User's Guide

ADC354xEVM Evaluation Module

ABSTRACT

This user's guide describes the characteristics, operation, and use of the ADC354x evaluation module (EVM). This user's guide discusses how to set up and configure the software and hardware, and reviews various aspects of the program operation. Throughout this document, the terms evaluation board, evaluation module, and EVM are synonymous with the ADC354xEVM. In the following sections of this document, the ADC354x evaluation board is referred to as the EVM and the ADC354x device is referred to as the ADC device.

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Trademarks

1 Introduction

The ADC354xEVM is an evaluation board used to evaluate the ADC354x analog-to-digital converter (ADC) from Texas Instruments. The ADC354xEVM is a single-channel, 14-bit ADC that can operate up to 10, 25, 65, or 125 Mega-samples per second (MSPS) for the ADC3541, ADC3542, ADC3543, and ADC3544 respectively. The output data is transmitted over 1.8-V CMOS logic.

- Transformer and FDA coupled analog inputs
- Transformer coupled or singled ended clock inputs
- INA226 current shunt monitors for evaluating power consumption
- FMC connector to easily interface with popular FPGA evaluation boards
- Device register programming through USB connector and FTDI USB-to-SPI translator

The TSW1400EVM captures the CMOS output data, and uploads to a connected PV through a USB interface for analysis. The High-Speed Data Converter Pro (HSDC Pro) software on the PC communicates with the hardware and processes the data.

2 Equipment

This section describes how to setup the EVM on the bench with the proper equipment to evaluate the full performance of the ADC device.

2.1 Evaluation Board Feature Identification Summary

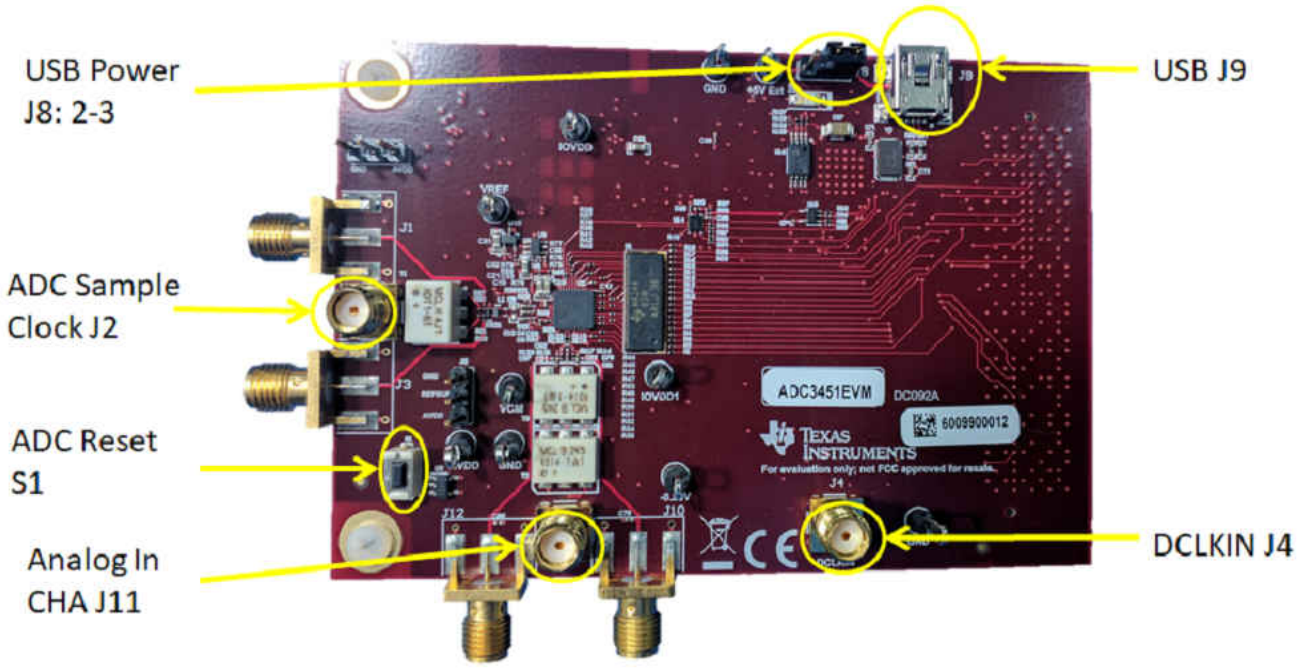

Figure 2-1. ADC354xEVM Feature Identification

Ensure that jumper J8 is shunted in the 2-3 position. This allows 5 V to be supplied to the ADC354xEVM through the mini-USB connector.

If an external 5-V supply is desired, J8 must be shunted in the 1-2 position, and the external 5 V can be connected to the test point labeled "+5 EXT".

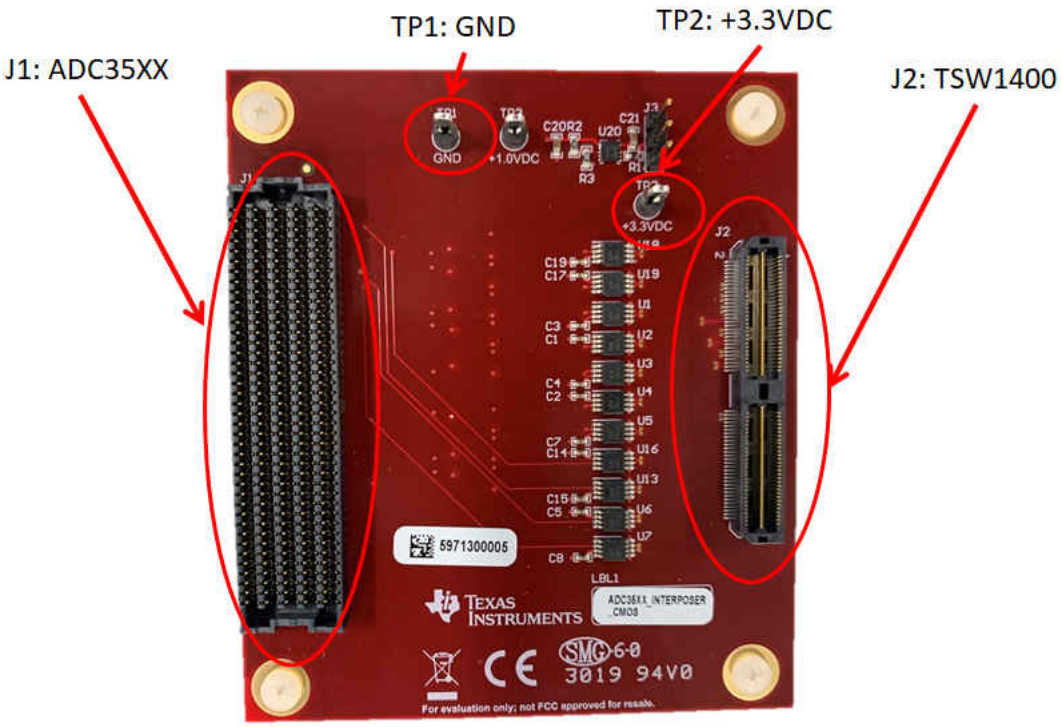

Figure 2-2. CMOS FPGA Interposer

2.2 Required Equipment

The following equipment is included in the EVM evaluation kit:

- Evaluation board (EVM)
- CMOS FPGA Interposer Card
- Power supply clips for Interposer Card
- Mini-USB cable

The following equipment is **not** included in the EVM evaluation kit, but is required for evaluation of this EVM:

- TSW1400EVM data capture board and related items
- HSDC Pro software
- PC running Microsoft® Windows® 7, or 10
- Two low-noise signal generators for the sampling clock and analog input. TI recommends the following generators:
  - Rohde & Schwarz SMA100A
  - Rohde & Schwarz SMA100B
- Bandpass filter for the analog input signal. The following recommended bandpass filter will have:
  - Bandpass filter, greater than or equal to 60-dB harmonic attenuation, less than or equal to 5% bandwidth, greater than 18-dBm power, less than 5-dB insertion loss
- Signal-path cables, SMA

3 Setup Procedure

3.1 Install High-Speed Data Converter (HSDC) Pro Software

Download the most recent version of the HSDC Pro software. Follow the installation instructions to install the software.

Download and install the HSDC Pro Patch. This patch copies all the INI files required to the HSDC pro directory.

3.2 Install the Configuration GUI Software

Download the Configuration GUI software from the EVM tool folder at ADC354xEVM.

Extract and run the executable file, and follow the instructions.

3.3 Connect the ADC EVM and TSW1400EVM

Connect the ADC354xEVM FMC connector to J1 of the FPGA Interposer Card.

Connect J2 of the FPGA Interposer Card to J1 of the TSW1400EVM.

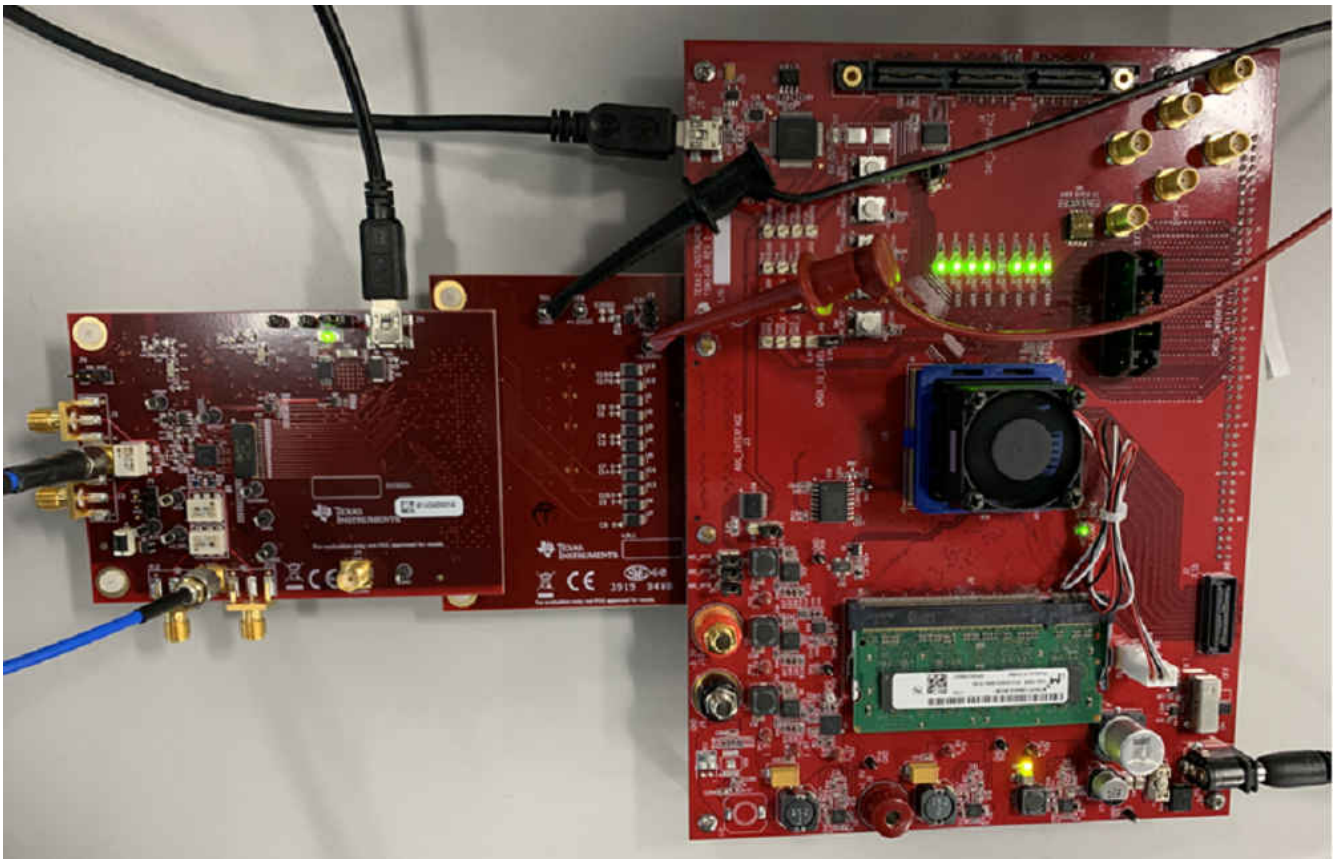

Figure 3-1. ADC354xEVM Full Setup

3.4 Connect the Power Supply and Mini-USB Connections

Use the following steps to connect the power supply and mini-USB connections:

1. Connect 3.3 VDC to TP2 of the FPGA Interposer card. Provide power supply ground to TP1, as required. J10 of the TSW1400EVM can be used to source this +3.3 VDC.
2. Connect the power cable to the TSW1400EVM at 5-V (minimum 3 A) power supply. Place the power switch (SW7) to the "On" position.
3. Connect the mini-USB cable to the TSW1400EVM (J2).
4. Connect the mini-USB cable to the ADC354xEVM (J19).

3.5 Connect Signal Generators to ADC354xEVM

Connect a signal generator to the clock input at J2. Set the frequency to 10 MHz, and amplitude to +10 dBm. By default, the clock signal is converted from single-ended to differential by transformer T1.

Connect a signal generator to the analog input at J11. A 2.2-MHz sine wave input at +15 dBm is used in this example. Use a bandpass filter for best results. By default, back-to-back baluns are used to convert the single-ended input to differential.

3.6 Configure HSDC Pro and Capture Data

Use the following steps to configure the HSDC Pro and Capture Data

1. Open the HSDC Pro Software
2. Click the *OK* button to confirm the serial number of the TSW1400EVM

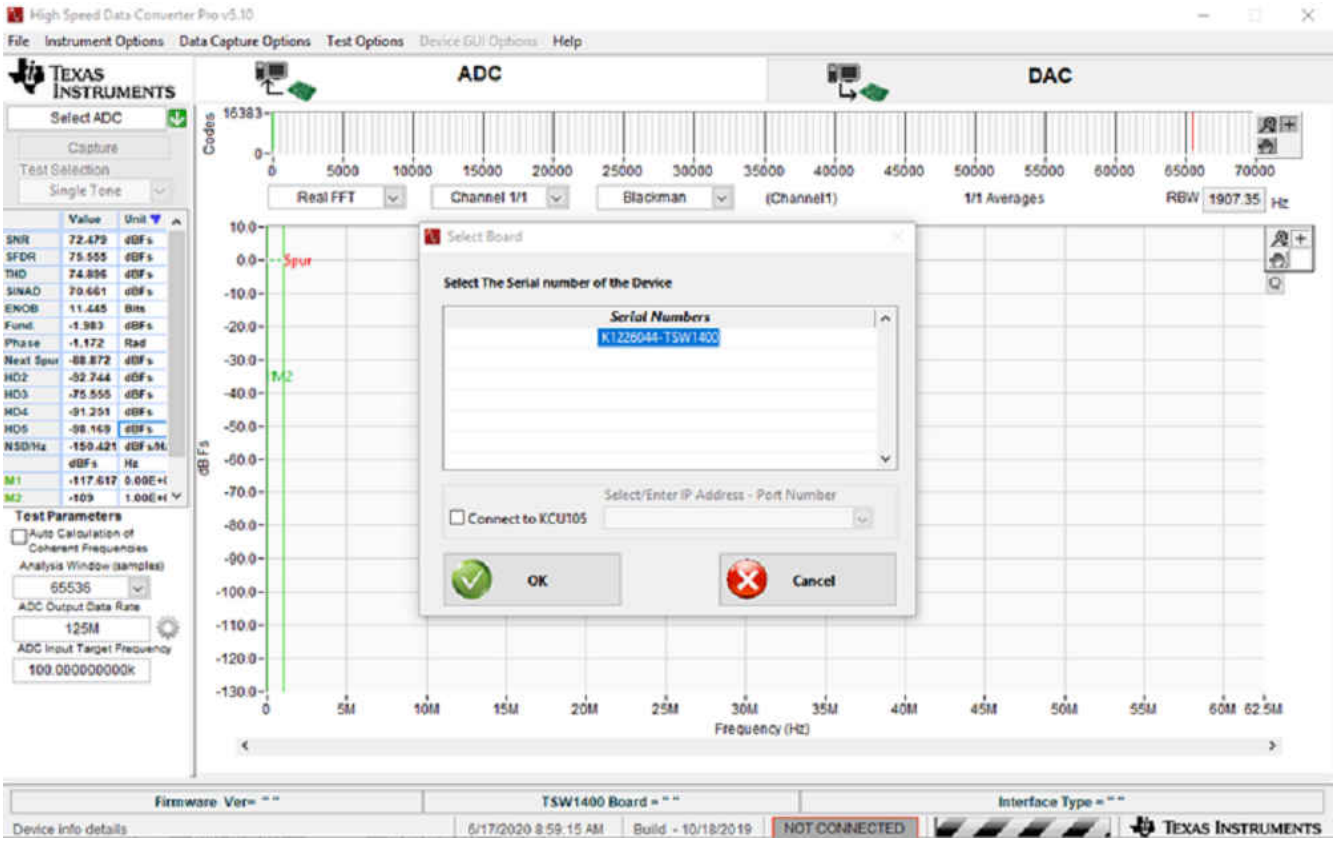

Figure 3-2. HSDC Pro: TSW1400EVM Acknowledgment

3. Select *ADC3543_14W_14bit_SDR* from the ADC select drop-down in the top left corner
4. When prompted, click the *Yes* button to update the firmware
5. Enter “10M” in *ADC Output Data Rate*

6. Click the *Capture* button to initiate data capture

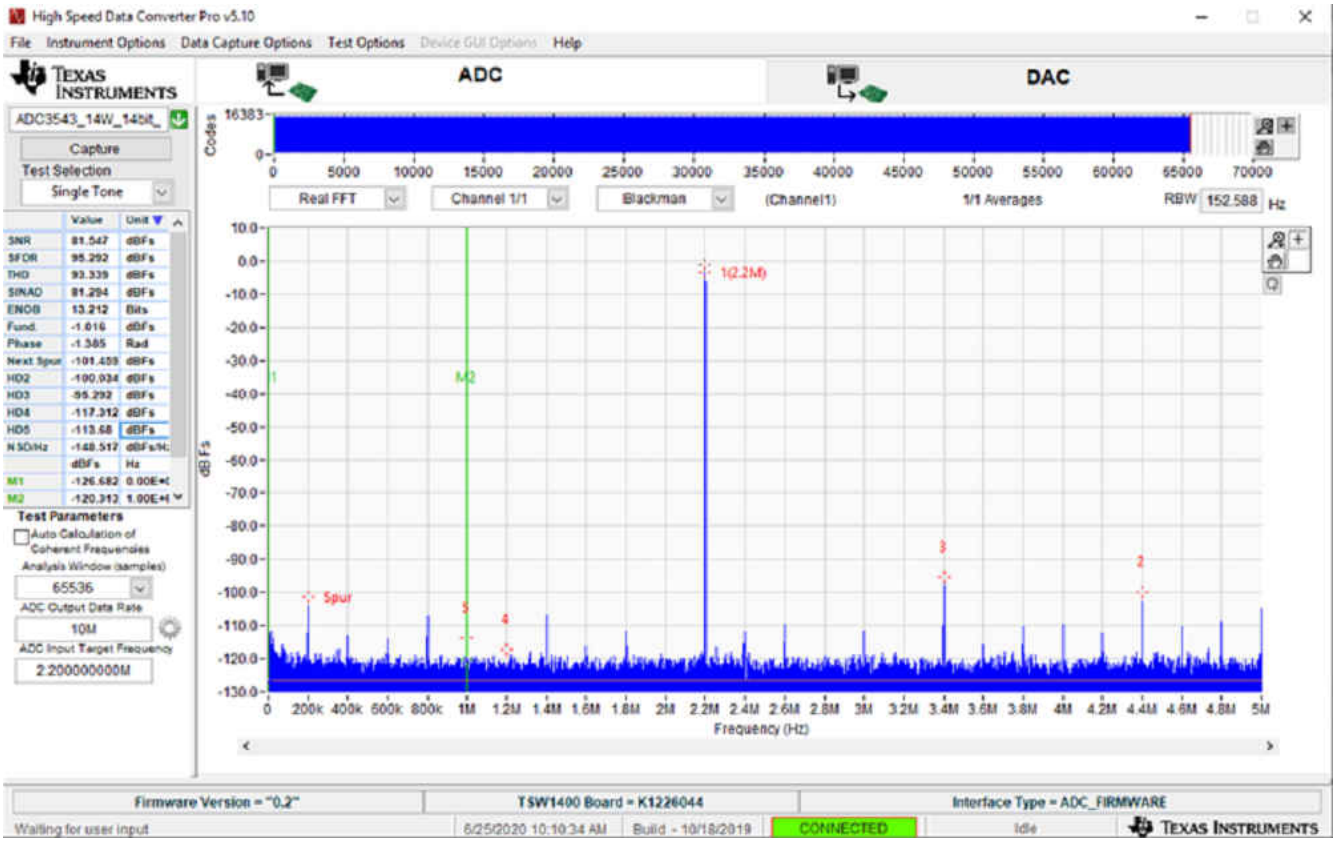

Figure 3-3. HSDC Pro: Data Capture

4 Device Configuration

The ADC35XXEVM GUI provides an easy-to-use interface for programming the ADC354x registers. Most register functions are accessible through buttons or drop-down menus.

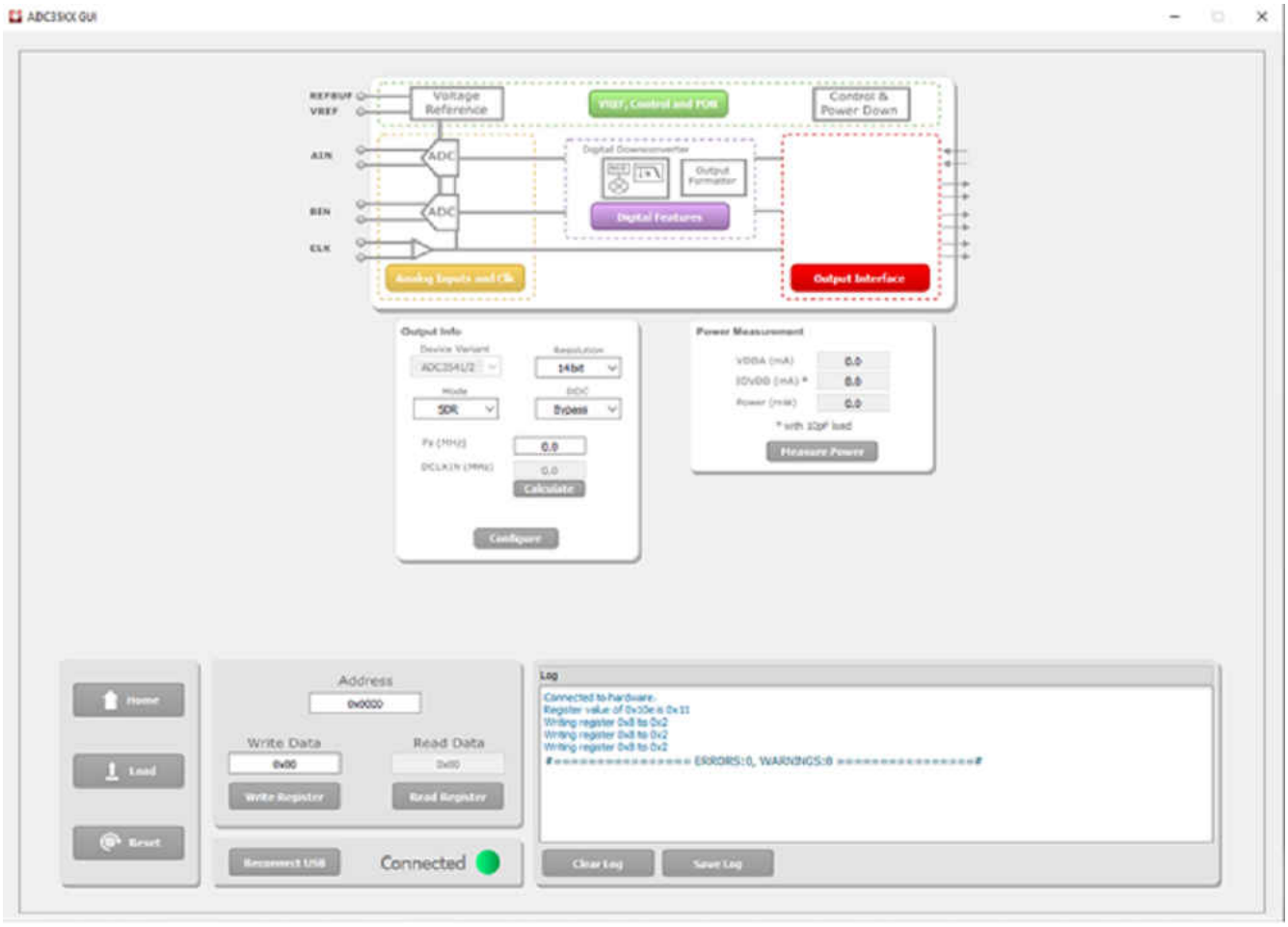

Figure 4-1. ADC35XXEVM GUI

4.1 Low Level Control

The ADC354x registers can also be read or written directly. All values are in hexadecimal.

Reading the contents of a register can be performed by entering the register address in the *Address* field, and clicking the *Read Register* button. The register value will then be displayed in the *Log* field.

Writing to a register can be performed by entering the register address, in the *Address* field, and the desired register value in the *Write Data* field. The write data will then be displayed in the *Log* field.

4.2 Current Monitoring

The current that is being consumed by the ADC354xEVM on its +1.8VDC rails (AVDD and IOVDD) can be monitored through the front page of ADC35XXEVM GUI. Click the "Measure Power" button to refresh the current values.

5 Troubleshooting

If the ADC354xEVM D1 LED is not illuminated:

- Ensure J12 jumper is installed (shunt 2-3)
- Ensure mini-USB cable is securely connected to J19

If HSDC Pro does not successfully capture data:

- Ensure that the sampling clock is present at J2 of the ADC354xEVM
- Ensure that the TSW1400EVM has at least 3 A of current available on its 5-V power supply
- Push the S1 button on the ADC354xEVM to reset ADC, and restore default settings

6 References

1. Texas Instruments, *TSW140x High Speed Data Capture/Pattern Generator Card*
2. Texas Instruments, *High-Speed Data Converter Pro GUI User's Guide*, also available in the help menu of the software
3. FTDI USB to Serial Driver Installation Manual (www.ftdichip.com/Support/Documents/InstallGuides.htm)

6.1 Analog Input Configuration

By default, the analog input for the ADC354xEVM is configured for an AC-coupled, balun signal chain. For best spurious performance, the input frequency should be above 2 MHz.

For DC-coupled inputs, and those below 2 MHz, the FDA input path should be used. This can be done by making the following modifications to the EVM:

- DNI: R116, R118, R119, R120, C81, C84
- Install: C79 (use 0-Ω resistor for DC coupled input), R115, R122, and R134
- C88 and C92 may be bypassed (short with 0-Ω resistor) to create DC ground.

Once these modifications are performed, the analog input must be connected to J10.

7 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (July 2020) to Revision A (January 2023)	Page
• Changed ADC3541 to a more generic ADC354x throughout the document	1
• Changed the *Introduction* to include multiple ADC devices	2

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