ADS42LBx9EVM

The ADS42LB49 and ADS42LB69 are dual-channel, 250-MSPS, analog-to-digital converters that are 14-bit and 16-bit resolutions, respectively. The ADS42LB49EVM and ADS42LB69EVM (ADS42LBx9EVM) are specifically suited for interfacing with TI's TSW1400EVM to capture and display waveforms from the ADC. The EVM schematic, BOM, and layout files are found in the design package in the ADS42LB69EVM product folder on www.ti.com.

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1 Introduction

1.1 Overview

The ADS42LB49EVM and ADS42LB69EVM (ADS42LBx9EVM) are evaluation modules (EVMs) that allow for the evaluation of TI's ADS42LB49 and ADS42LB69. The ADS42LB49 and ADS42LB69 (ADS42LBx9) are dual-channel, low-power, 250-MSPS analog-to-digital converters (ADC) with 14-bit and 16-bit resolutions, respectively and buffered analog inputs and LVDS outputs. The EVM has transformer coupled analog and clock inputs to accommodate a wide range of signal sources and frequencies. The ADS42LBx9 is programmable through an easy-to-use software GUI enabling quick configuration for a variety of uses.

The ADS42LBx9EVM is designed to mate with the TSW1400EVM which is a full-function data-capture card. The High Speed Data Converter Pro (HSDCPro) software GUI can then process the data from the TSW1400EVM to quickly assess the performance of the ADS42LBx9. It is also compatible with Altera and Xilinx FPGA development platforms which have FMC or HSMC connectors, via the appropriate interposer card.

1.2 Block Diagram

The block diagram for the ADS42LBx9EVM is shown in Figure 1. The various inputs, outputs, and jumpers of the ADS42LBx9EVM are described in Table 1.

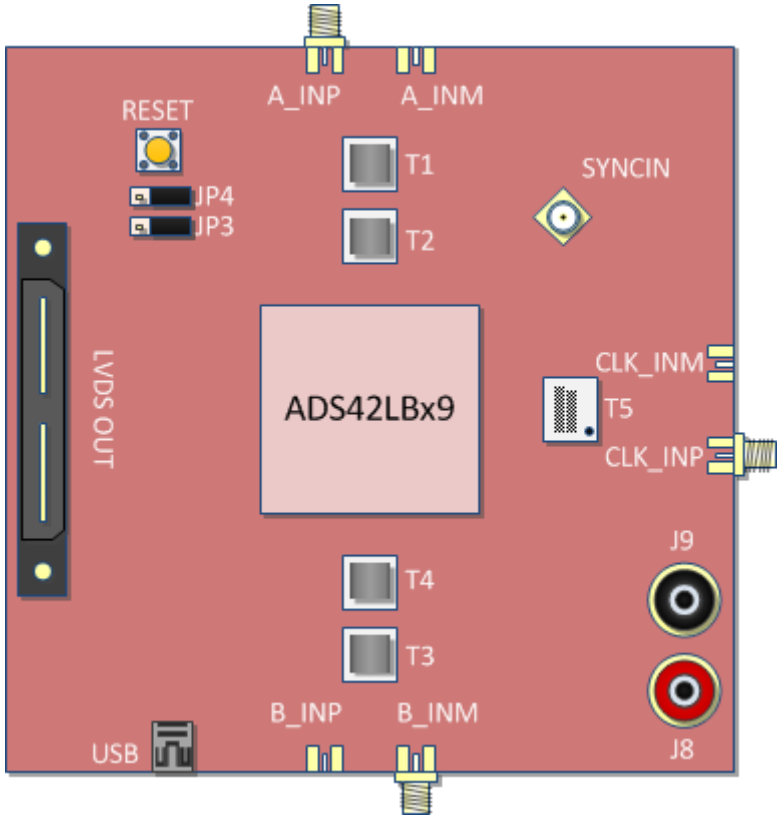

Figure 1. Block Diagram of the ADS42LBx9EVM

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Table 1. Input and Output Connectors and Jumper Descriptions of the ADS42LBx9EVM

Component	Description
A_INP	Single-ended analog input for channel A
B_INM	Single-ended analog input for channel B
CLK_INM	Single-ended ADC clock input
J8	Positive power connection (3.3 V)
J9	Negative power connection (GND)
USB	USB connection
LVDS OUT	LVDS connector to connect to the TSW1400
SYNCIN	ADC sync input
RESET	Switch to reset the ADC using the RESET pin
JP4	ADC CNTRL1 pin, controls power down modes (default: short 2-3)
JP3	ADC CNTRL2 pin, controls power down modes (default: short 2-3)

2 Software Control

This section provides installation instructions for the ADS42LBx9 GUI and descriptions of the various controls.

2.1 Installation Instructions

1. The software can be downloaded from the ADS42LB69EVM product page on www.ti.com. Find the page by searching for *ADS42LB69EVM*.
2. Extract the files from the zip file named *ADS42LBx9 GUI vXpY installer.zip* where XpY represents the version number.
3. Run *setup.exe* and follow the installation prompts.
4. Start the GUI by going to **Start Menu → All Programs → Texas Instruments ADCs → ADS42LBx9 GUI**.
5. When plugging the board into the computer for the first time through the USB cable, you are prompted to install the USB drivers:
   - Microsoft® Windows® XP: If Windows XP does not automatically install the drivers, follow the prompts on the screen to do so. Do not let Windows XP search Microsoft Update for the drivers, but do let Windows XP install the drivers automatically.
   - Windows 7: After installing the GUI, Windows 7 should automatically be able to install the drivers for the ADS42LBx9EVM with no user input.

2.2 Software Operation

The software GUI allows full programming control of the ADS42LBx9 device. Figure 2 shows the GUI front panel which contains a block diagram of the ADS42LBx9. Detailed descriptions for each screen of the GUI are given in this section. Please refer to the ADS42LBx9 datasheet (SLAS904) for more detailed explanations of the register fields.

2.2.1 Block Diagram Tab

Figure 2 shows the top-level view of the GUI which contains the block diagram of the ADS42LBx9. Along the top of the GUI is an indicator which informs of the USB connection status and a button to re-establish the connection with the ADS42LBx9 EVM. Having the USB link disconnected or having the drivers of the EVM not installed will turn this indicator off.

On the bottom side of the GUI a status bar reports the current application state. Double clicking on the left field of the status bar displays the complete status log of the application in a separated window.

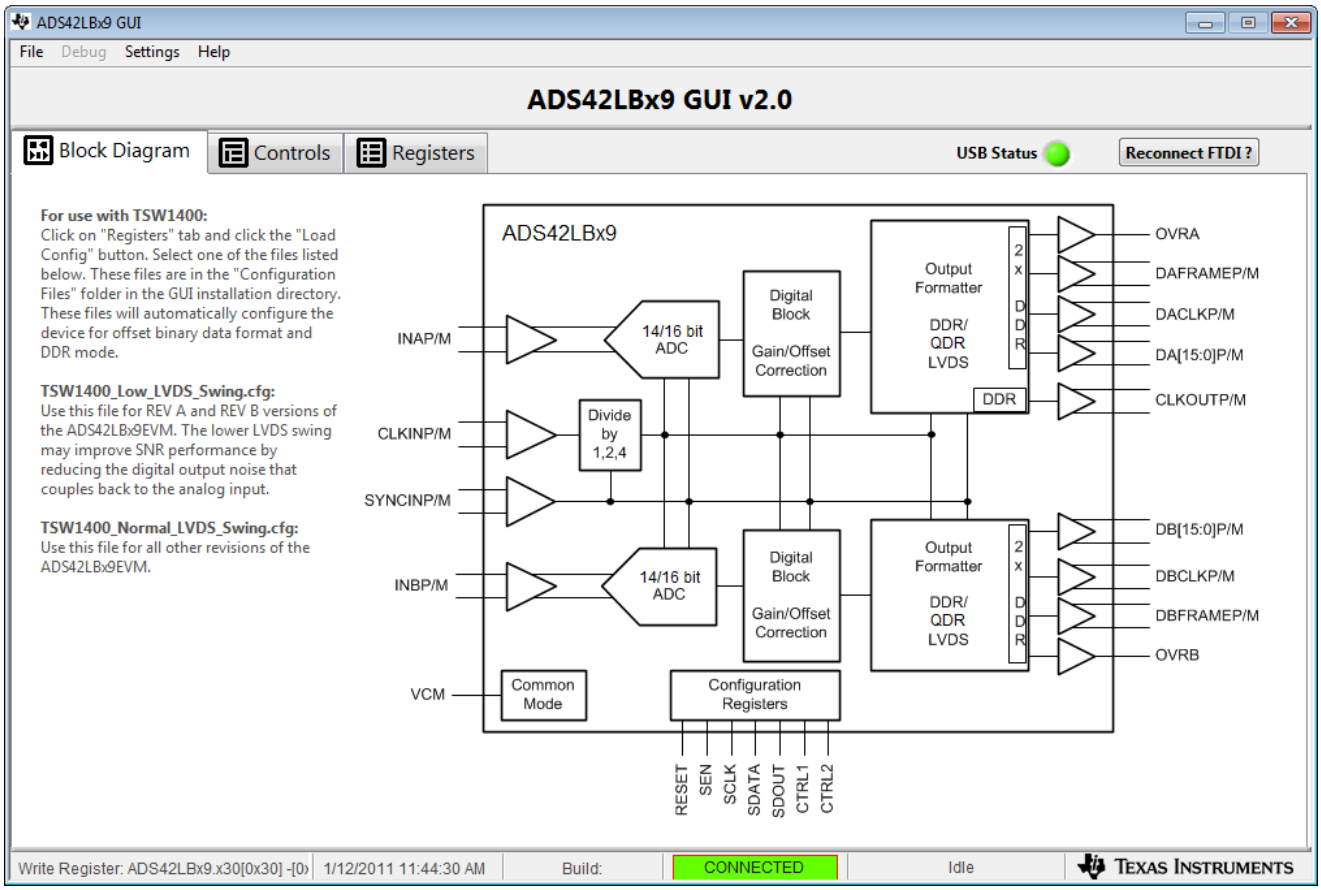

Figure 2. Block Diagram Windows of the ADS42LBx9 GUI v2.0

2.2.2 Controls Tab

The *Controls* tab of the ADS42LBx9 GUI enables quick configuration of key parameters of the data converter. For more configuration options, refer to Section 2.2.3.

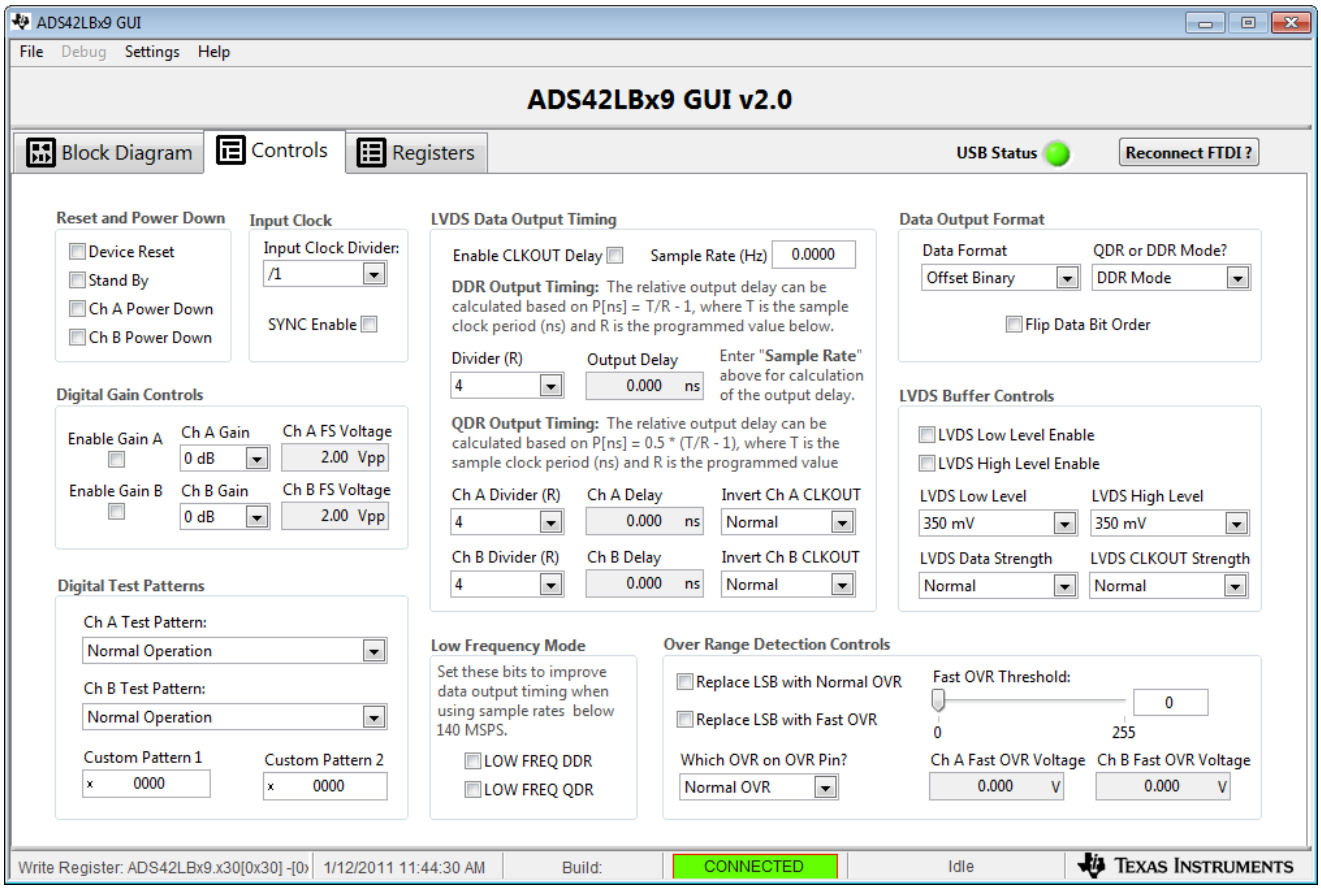

Figure 3. Controls Tab of the ADS42LBx9 GUI v2.0

2.2.3 Registers Tab

The *Registers* tab is used to access the ADC registers as well as loading or saving a configuration. Figure 4 shows a screenshot of the *Registers* tab.

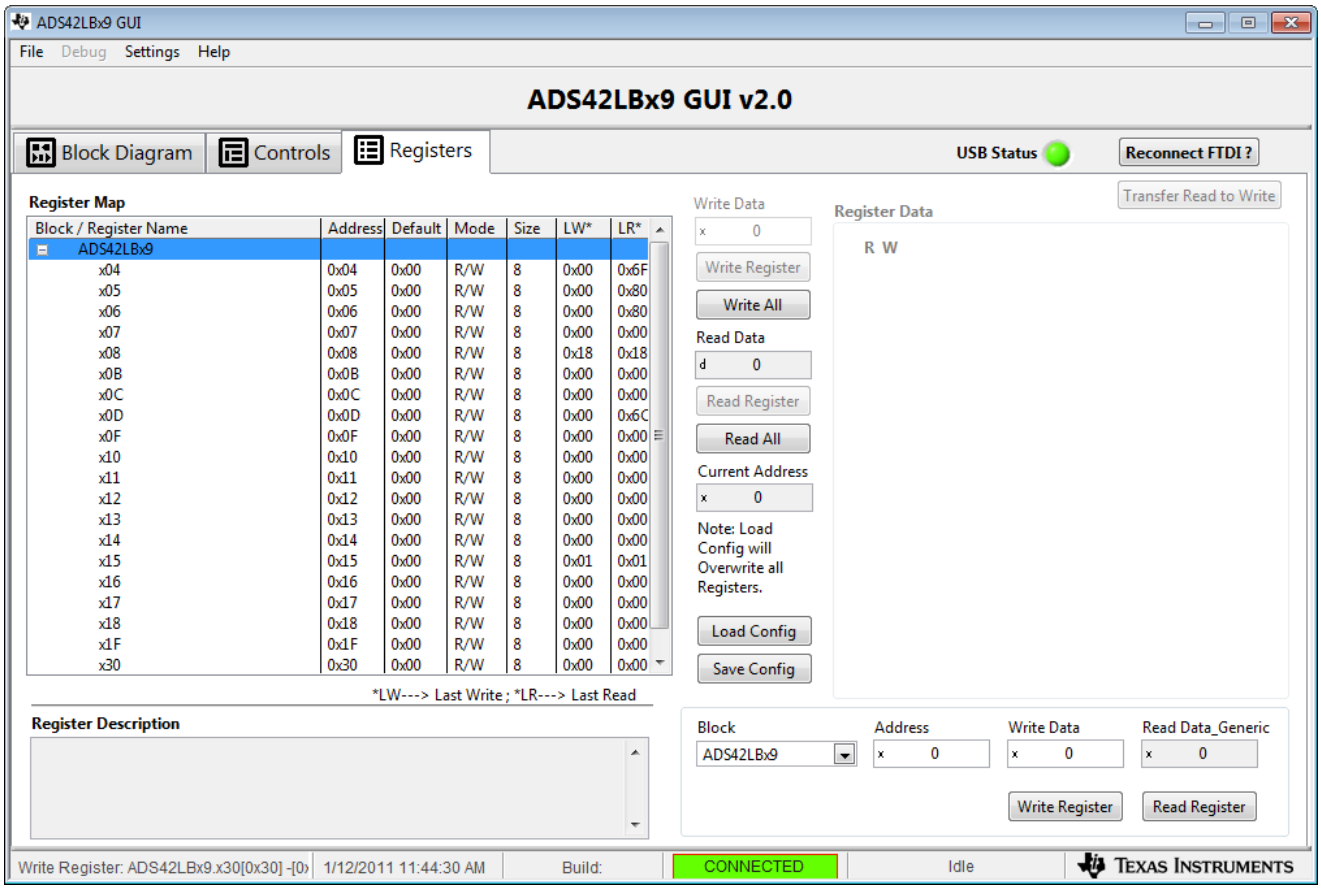

Figure 4. Registers Tab of the ADS42LBx9 GUI v2.0

3 Basic Test Setup

This section outlines basic testing of the ADS42LBx9EVM.

3.1 Test Block Diagram

The test setup for the ADS42LBx9EVM is shown in Figure 5. The TSW1400EVM is used to capture data from the ADS42LBx9, which is then transferred to the computer for analysis in the HSDCPro software tool. The analog signal source shown is an HP8644B signal generator, however any analog signal source can be used. The clock source is also an HP8644B, but other clock sources can be used, such as a TI clock-chip EVM. Note that there are filters on both the analog and clock sources, which is necessary to achieve the best performance.

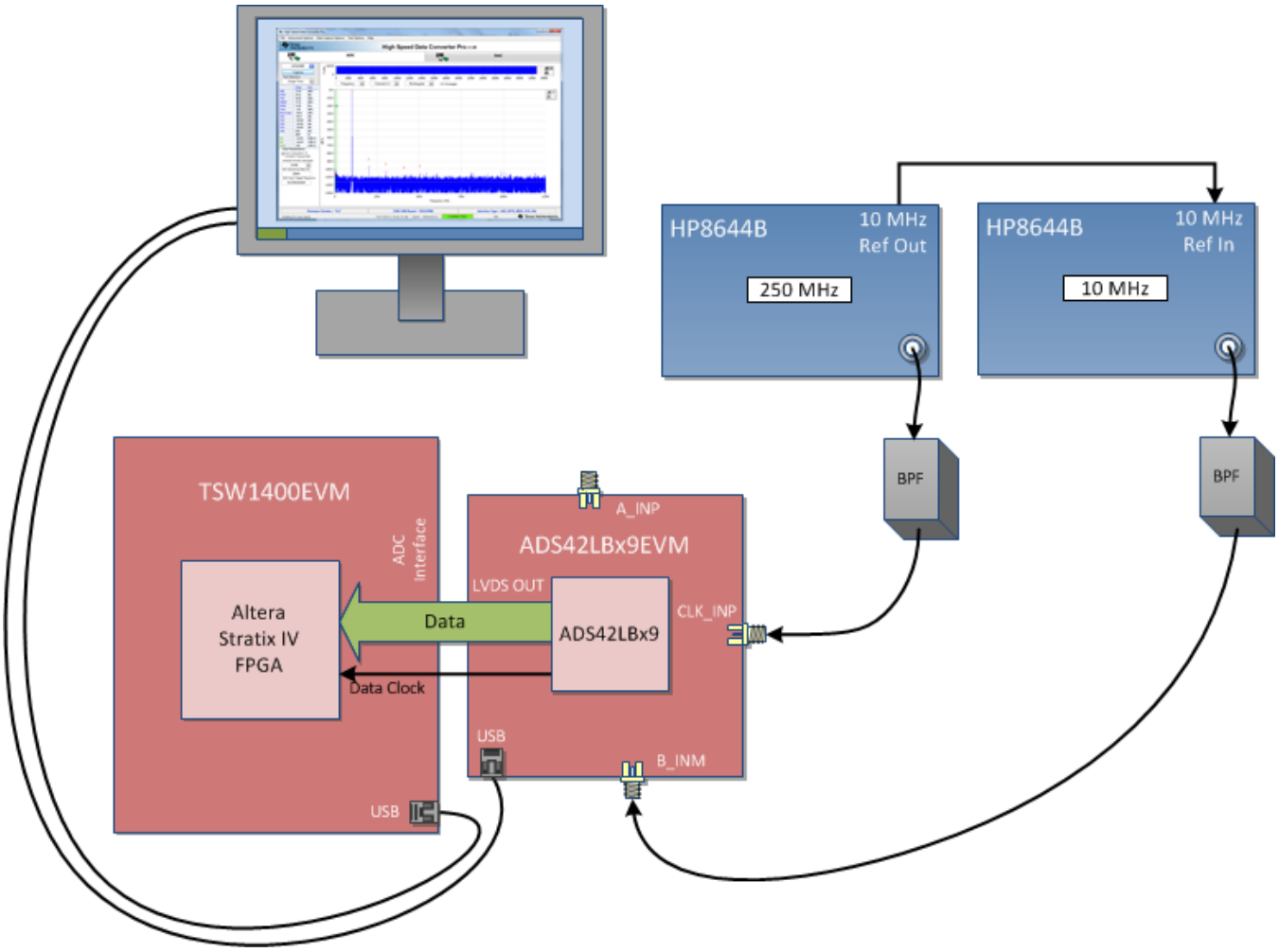

Figure 5. Quick Start Test Setup for the ADS42LBx9EVM

3.2 TSW1400EVM Setup

See the TSW1400EVM User's Guide (SLWU079) for a more detailed explanation of the TSW1400 setup and its features. This document assumes that the HSDCPro software and the TSW1400 pattern capture and generation board are both installed and functioning properly. This information can be found at http://www.ti.com/tool/tsw1400evm

http://www.ti.com/tool/tsw1400evm.

3.3 ADS42LBx9EVM Quick-Start Procedure

3.3.1 TSW1400 Data Capture Card

1. Connect a 5-V power supply to connector *J12* of the TSW1400EVM.
2. Flip switch *SW7* to the *ON* position.
3. Insert a USB cable into the USB port on the TSW1400. Connect the other end to the PC.

3.3.2 ADS42LBx9EVM

1. Connect a 3.3-V power supply to the banana jacks, *J8* and *J9*. Connect the positive end to *J8* and the negative end to *J9*.
2. Connect a USB cable to the USB port on the ADS42LBx9EVM and connect the other end to the PC.
3. Connect a clock to the SMA connector labeled *CLK_INM*. The maximum clock frequency is 250 MHz and the clock should be around 1 Vpp. A smaller voltage may reduce the SNR performance. A bandpass filter should be placed on the clock in order to achieve the best SNR performance.
4. Connect a signal source to either analog input SMA connector, *A_INP* or *B_INM*. For single-tone testing, a bandpass filter should be used to achieve the best SNR and harmonic performance.
5. Connect the ADS42LBx9EVM to the TSW1400 by connecting *J7* on the ADS42LBx9EVM to the ADC Interface connector on the bottom of the TSW1400.
6. Press the *RESET* switch, *SW1* on the ADS42LBx9EVM.

3.3.3 ADS42LBx9 GUI

1. Start the ADS42LBx9 GUI by selecting **Start Menu → Program Files → Texas Instruments ADCs → ADS42LBx9 GUI**.
2. Verify that the board is properly connected by looking at the *USB Status* indicator on the top right corner of the GUI. If the indicator is not green then click *Reconnect FTDI ?* until the connection with the board is established.
3. Follow the instructions displayed on the *Block Diagram* to program the ADC.

3.3.4 High Speed Data Converter Pro (HSDCPro)

1. Start the HSDCPro software tool by selecting **Start Menu → All Programs → Texas Instruments ADCs → High Speed Data Converter Pro**.
2. When prompted for the serial number of the board, select the serial number that represents the TSW1400 that has been connected to the ADS42LBx9. This number is on a sticker on the TSW1400 board.
3. Click the *ADC* tab to display the ADC working environment.
4. In the *Select ADC* drop-down box select either *ADS42LB49* or *ADS42LB69*, depending on which EVM is being used. If it asks to download the firmware, select *Yes*. Multiple LEDs light up on the TSW1400, once the firmware has finished downloading.
5. Select *Single Tone* from the *Test Selection* drop-down menu.
6. At the bottom-left corner, enter *250M* in the *ADC Output Data Rate* box, or another value if a clock other than 250 MHz is used. Enter the input frequency into the *ADC Input Target Frequency* box. Press the Enter key.
7. If a windowing function is desired, then *Blackman* should be selected above the plot window. If the signals are synchronized and coherent, select *Rectangular*.
8. All boards and software are now setup. Click the *Capture* button. A sample capture is shown in Figure 6 for the ADS42LB69 with a 250-MHz clock and 10-MHz input frequency.

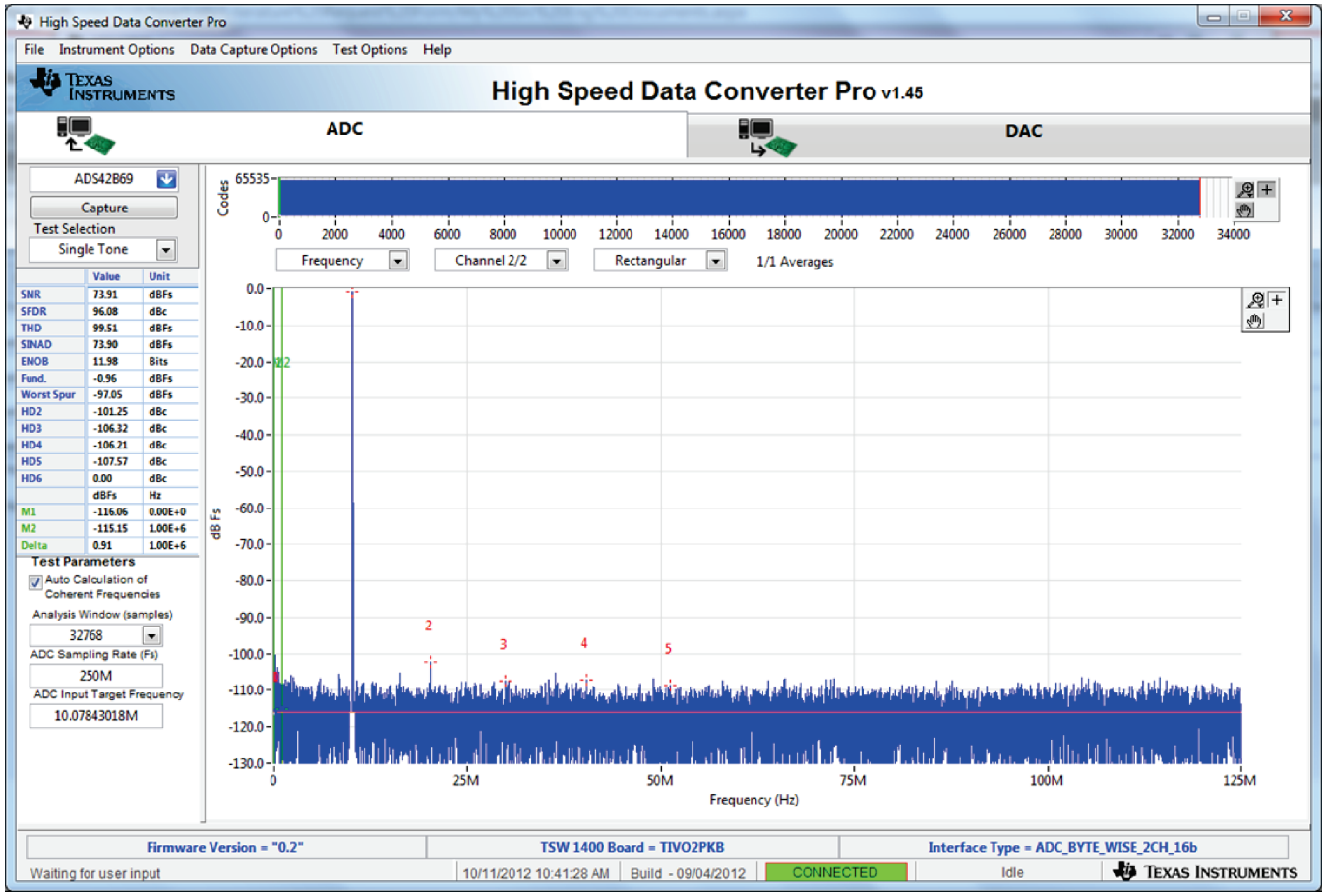

Figure 6. ADS42LB69 Sample Capture using the TSW1400

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- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

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