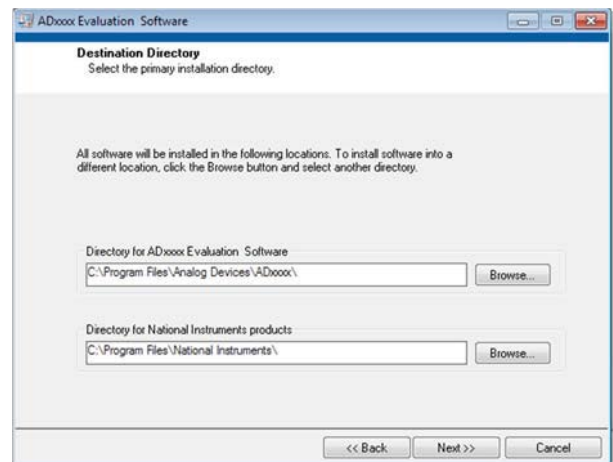
Figure 5. Evaluation Software Installation—**Destination Directory** Dialog Box

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

Figure 6. Evaluation Software Installation—Accepting the License Agreement

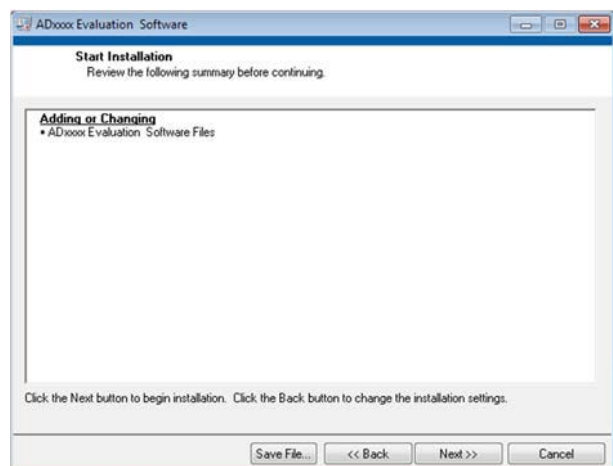6. A summary of the installation displays. Click **Next** to continue.

Figure 7. Evaluation Software Installation—**Start Installation** Dialog Box

7. The **Installation Complete** dialog box informs the user when the evaluation software installation is complete. Click **Next** to proceed with the installation of the drivers.
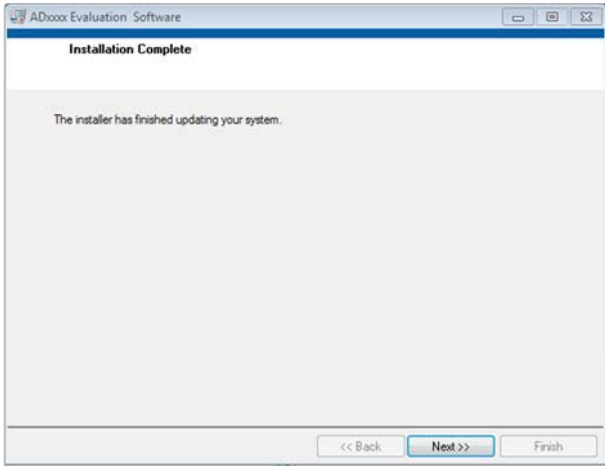

*Figure 8. Evaluation Software Installation—**Installation Complete** Dialog Box*

Installing the EVAL-SDP-CB1Z SDP Board Drivers

After the installation of the AD7616/AD7616-P evaluation board software completes, the **ADI SDP Drivers Setup** wizard window opens for the installation of the EVAL-SDP-CB1Z SDP board drivers. To install the drivers, continue with the following process:

1. Ensure all other applications are closed and click **Next** to begin the driver installation process.

Figure 9. EVAL-SDP-CB1Z Drivers Installation—Setup Wizard

2. Select a location to install the drivers and click **Install**.
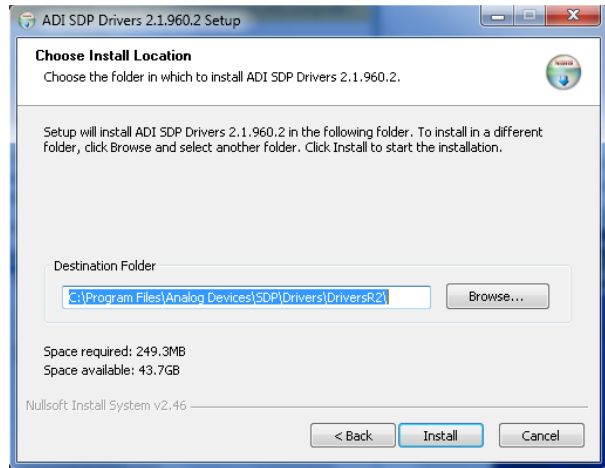
*Figure 10. EVAL-SDP-CB1Z Drivers Installation—**Choose Install Location** Dialog Box*

3. Click **Install** to proceed with the installation.
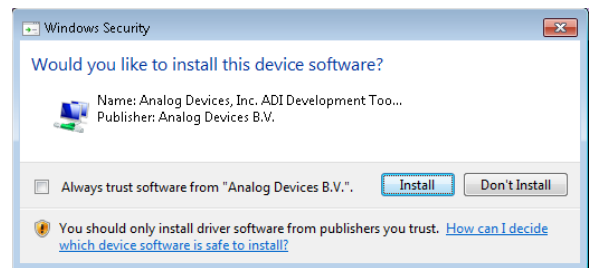
*Figure 11. EVAL-SDP-CB1Z Drivers Installation—**Windows Security** Dialog Box*

4. To complete the drivers installation, click **Finish**, which closes the installation wizard.
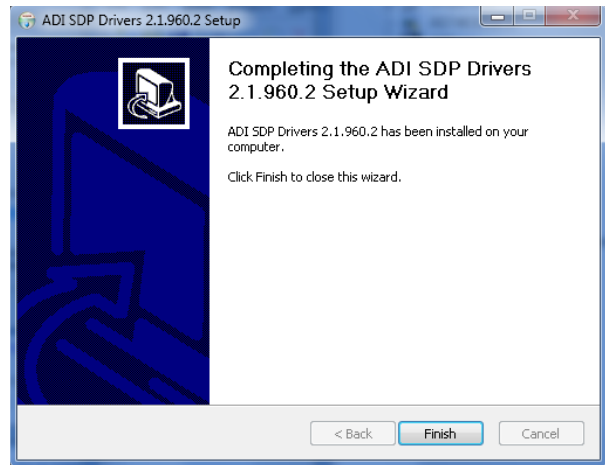
Figure 12. EVAL-SDP-CB1Z Drivers Installation—Completing the Installation

EVALUATION BOARD SETUP PROCEDURES

The EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board connects to the EVAL-SDP-CB1Z. The EVAL-SDP-CB1Z is the controller board, which is the communication link between the PC and the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ. Figure 2 shows a photograph of the connections between the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board and the EVAL-SDP-CB1Z.

After following the instructions in the Software Installation Procedures section, set up the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ and EVAL-SDP-CB1Z as detailed in this section.

Warning

The evaluation software and drivers must be installed before connecting the evaluation board and EVAL-SDP-CB1Z to the USB port of the PC to ensure that the evaluation system is correctly recognized when it is connected to the PC.

Connecting the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ and EVAL-SDP-CB1Z to a PC

1. Ensure all configuration links are in the appropriate positions (see Table 2).
2. Connect the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ board securely to the CON A J2 120-way connector on the EVAL-SDP-CB1Z.
3. The EVAL-AD7616SDZ/EVAL-AD7616-PSDZ board requires an external power supply adapter, which is included in the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ kit. Connect this power supply to the dc barrel connector, J7, on the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ board.
4. Connect the EVAL-SDP-CB1Z board to the PC via the USB cable enclosed in the EVAL-SDP-CB1Z kit.

Verifying the Board Connection

1. Allow the **Found New Hardware Wizard** to run after the EVAL-SDP-CB1Z board is plugged into the PC.
   a. If using Windows XP, search for the EVAL-SDP-CB1Z drivers.
   b. Choose to automatically search for the drivers for the EVAL-SDP-CB1Z board if prompted by the operating system.
2. Check that the evaluation board is connected to the PC correctly using the **Device Manager** of the PC by right-clicking **My Computer** and then **Manage**.
   a. A dialog box appears asking for permission to allow the program to make changes to the computer. Click **Yes**.
   b. The **Computer Management** window appears. From the list of **System Tools**, click **Device Manager**.
3. Under **ADI Development Tools**, **Analog Devices System Demonstration Platform SDP-B** appears (see Figure 13), indicating the EVAL-SDP-CB1Z driver software is installed and the board is connected to the PC correctly.
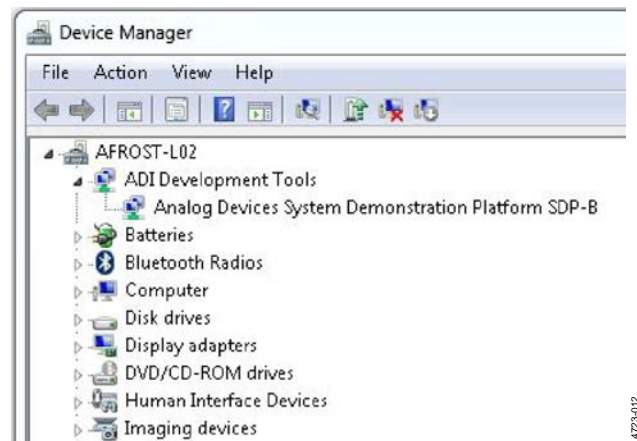

*Figure 13. **Device Manager** Window— Checking the EVAL-SDP-CB1Z Is Connected to the PC Correctly*

Disconnecting the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ Evaluation Board

Always remove power from the EVAL-SDP-CB1Z or click the reset tact switch (located alongside the mini USB port) before removing the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board.

AD7616 EVALUATION SOFTWARE OPERATION

LAUNCHING THE SOFTWARE

After the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ and EVAL-SDP-CB1Z boards are correctly connected to the PC, the AD7616 evaluation software can launch.

1. From the **Start** menu, select **Programs** > **Analog Devices** > **AD7616**. The main window of the software then opens (see Figure 21).
2. If the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ evaluation board is not connected to the USB port via the EVAL-SDP-CB1Z when the software is launched, a connectivity error displays (see Figure 14). Connect the EVAL-AD7616SDZ/EVAL-AD7616-PSDZ and EVAL-SDP-CB1Z to the USB port of the PC and wait a few seconds, then click **Refresh** and follow the instructions.
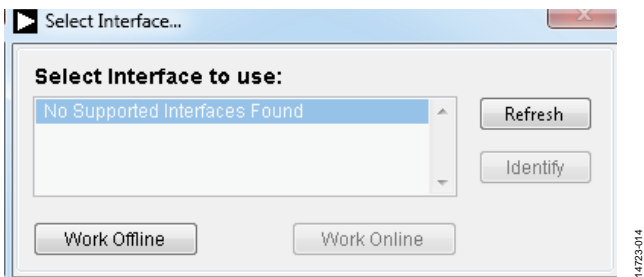
Figure 14. Connectivity Error Alert

SETTING UP THE SYSTEM FOR DATA CAPTURE

After completing the steps in the Software Installation Procedures section and the Evaluation Board Setup Procedures section, set up the system for data capture as follows:

1. Select the desired device settings
2. Click the **Sample** button to gather data

DESCRIPTION OF MAIN WINDOW

When the software launches, the main software window opens (see Figure 21) and displays the significant control buttons and analysis indicators of the AD7616 evaluation board software.

ADC Reset

The **ADC Reset** button, Label 1 in Figure 21, performs a hardware reset to the AD7616 or AD7616-P. This returns the device to a known-good state and reinitializes all registers to their default values.

Window Tabs

Label 2 in Figure 21 are the tabs that switch between the **Device Configuration**, **Waveform**, **Analysis**, and **Register Map** views.

Input Range

The **Input Range** dropdown menu, Label 3 in Figure 21, sets the analog input range for analysis on the AD7616 or AD7616-P. The range must match that selected from the **Input Range** button, otherwise the analysis result is incorrect.

Sampling Frequency

The **Sampling Freq** field, Label 4 in Figure 21, controls the throughput rate of the device. The software is capable of running at a maximum throughput rate of 1 MSPS.

Help

The **Help** button, Label 5 in Figure 21, launches a short tutorial on how to use the AD7616 or AD7616-P evaluation software. Use the tutorial in conjunction with this user guide.

Input Range

The **Input Range** button, Label 6 in Figure 21, allows for independent configurations of the input range per channel. Clicking the **Input Range** button opens the **VA_INPUT_RANGE** window, shown in Figure 15.
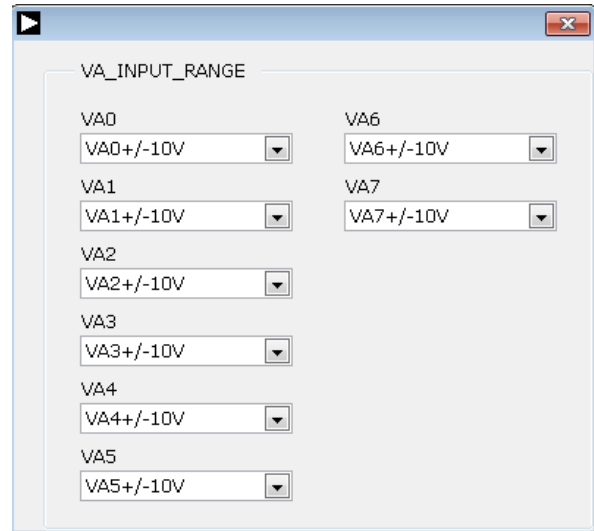

Figure 15. Input Range Window

Multiplexer Configuration

The **Multiplexer Configuration** button, Label 7 in Figure 21, allows the user to select the next channel for conversion when the sequencer is not in use. Clicking the button opens the **INPUT_MUX** window, prompting the user to configure the channel pair on which the conversion performs, shown in Figure 16.
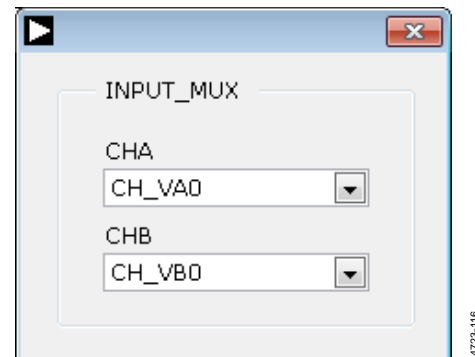

Figure 16. Multiplexer Configuration in Manual Mode

Sequencer Control

The **Flexible Sequencer** button, Label 8 in Figure 21, enables the sequencer and burst modes on the AD7616 or AD7616-P. The user can program the 32-layer sequencer stack registers via the **Register Map** tab, shown in Figure 25. Any combination of ADC A/ADC B channel pairs can be configured in the sequencer stack. It is not possible to configure two ADC A channels or two ADC B channels in a single layer. Refer to the AD7616 or the AD7616-P data sheet for a detailed explanation of the sequencer. Clicking the **Flexible Sequencer** button opens the **SEQUENCER_ALL** window, shown in Figure 17.
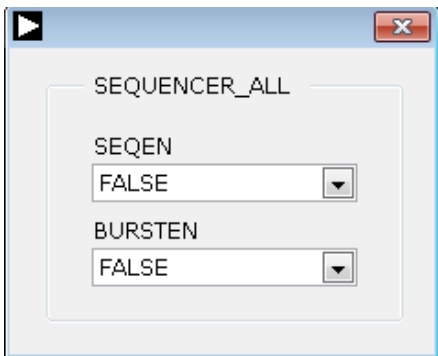
*Figure 17. **SEQUENCER_ALL** Window*

Additionally, the software continuously monitors the channels programmed to the sequencer stack for nonperiodic channels within the sequence. If it detects a sequence with nonperiodic channels, a warning message appears, alerting the user (see Figure 18). It is possible to perform fast Fourier transform (FFT) analysis on periodically sampled data only; if a nonperiodic sequence is detected, the associated FFT for that channel disables. The user can still sample and plot the waveform data for the nonperiodic sequence after acknowledging the warning message.
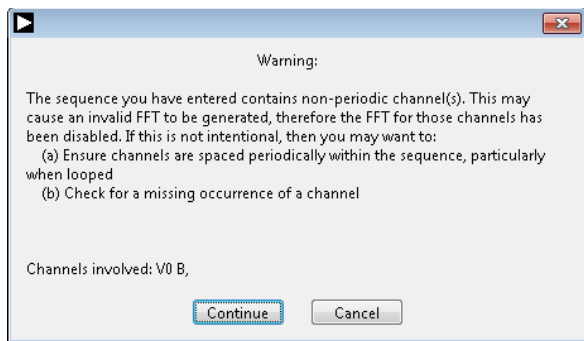
Figure 18. Nonperiodic Sequence Warning

Oversampling

The **Oversampling** button, Label 9 in Figure 21, allows the user to select the oversampling ratio of the on-board digital filter. Clicking the button opens the **OSR** window, shown in Figure 19.
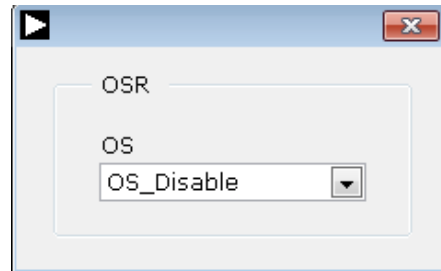
*Figure 19. **OSR** Window*

ADC Configuration

The **ADC Configuration** button, Label 10 in Figure 21, allows the user to view/control the self detect error flag, the status register output, and the CRC of the AD7616 or AD7616-P. Refer to the AD7616 or AD7616-P data sheet for a detailed explanation of these register items. Clicking the **ADC Configuration** button opens the **ADC_CONFIG** window, shown in Figure 20.
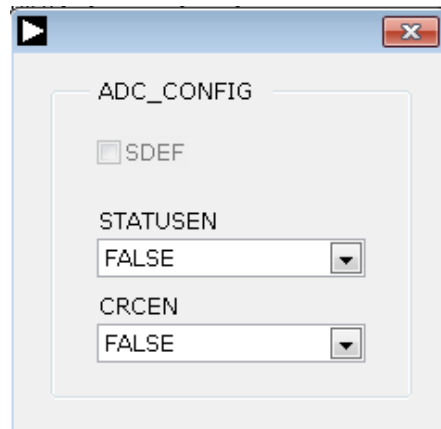
*Figure 20. **ADC_CONFIG** Window*
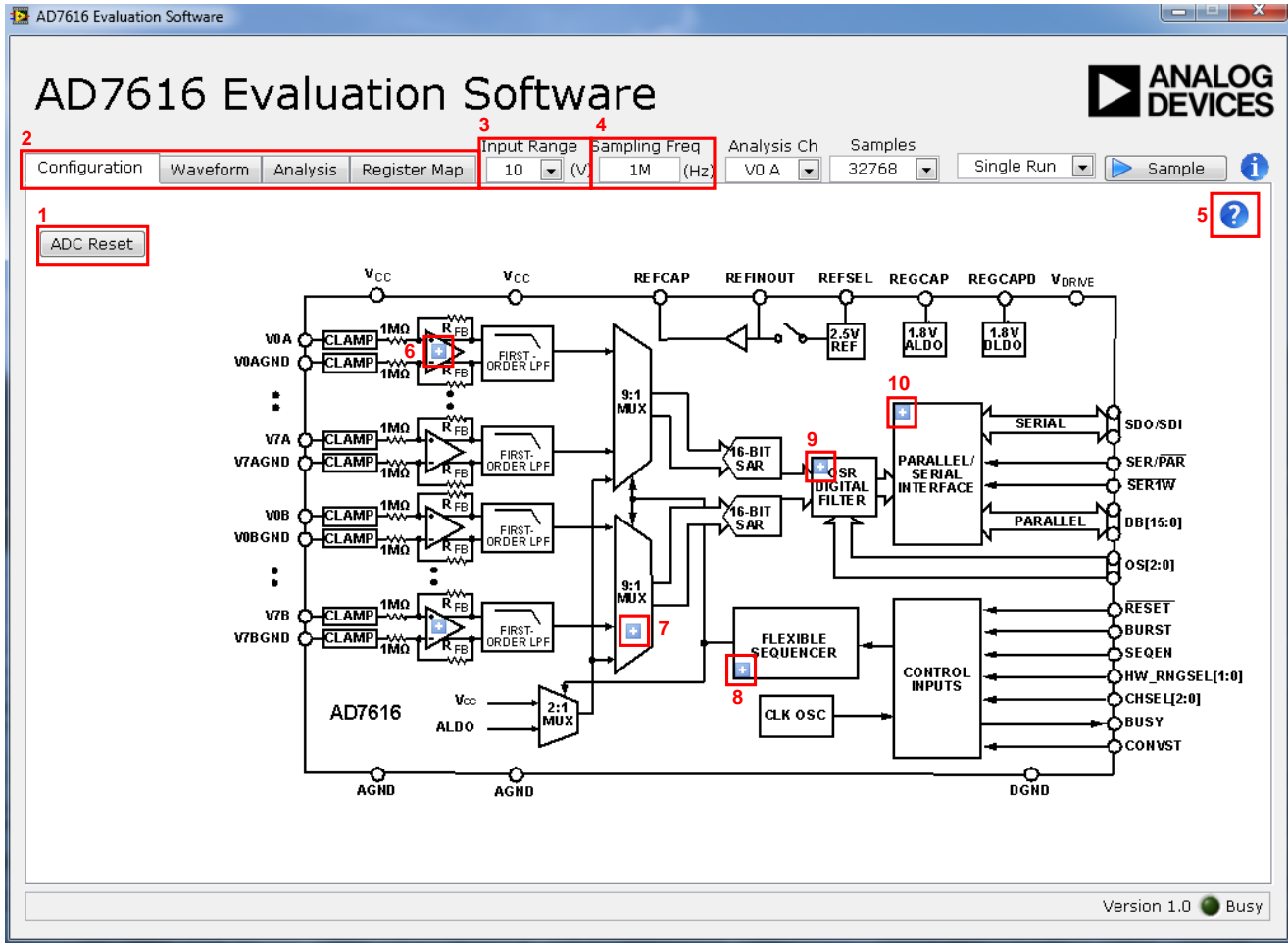
Figure 21. **AD7616 Evaluation Software** *Main Window*
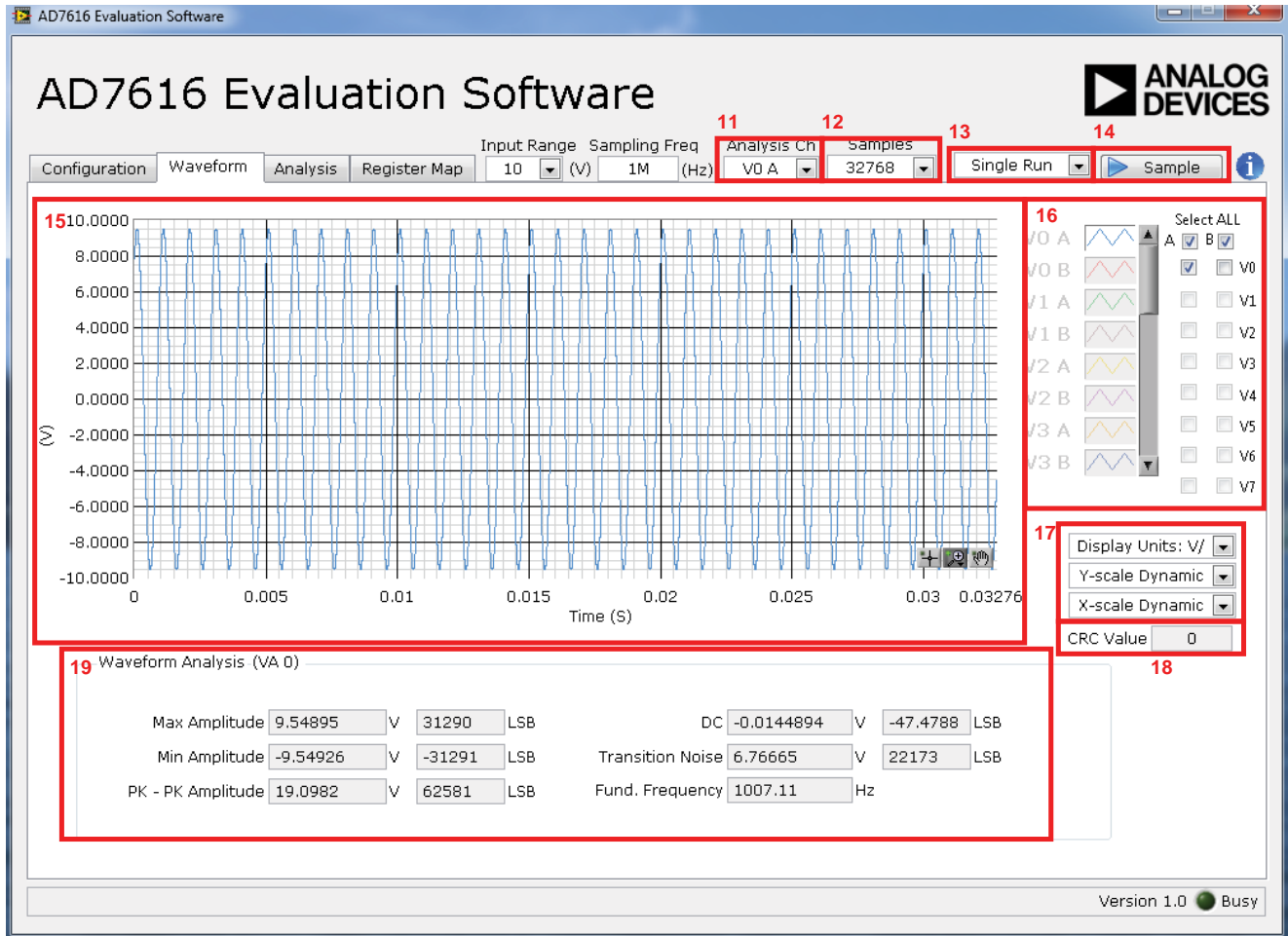
*Figure 22. **Waveform** Tab*

WAVEFORM ANALYSIS

Figure 22 illustrates the **Waveform** tab used for waveform capture.

Analysis Channel

The **Analysis Ch** dropdown menu, Label 11 in Figure 22, selects a channel on which to perform a waveform analysis. The results display in the waveform analysis pane, Label 15 in Figure 22, and in the **Analysis** tab.

Samples

The **Samples** dropdown menu, Label 12 in Figure 22, selects the number of samples to acquire per ADC acquisition.

Batch

The **Batch** dropdown menu, Label 13 in Figure 22, dictates whether a single batch of samples is gathered, defined by the **Samples** dropdown menu, or whether samples are gathered continuously until the user manually stops acquisition.

Sample

The **Sample** button, Label 14 in Figure 22, initiates a single or continuous acquisition depending on the option selected in the **Batch** dropdown menu.

Waveform Graph

The data waveform displayed in the data waveform graph, Label 15 in Figure 22, shows each successive sample of the ADC output. The user can zoom and pan the waveform using the embedded waveform tools. The user can change the scales on the axes by typing values into the x-axis and y-axis.

Channel Selection

The checkboxes listed under Label 16 in Figure 22 allow the user to choose which channels to display on the data waveform graph. These controls affect the display of the channels on the graph only and do not have any effect on the channel settings in the ADC register map.

Display Units and Axis Controls

Label 17 in Figure 22 contains controls to format the waveform graph. Click the **Display Units** dropdown menu to select whether the data graph displays in units of volts or codes. This affects both the waveform graph and the histogram graph in the **Analysis** tab. The axis controls can be switched between dynamic and fixed.

When selecting either **Y-scale Dynamic** or **X-scale Dynamic**, the corresponding axis width automatically adjusts to show the entire range of the ADC results after each batch of samples. When selecting either **Y-scale Fixed** or **X-scale Fixed**, the user can control the corresponding axis ranges; the ranges do not adjust after each sample batch.

CRC Value

When CRC is enabled in the Status register, the CRC result is calculated in the software for the received data and compared with the CRC result appended to the conversion results. Errors detected are shown in Label 18 in Figure 22.

Waveform Analysis (VA 0)

The **Waveform Analysis (VA 0)** pane, Label 19 in Figure 22, displays amplitude, frequency, and noise analysis data for the selected analysis channel.
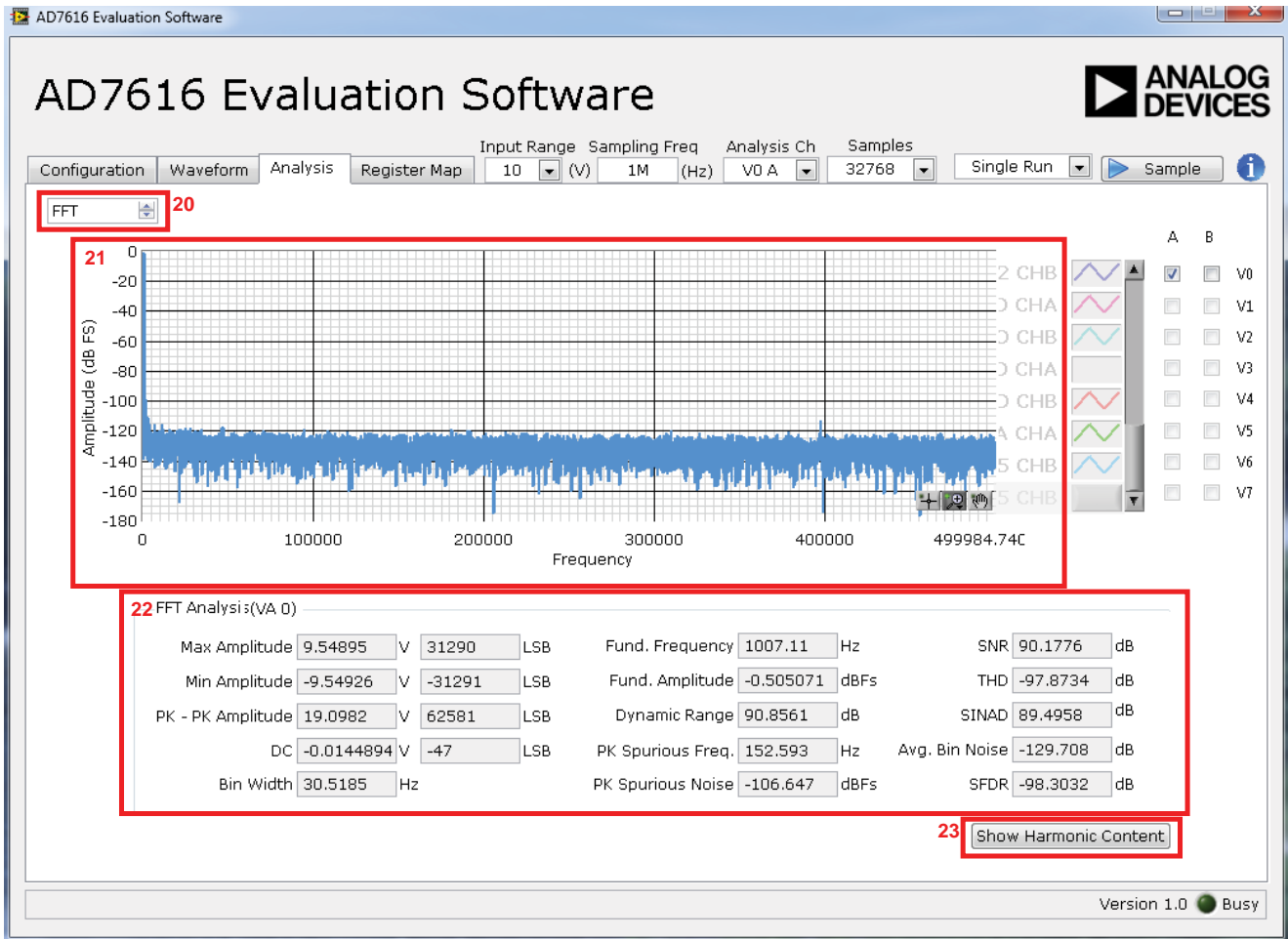
*Figure 23. **Analysis** Tab for FFT Analysis*

ANALYSIS TAB

Figure 23 shows the **Analysis** tab displaying FFT and histogram information for the last batch of samples gathered.

FFT/Histogram Selection

The **FFT/Histogram Selection** spin box, Label 20 in Figure 23, allows the user to display FFT or histogram analysis in the **Analysis** tab.

The waveform graph and **FFT Analysis (VA 0)** data (Label 21 and Label 22, respectively) change display according to the option selected in the **FFT/Histogram Selection** spin box.

Harmonic Content

The **Show Harmonic Content** button, Label 23 in Figure 23, displays the harmonic content of the sampled signal when viewing the FFT analysis.
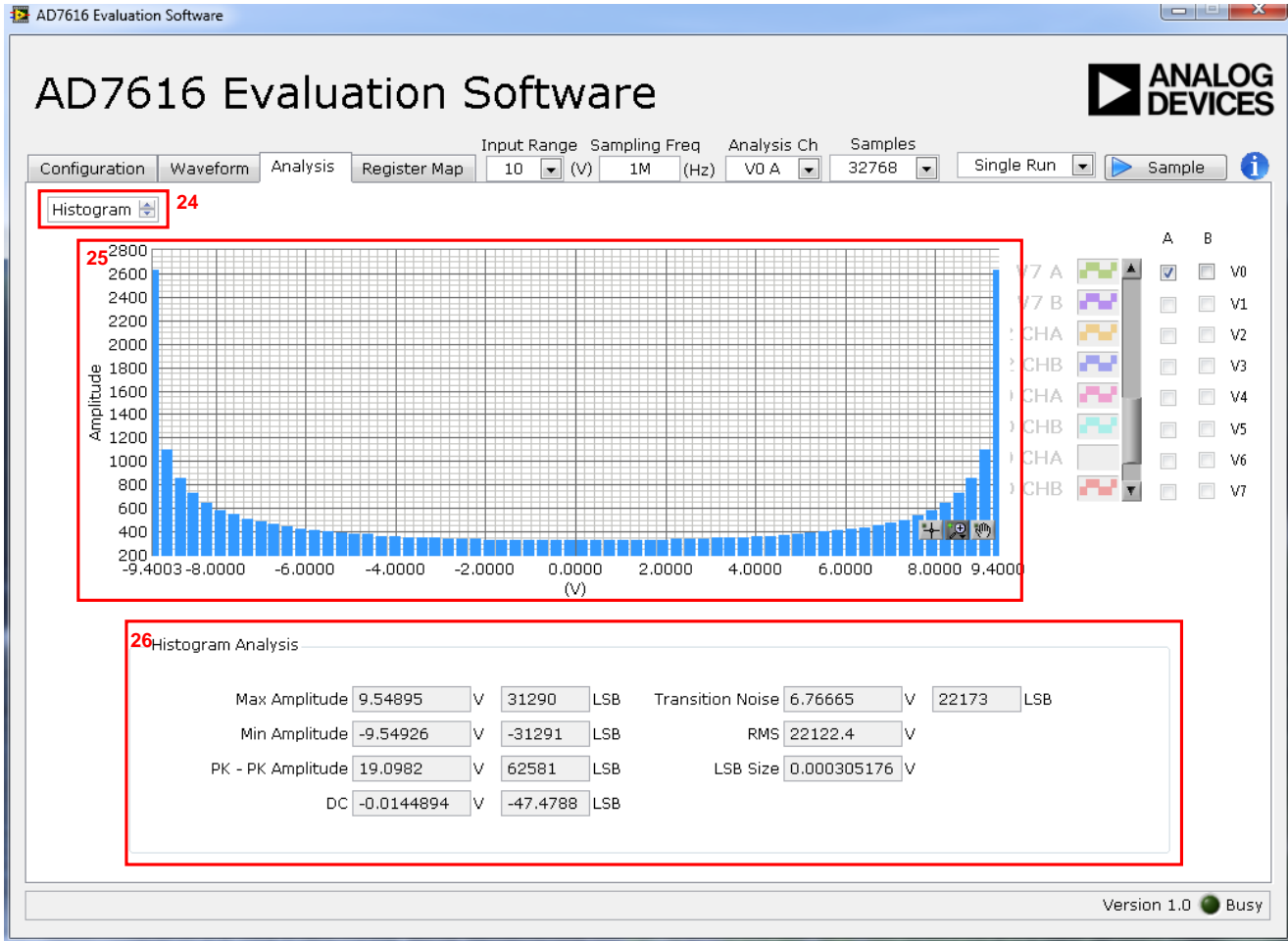
Figure 24. Analysis Tab for Histogram

Histogram Graph

The histogram graph is displayed in Label 25, Figure 24. This graph displays the number of hits per code within the sampled data. Useful for dc analysis, the histogram indicates noise performance of the device.

Histogram Analysis

The **Histogram Analysis** pane, Label 26 in Figure 24, changes display according to the option selected in the **FFT/Histogram Selection** spin box. It provides information related to the dc performance of the AD7616 or AD7616-P.
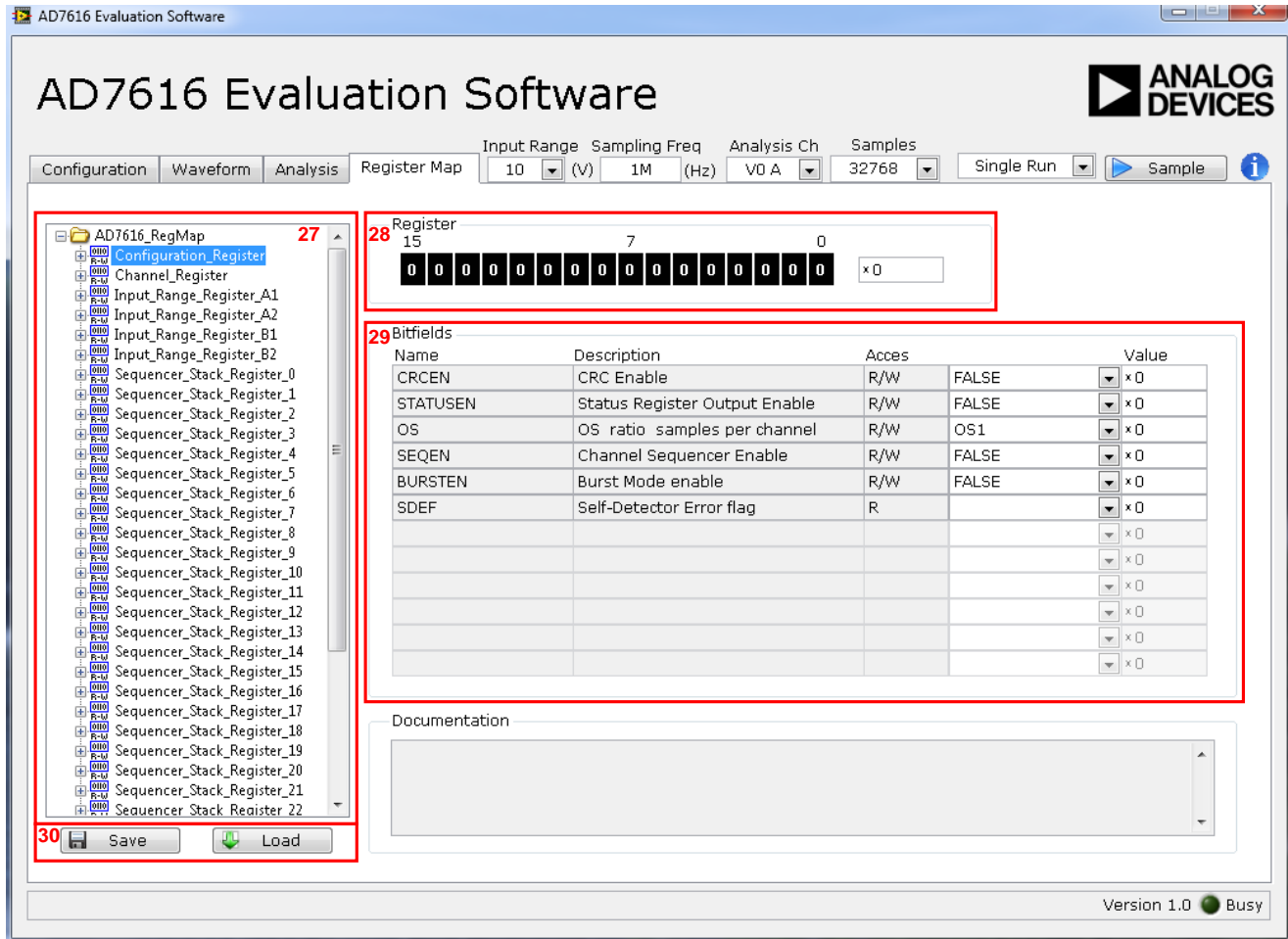
Figure 25. *Register Map Tab*

REGISTER MAP TAB

Register Tree

The register tree, Label 27 in Figure 25, displays the full register map in a hierarchical tree view. Each register is shown as a branch. Click the expand button next to each register to show the bit fields contained within the corresponding register.

Register Control

The **Register** pane, Label 28 in Figure 25, allows the user to change an individual bit of the register, selected from the register tree, by either clicking the relevant bit or typing the register value into the numeric field.

Bitfields

The **Bitfields** pane, Label 29 in Figure 25, shows the bit fields within a selected register. The values can be changed using the **Value** dropdown menu or directly entering a value in the numeric field.

Save and Load

The **Save** button, Label 30 in Figure 25, allows the user to save the current register map setting to a file. The **Load** button allows the user to load a setting from a previously saved file.

EXITING THE SOFTWARE

To exit the software, click the **Close** button of any window, or press Esc on the computer keyboard.

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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