TSW2170EVM Evaluation Module (EVM)

This user's guide describes the operation of the TSW2170 signal generator evaluation module (EVM). The EVM is a low-cost tool used to verify the functionality of various TI analog-to-digital converters (ADCs). This document has setup instructions, block diagrams and screen captures from actual experiments using the TSW2170EVM. The TSW2170EVM product folder on the TI web site contains the EVM schematic, bill of materials, and layout files.

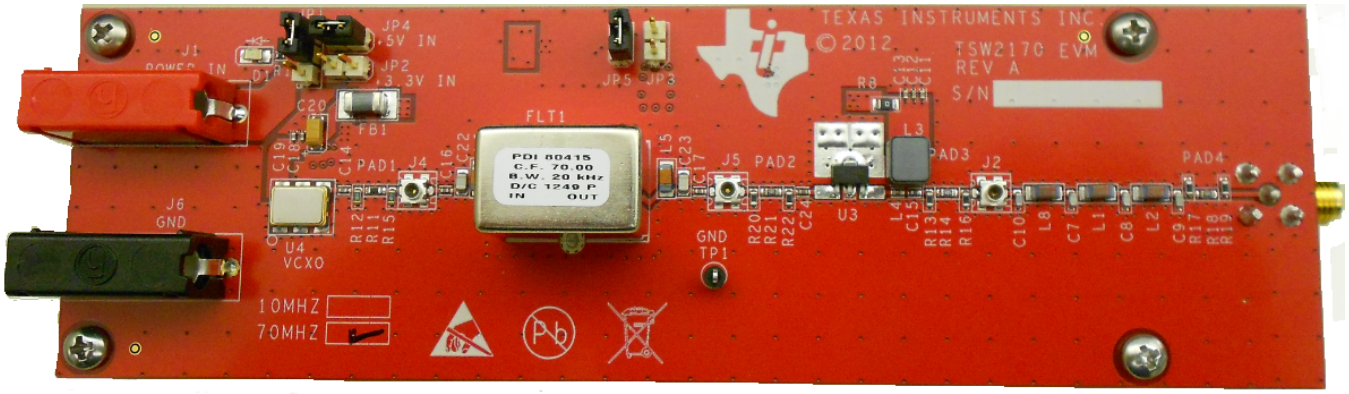

Figure 1. TSW2170EVM Board

1 Introduction

The TI TSW2170EVM (EVM) helps designers evaluate the functionality of their ADC devices. This product eliminates the expense of using a signal generator to create an input signal.

The board is powered off a bench power supply or the 5-V output which is found on the TSW2200EVM. An external clock generator is required to provide a sampling clock for the ADC board to capture correctly. For the captures conducted in this document, a 245.76-MHz clocking signal from the TSW4806EVM was used.

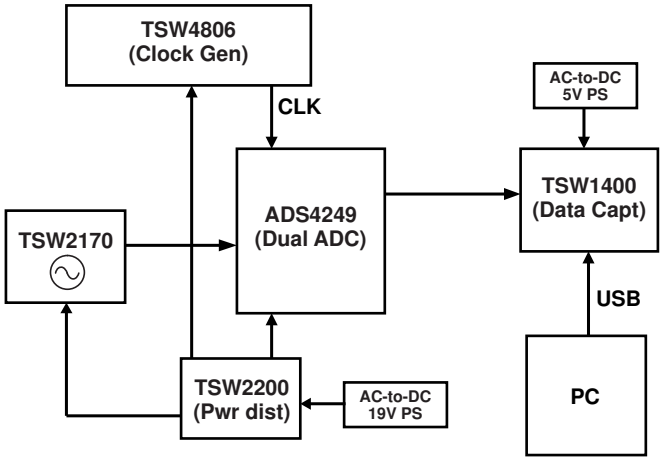

Figure 2. Block Diagram for Testing

The EVM has a default setup expecting an input voltage of 5 V. With this voltage applied, a crystal oscillator (XO) generates a HCMOS waveform at 70 MHz. Using amplification, attenuation and filtering, a 70-MHz signal is generated with low harmonic distortion output. The output waveform is set to ≥ 10 dBm (2 Vpp), which is used as the input to an ADC board. External attenuation may be needed. The block diagram of the TSW2170EVM is shown in Figure 3.

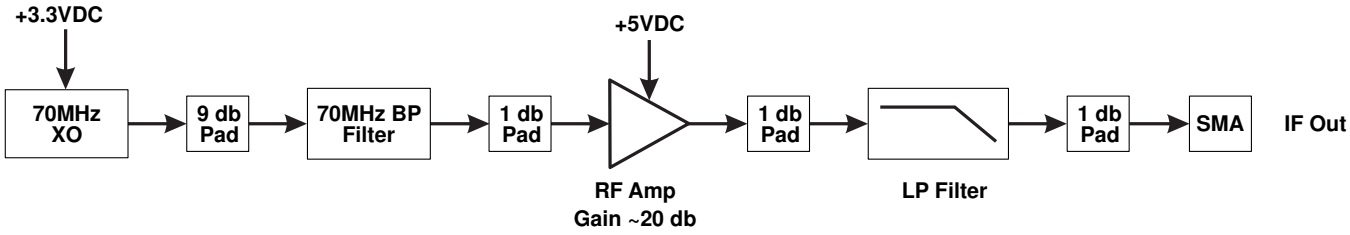

Figure 3. TSW2170EVM Block Diagram

For information on the 70MHz bandpass filter, contact PDI at www.pdixtal.com.

2 Evaluation with the TSW2170

This chapter details the evaluation process and features of the EVM. An external supply voltage must be connected to the voltage in and ground banana jacks (J1 and J6, respectively). An LED illuminates when power is supplied. An SMA to SMA cable must be connected from the output SMA connector to the input channel of the ADC EVM.

The board accepts a supply voltage of 5 V (default) or 3.3 V. Different jumper configurations are necessary for these two options. If the board is supplied with 5 V, the charge pump is bypassed and the LDO 3.3-V regulator is implemented. If 3.3 V is supplied, the regulator is bypassed and the charge pump is used. At 5 V, the board draws approximately 150 mA while at 3.3 V, the board draws approximately 230 mA. The necessary configurations for each method are shown in Table 1. Improper jumpers will not damage the parts on the board; however, the system will not create the desired waveform for accurate testing.

Table 1. Jumper Configurations

Option	JP1	JP2, JP3	JP4, JP5
5 V (default)	Short 1-2	Opened	Shorted
3.3 V	Short 2-3	Shorted	Opened

3 Measurements

The output waveform measured on the SMA connector should have ≥ 10 dBm of power. The best way to get an accurate reading is when measured on a signal analyzer with a 50-Ω load termination. The testing for this user's guide was done on a spectrum analyzer.

On many signal analyzers, the EVM output signal overdrives the machine in their default settings. RF attenuation must be set to account for this. The data taken in Figure 4 had the RF attenuation set to 50 dB.

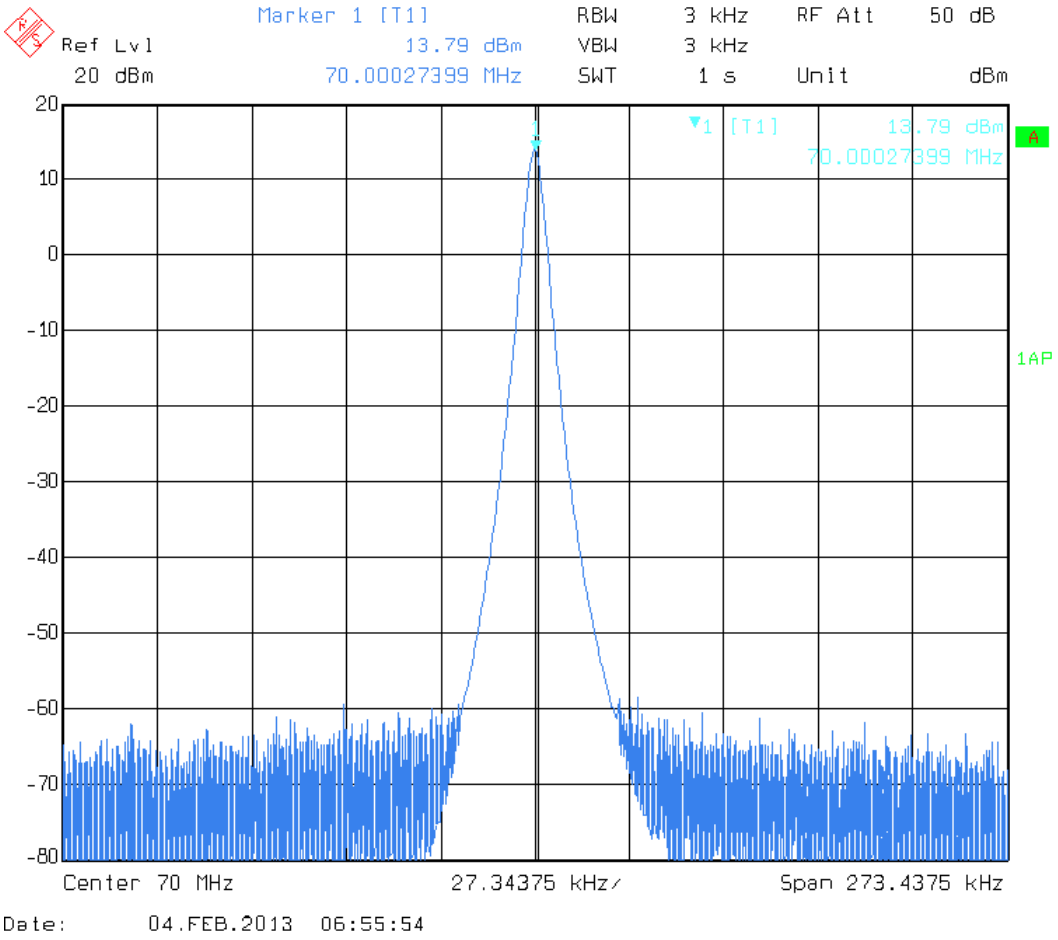

Figure 4. Output Waveform At 70 MHz

The spectrum analyzer has the attenuation set to 10 dB in Figure 5 and the TSW2170EVM output is filtered with an external 70-MHz rejection filter to keep from distorting the analyzer. Figure 5 shows the performance of the EVM at the second and third harmonics.

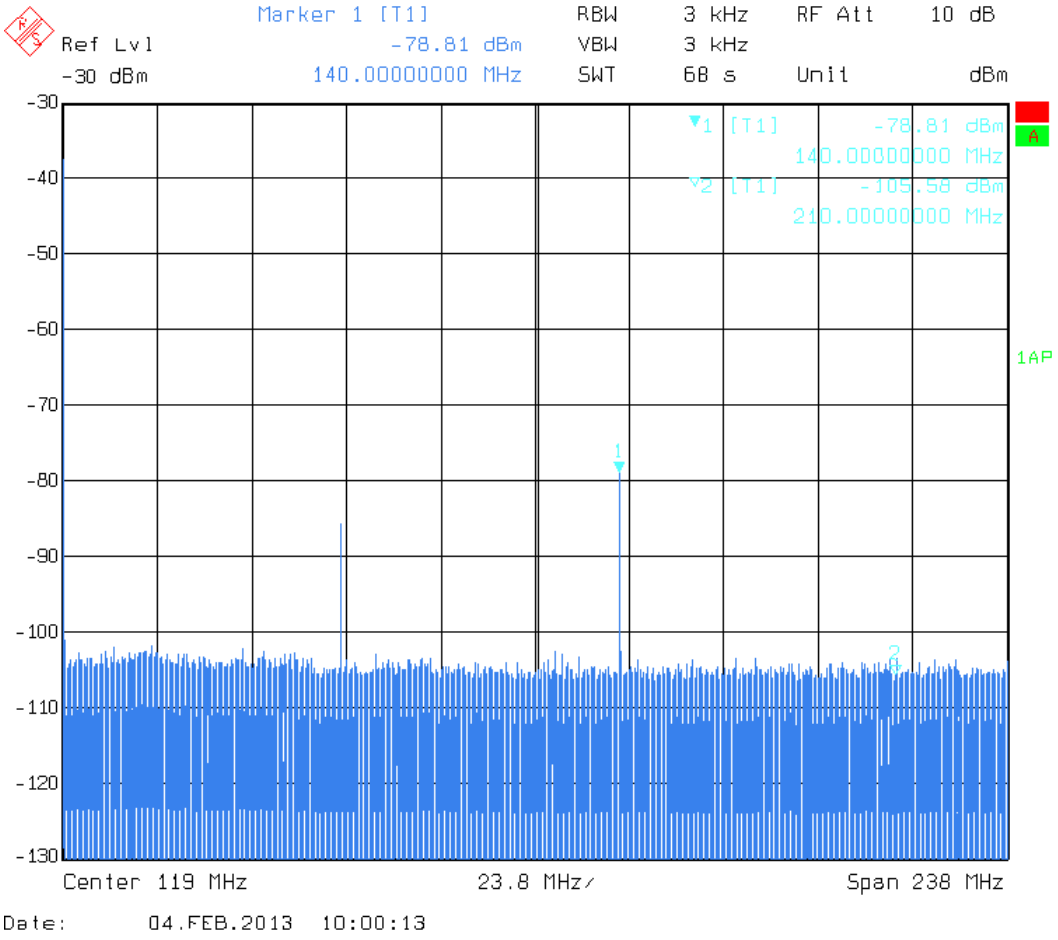

Figure 5. Waveform 2nd and 3rd Harmonics After Filtering

3.1 TSW1400 Data Capture

Figure 6 shows the captured data of the ADS4249EVM using the TSW2170 as the input signal source.

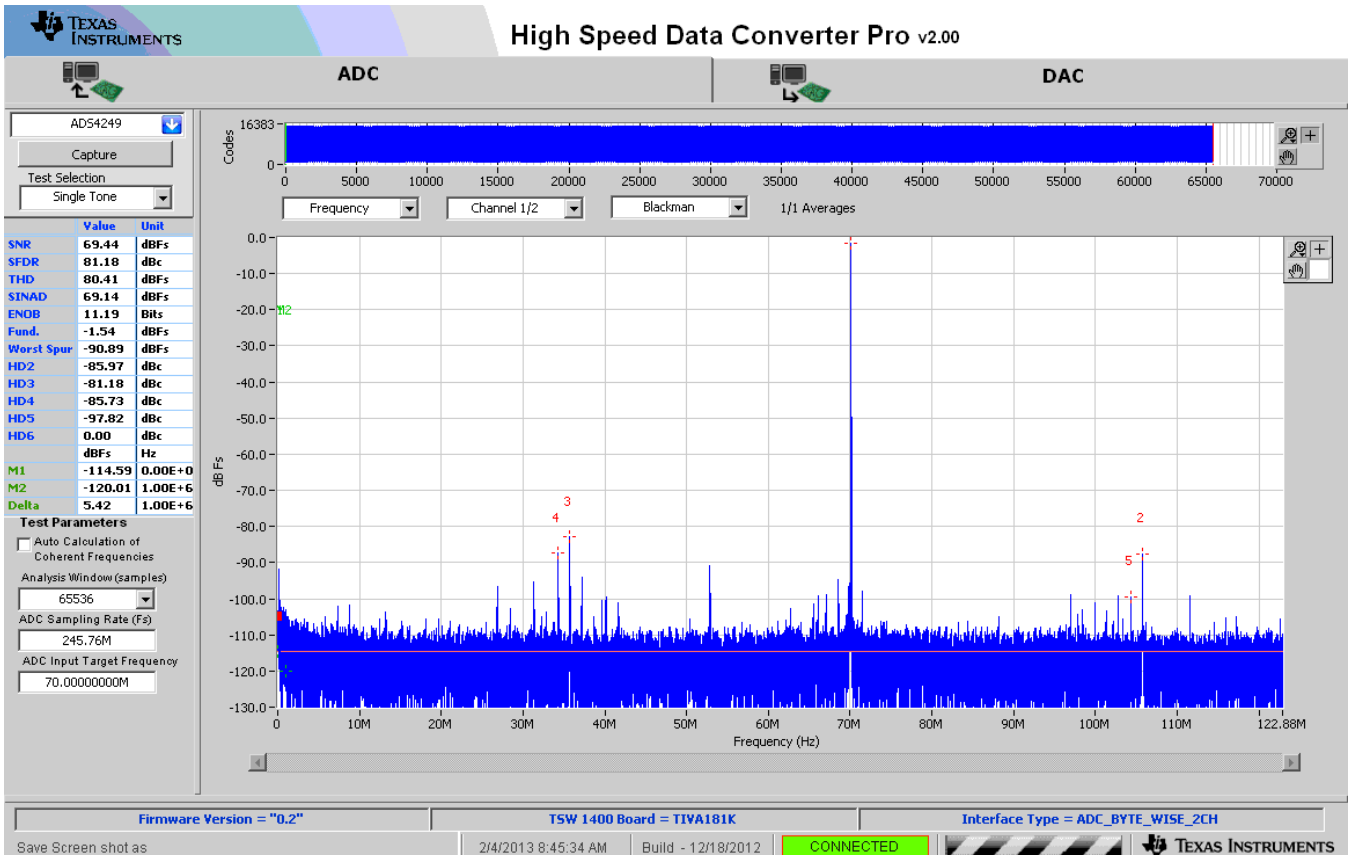

Figure 6. Captured Data of the ADS4249EVM Using TSW2170 Input

The data captured meets datasheet-type performance for the ADS4249EVM.

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- *Increase the separation between the equipment and receiver.*
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