Texas Instruments

TSW1100 Data Capture Board

Quick Start Guide

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Contents

Overview

Texas Instrument's TSW1100 allows for high-speed digital data capture from Texas Instruments high speed, high-resolution analog-to-digital converters (ADC). It comes complete with software, allowing the user to quickly evaluate Texas Instruments ADCs without the need for expensive logic analyzers and complex analysis routines. The TSW1100 features data capture speeds of up to 170 MSPS and data capture depths of up to 16 x 1 million points. It can operate in dual-channel mode allowing simultaneous capture of a dual-channel ADC. Data is transferred via a USB interface allowing easy PC control and it requires only one power supply for operation. Consult the TSW1100 website for the list of compatible EVMs.

This guide allows for a quick setup of commonly used functions; such as setup, acquiring data, saving, and recalling data and performing screen captures. Install the software before using this guide. For more complete documentation, see the TSW1100 user's guide.

Setup the TSW1100

The TSW1100 has a defined start-up procedure. Follow the steps below in order to ensure proper operation. ***Not following this procedure could result in improper operation.***

2.1 Connect to a Texas Instrument's ADC EVM

Before connecting an ADC, see the TSW1100 website to view the most up to date ADC EVM compatibility list. On compatible Texas Instruments ADC EVMs', connect the right angle digital data output connector to either J1 or J2. J1 connects to channel 1 of the TSW1100, while J2 connects to channel 2 of the TSW1100.

2.2 Provide Power to the ADC EVM

Follow the ADC EVM user's guide instructions and power on the ADC EVM.

2.3 Providing Power to the TSW1100

You may use either a wall mount transformer that has an output rating of 12 VDC and 600 mA or you can use a lab power supply that can supply a 12 VDVC to J8 while connecting the return to J9. Texas Instruments recommends that you set a current limit of 500 mA. Power on the TSW1100.

2.4 Connecting to the USB

With the PC turned on, connect the USB cable from the PC to the TSW1100 USB connector, J10. At this point, the PC should recognize the TSW1100. To verify, you can go to the Hardware Device Manager and select USB Devices and ensure the TSW1100 is listed as a USB device. At this point, you will also see the LED D13 illuminated on the TSW1100 signaling that the device has been configured properly and is communicating with the PC. This should be the only LED illuminated. If, at this point LEDs D10-D13 are illuminated, depress the Reset switch (SW2) on the TSW1100.

2.5 Launching the TSW1100 Software

With the TSW recognized by the hardware device manager, you can run the software package. To run the program, click on Start -> Program Files -> Texas Instruments -> Texas Instruments ADC Capture Card. This launches the program window. Initially, the software should display diagnostic info on the FPGA version number in the status window.

Capture the ADC Samples, Perform an FFT, and Plot the Results

3.1 Information

This section allows you to capture the raw digital data output from the ADC, perform an FFT, plot the results, and display the performance of the ADC under evaluation.

3.2 Setting Up Remote Control of Instruments

For the best performance, Texas Instruments recommends using an Agilent 8644 for both the signal source and the clock source with the appropriate filters. The TSW1100 software automatically controls these instruments if they are hooked up using GPIB and the Remote Control of Lab Instruments is turned on in the Equipment Setup tab. You may also change the GPIB address for both the signal generator and clock generator.

3.3 Select the ADC Under Evaluation

In the top left-hand corner of the user controls, find the pulldown control labeled Texas Instruments chip. Select the appropriate EVM from the list. Based off this selection, the software automatically updates the ADC characteristic indicators: number of bits and 2's compliment.

3.4 Configure the Input Waveform (A_{IN}) Conditions

Find the control labeled *Desired Frequency* and change it to the sinusoidal frequency you would like to provide to the ADC analog input. In its default state and for best ADC performance, the software calculates a coherent bin based off of a prime integer and overwrites the frequency indicator. If you are not using the Remote Control of Lab Instruments feature, then manually set your signal source output frequency to coincide with the displayed frequency indicator.

3.5 Configure the ADC Sampling Frequency (F_S) Conditions

Find the control labeled Sampling Frequency and set this to the value at which you want to clock the ADC. For the best performance, do not set this above the recommended device operating frequency. Set the clock amplitude by varying the Clock Amplitude control.

3.6 Configure the TSW1100 Capture

With the understanding that J1 connects to channel 1 and J2 connects to channel 2 of the TSW1100, use the Capture control to select which channel the ADC EVM is connected to. Select the depth of capture by selecting the acquisition size in the Number of Points control. .

3.7 Acquire Data

At this point you are ready to capture data from the ADC. You can do so by clicking on the red circular Acquire Data button located below the graph. The button turns green and stay green until the capture is complete. After it is complete, you will see a FFT plot as well as Capture Statistics and FFT Computations.

Performing a Dual Channel Capture

4.1 Information

This section allows you to perform a dual-channel capture from a dual channel ADC, perform an FFT, plot the results and display the performance of the ADC under evaluation.

4.2 Setting up Remote Control of Instruments

For the best performance Texas Instruments recommends using an Agilent 8644 for both the signal source and the clock source with the appropriate filters. The TSW1100 software automatically controls these instruments if they hooked up using GPIB and the Remote Control of Lab Instruments is turned on in the Equipment Setup tab. You may also change the GPIB address for both the signal generator and clock generator.

4.3 Select the ADC Under Evaluation

In the top left-hand corner of the user controls, find the pulldown control labeled Texas Instruments Chip. Select the appropriate EVM from the list. Based off this selection, the software will automatically update the ADC characteristic indicators: Number of Bits and 2's Compliment.

4.4 Configure the Input Waveform (A_{IN}) Conditions

Find the control labeled *Desired Frequency* and change it to the sinusoidal frequency you would like to provide to the ADC analog input. In it's default state and for the best ADC performance, the software calculates a coherent bin based off of a prime integer and overwrites the Frequency indicator. If you are not using the Remote Control of Lab Instruments feature, then manually set your signal source output frequency to coincide with the displayed Frequency indicator. You also have control over the amplitude of the signal source.

4.5 Configure the ADC Sampling Frequency (Fs) conditions

Find the control labeled Sampling Frequency and set this to the value at which you want to clock the ADC. For the best performance, do not set this above the recommended device operating frequency. Set the clock amplitude by varying the clock amplitude control.

4.6 Configure the TSW1100 Capture

Use the Capture control to select which Chan 1 + Chan 2. Select the depth of capture by selecting the acquisition size in the Number of Points control.

4.7 Acquire Data

At this point you are ready to capture data from the ADC. You can do so by clicking on the red circular Acquire Data button located below the graph. After clicking the acquire button the software will wait for an external trigger, which can be applied by either depressing SW1 or providing a trigger stimulus to J5 of the TSW1100. This synchronously captures ADC data on both channel 1 and channel 2. After it is complete, you will see a FFT plot as well as Capture Statistics and FFT Computations for the channel selected. You can view the data and performance for each channel independently.

Saving and Recalling Data to a File

The TSW1100 software package allows users to save raw data sets for import into other analysis packages. Once saved, you may recall it at any time and the software will configure the settings to match the previously taken data set.

5.1 Saving a Data Set

On the tabbed browser at the bottom, select the File Save tab. Once there make sure the File Capture Selector is set to capture a text file. You may also change the default directory path and the data format to either decimal or hexadecimal.

5.2 Retrieving a Saved Data Set

On the Data Capture Selector, scroll through the list and select Read From File. Once selected, click on the red circular Acquire Data button and it prompts you for a text file to read in. Select the appropriate text file and the saved date set will be redisplayed.

5.3 Performing a Screen Capture

Similar to saving a data set, a screen capture can be performed by the following method. First, on the tabbed browser at the bottom, select the File Save tab. Change the File Capture Selector to Screen. There are three different picture formats supported: bmp, png, and jpg all of which can be selected by the Image File Type control. When you are ready to acquire the screen, click on the red circular button, Save Data.

Exiting the Program

While there is more than one way to exit the TSW1100 software package, it is advised to click on the red circular Exit button located below the graph. In doing so, all control values will be saved and recorded such that the next time you open the program it will have the defaults set to when you last used the program.

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of xxx V to xxx V and the output voltage range of xxx V to xxx V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

EVM WARNINGS AND RESTRICTIONS (continued)

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than xxx C. The EVM is designed to operate properly with certain components above xxx C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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