ADS58H4x (ADS58H40/ADS58H43) EVM

This document serves as a user's guide for the ADS58H4x (ADS58H40/ADS58H43) Evaluation Module (EVM). The EVM provides a platform for evaluating the ADS58H40 or the ADS58H43, a quad-channel, 14-bit telecommunications analog-to-digital converter (ADC) operating at sampling rates of up to 250 MSPS. Designed for low-power consumption and high spurious free dynamic range (SFDR), the ADC has low-noise performance and outstanding SFDR over a large input-frequency range.

The four ADC channels are separated into two blocks with two ADCs each. Each block can individually be configured into three different operating modes: 11-bit Operating mode, 11-bit SNRBoost mode, 14-bit High Resolution Burst mode.

This EVM is ideally suited for mating with the TSW1400 Capture Card for performing a data capture into a capture buffer, uploading the sample data to a PC, performing an FFT, and reporting on SNR, SFDR, and other performance metrics.

For more information regarding the ADS58H4x and the related evaluation tools, please refer to the following:

- ADS58H40 – Quad 14-bit 250-MSPS ADC with SNRBoost and Burst Mode (SBAS589)
- TSW1400 – High-Speed Data Capture and Pattern Generation Platform (SLWU079)
- ADS58H40 EVM Configuration Software (SLAC533). This software is compatible for both ADS58H40 and ADS58H43.

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1 Introduction

1.1 EVM Block Diagram

Figure 1 shows a simplified block diagram of the default configuration of the EVM. The four analog inputs are supplied to the EVM through a single-ended SMA connection, then transformer coupled, turning the single-ended signal into a balanced differential signal, and then input to the ADS58H4x. A dual transformer input circuit provides better phase and amplitude balance of the input signal when compared to the performance delivered by a single transformer input circuit.

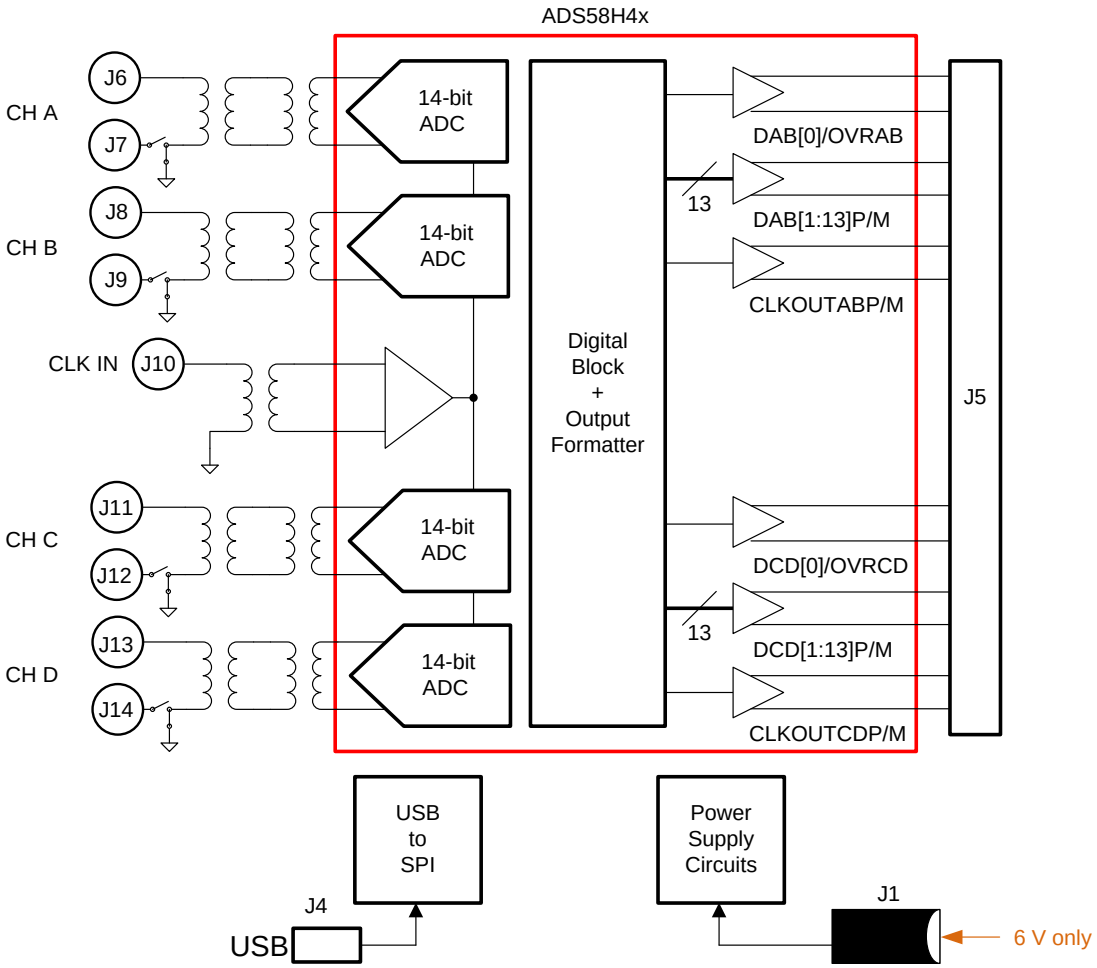

Figure 1. Simplified ADS58H4x EVM Block Diagram

The clock input is supplied by way of a single-ended signal to an SMA connector and transformer coupled producing a differential clock signal for the ADS58H4x.

Power to the EVM is typically supplied by a single 6-V power brick. Banana jacks may also be used to supply power to the EVM. All necessary voltages for the ADS58H4x are derived from the 6-V input connection.

1.2 EVM Power Supply

Figure 2 illustrates the power supply options available on the EVM. Jumpers are used to choose the power supply options, with the default jumper positions indicated by the darker portion of the jumper that represents the presence of the jumper. For jumper and feedback resistor configuration, see Table 1.

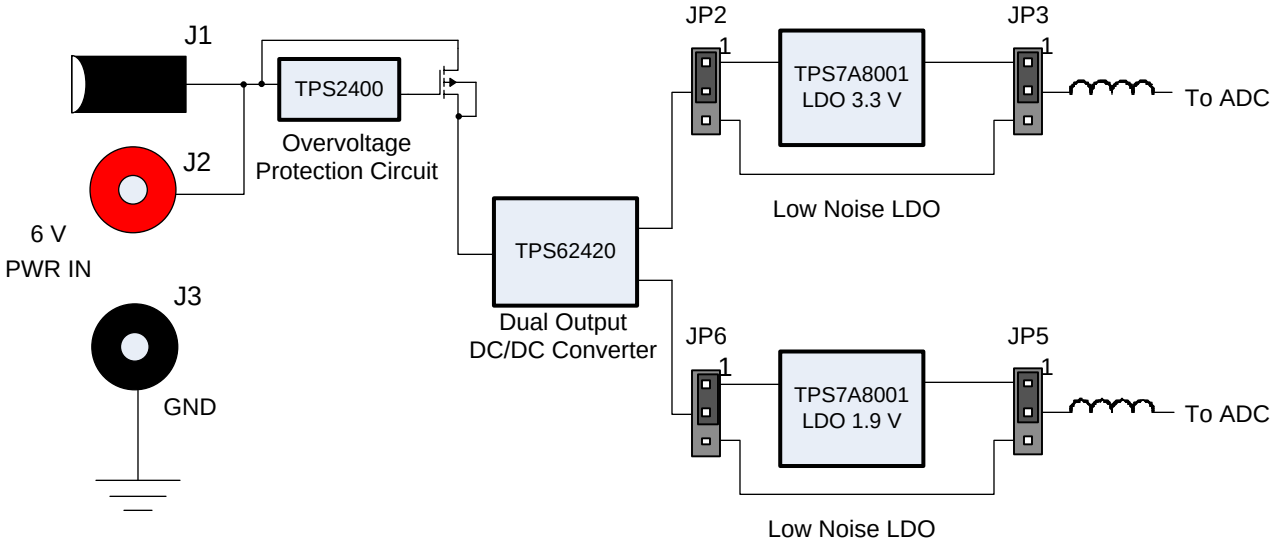

Figure 2. Simplified ADS58H4x EVM Power Supply

Table 1. Power Supply Options

Power Supply Options	JP2	JP3	JP4	JP5	R3	R7	Comment
Option #1 (Default)	1-2	1-2	1-2	1-2	649 kΩ	536 kΩ	Dual outputs DC/DC converter supplies 3.85 V and 2.4 V to two low-noise LDOs. The low-noise LDOs output 3.3 V and 1.9 V, respectively.
Option #2	2-3	2-3	2-3	2-3	536 kΩ	390 kΩ	Low-noise LDOs are bypassed. DC/DC converter powers the ADC directly.

The default power path has an efficient dual output DC-DC switching power supply to first step down the input supplies for the low-noise LDOs. The low-noise LDOs generate the 3.3 V and 1.9 V for the ADC power.

The low-noise LDOs can be bypassed, allowing the DC/DC power supply to directly power the ADC. In this implementation, adjust the feedback resistors of the DC/DC converter accordingly.

1.3 EVM Connectors and Jumpers

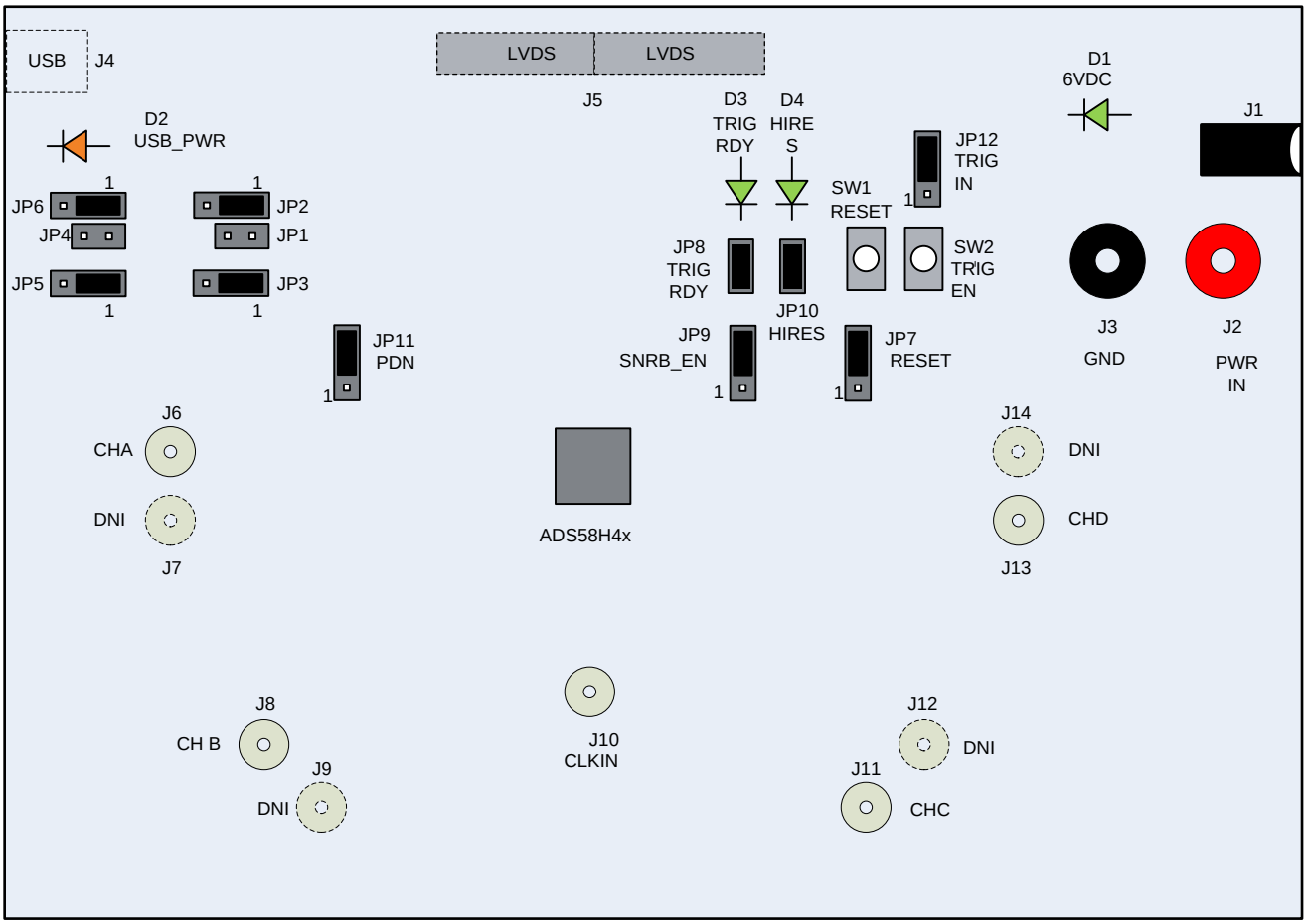

Figure 3. ADS58H4x EVM Connector and Jumper Locations

The locations of the connectors, jumpers, pushbutton switches, and LEDs are shown in Figure 3. The EVM has power connectors or banana jacks connecting the main power for power distribution. The SMA connectors connect the ADC input and ADC clock input to the ADC. Typically, the ADC inputs are transformer coupled, accepting single-ended connections. The input circuit can be configured to connect to two SMA connectors for differential signaling. Table 2 lists the connector information for the EVM.

Table 2. ADS58H4x EVM Connectors

Reference Designator	Description
J1	6 V (main) power input
J2	6 V (main) power input
J3	Ground return
J4	USB Mini-B connector
J5	SAMTEC high-speed LVDS connector
J6	CH A input (positive)
J7	CH A input (negative) DNI
J8	CH B input (positive)
J9	CH B input (negative) DNI
J10	ADC clock input
J11	CH C input (positive)
J12	CH C input (negative) DNI

Table 2. ADS58H4x EVM Connectors (continued)

Reference Designator	Description
J13	CH D input (positive)
J14	CH D input (negative) DNI

The on-board jumper options allow configuration of on-board power supplies and ADC options. Many of the jumper selections that involve DC inputs or static control signals are by way of push-on square post jumpers. The jumper options are listed in Table 3. The table indicates the default settings of the jumpers as the EVM is normally shipped. Some of the jumpers are open circuit by default.

Table 3. ADS58H4x EVM Jumper Options

Reference Designator	Default Setting	Function	Optional Setting	Function
JP1	DNI	Connects low-noise LDO (U2) input to main power input	N/A	
JP2	1-2	Connects DC/DC converter (U3) output to low-noise LDO (U2) input	2-3	Connects DC/DC converter (U3) output directly to the ADC
JP3	1-2	Connects low-noise LDO (U2) output to ADC	2-3	Connects DC/DC converter (U3) output directly to the ADC
JP4	DNI	Connects low-noise LDO (U4) input to main power input	N/A	
JP5	1-2	Connects DC/DC converter (U3) output to low-noise LDO (U4) input	2-3	Connects DC/DC converter (U3) output directly to the ADC
JP6	1-2	Connects low-noise LDO (U4) output to ADC	2-3	Connects DC/DC converter (U3) output directly to the ADC
JP7	2-3	Connects ADC RESET pin G6 to SW1 RESET switch	1-2	Connects ADC RESET pin G6 to DRVDD
JP8	1-2	Connects ADC TRIG_RDY pin G4 to LED circuit	Open	ADC TRIG_RDY pin G4 is open
JP9	2-3	Disables ADC SNRBoost	1-2	Enables ADC SNRBoost
JP10	1-2	Connects ADC HIRES pin G5 to LED circuit	Open	ADC HIRES pin G5 is open
JP11	2-3	Enables ADC	1-2	Power down the ADC or allows the ADC to standby (configured by CONFIG 0x45, bit D0)
JP12	2-3	Connects trigger signal from SW2 switch to ADC trigger input. This can be used to start the auto-burst process.	1-2	Connects trigger signal from TSW1400 rev. E to the ADC trigger input

There are two pushbuttons on the EVM. While JP7 is set in the 2-3 position, the pushbutton switch, SW1, provides a hardware reset to the ADS58H4x. Upon powering up, the ADC can either accept a hardware reset by pressing SW1 or by toggling the software reset switch on the EVM GUI. Table 4 lists the descriptions of each pushbutton switch.

If the ADS58H4x is configured for high resolution burst mode, pressing SW2 while JP12 is set to the 2-3 position allows the ADC to enter burst mode. The SW2 pushbutton also provides the initial pulse needed to start the auto-burst mode process after the ADC is configured in *High Resolution Auto-Burst* mode.

Table 4. ADS58H4x EVM Pushbutton Switches

Reference Designator	Purpose
SW1	While JP7 is set in the 2-3 position, pressing SW1 resets the ADC. The ADC can be reset either by pressing SW1 or with a software reset in the GUI.
SW2	While JP12 is set in the 2-3 position, pressing SW2 allows the ADC to enter burst mode. This can also provide the initial pulse needed start the auto-burst process.

LED D1 is lit indicating the presence of the 6-V supply voltage to the EVM, while LED D2 is lit indicating the presence of the USB to serial converter power. LEDs D3 and D4 indicate the status of the ADS58H4x High Resolution Burst Mode. Table 5 lists the description of each LED indicator.

Table 5. ADS58H4x EVM LED Indicators

Reference Designator	Description
D1	When lit, D1 shows the presence of the 6-V (main) power supply
D2	When lit, D2 shows the presence of the USB to serial converter power
D3	When lit, D3 indicates that the ADC is ready to enter trigger mode
D4	When lit, D4 indicates that the ADC is in high resolution burst mode

1.4 EVM ADC Input Circuit Configurations

Figure 4 shows the ADS58H4x ADC input circuit. The default setup has a dual 1:1 impedance ratio transformer input circuit, which achieves better phase and amplitude balance of the input signal than is typically produced by a single transformer input circuit. Third-order bandpass filter component pads are available for installing bandpass filter components. The default components for the bandpass filter are either zero Ω or open circuit.

The default input termination is 50 Ω, which is formed by two 25-Ω resistors connected to the ADC VCM node. If the user chooses to use 100-Ω termination with the 1:2 impedance transformer, the optional RLR differential arm can be used to tune the in-band flatness.

The ADC analog input consists of a switched-capacitor-based, differential sample-and-hold (S/H) architecture. Due to the opening and closing of the sampling glitches, the kick-back noise from the S/H circuit may affect the ADC performance. Besides the on-chip R-C filter of the ADC input, the external RLCR circuit provides additional filtering of the glitches. The default RLCR components have been optimized for input bandwidth centered at 185 MHz. For additional RLCR components of different center frequencies, refer to the ADS58H40 datasheet (SBAS589).

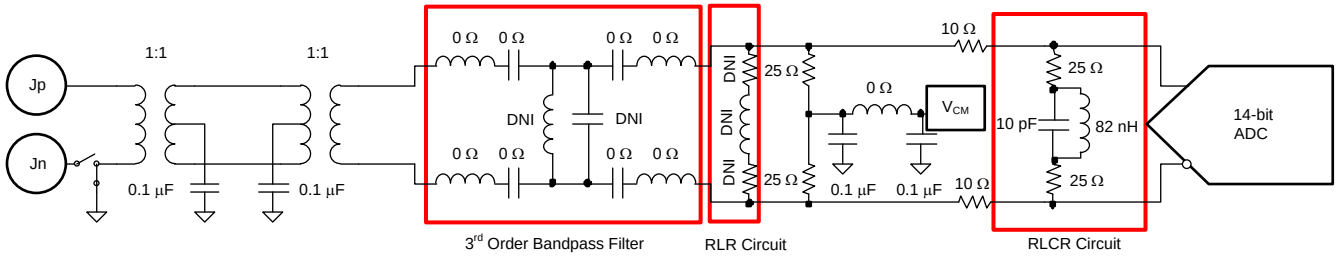

Figure 4. ADS58H4x ADC Input Circuit

Figure 5 shows the ADS58H4x clock input circuit. The clock signal goes through the 1:4 impedance ratio transformer increasing the clock amplitude by two (1:4 impedance ratio equals to 1:2 voltage ratio). The two 121-Ω resistors will impedance transform back to the primary side as 50-Ω load impedance for the signal source generator. For ADC evaluation, set the signal generator output to 10 dBm.

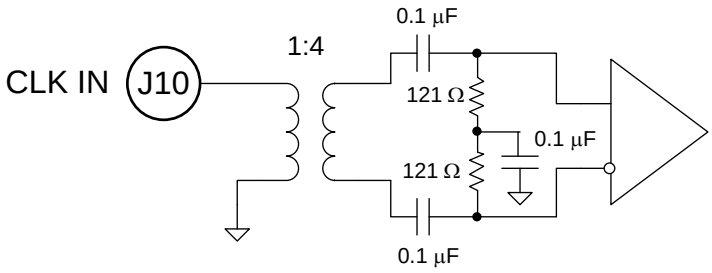

Figure 5. ADS58H4x Clock Input Circuit

2 Software Control

2.1 Installation Instructions

- Open the ADS58H40_Installer_vxpx folder (xpx represents the latest version, which is 2.0 at the time of this writing)
- Run Setup.exe
- Follow the on-screen instructions
- Once installed, launch by clicking on the ADS58H40_GUI_vxpx program in Start → All Programs → Texas Instruments ADCs
- When plugging in the USB cable for the first time, the Found-New-Hardware-Wizard prompts to install the USB drivers
  - When a pop-up screen opens, select *Continue Downloading*
  - Follow the on-screen instructions to install the USB drivers
  - If needed, access the drivers directly in the install directory

2.2 Software Operation

The ADS58H40 EVM GUI is compatible for both ADS58H40 and ADS58H43 EVMs. The software allows programming control of the ADS58H4x device. The front panel provides a tab for common control of the ADS58H4x and a SNRBoost/Burst Mode tab for control of the special data capture modes. The GUI tabs provide a convenient and simplified interface to the most-used registers of each device.

2.2.1 Control Options

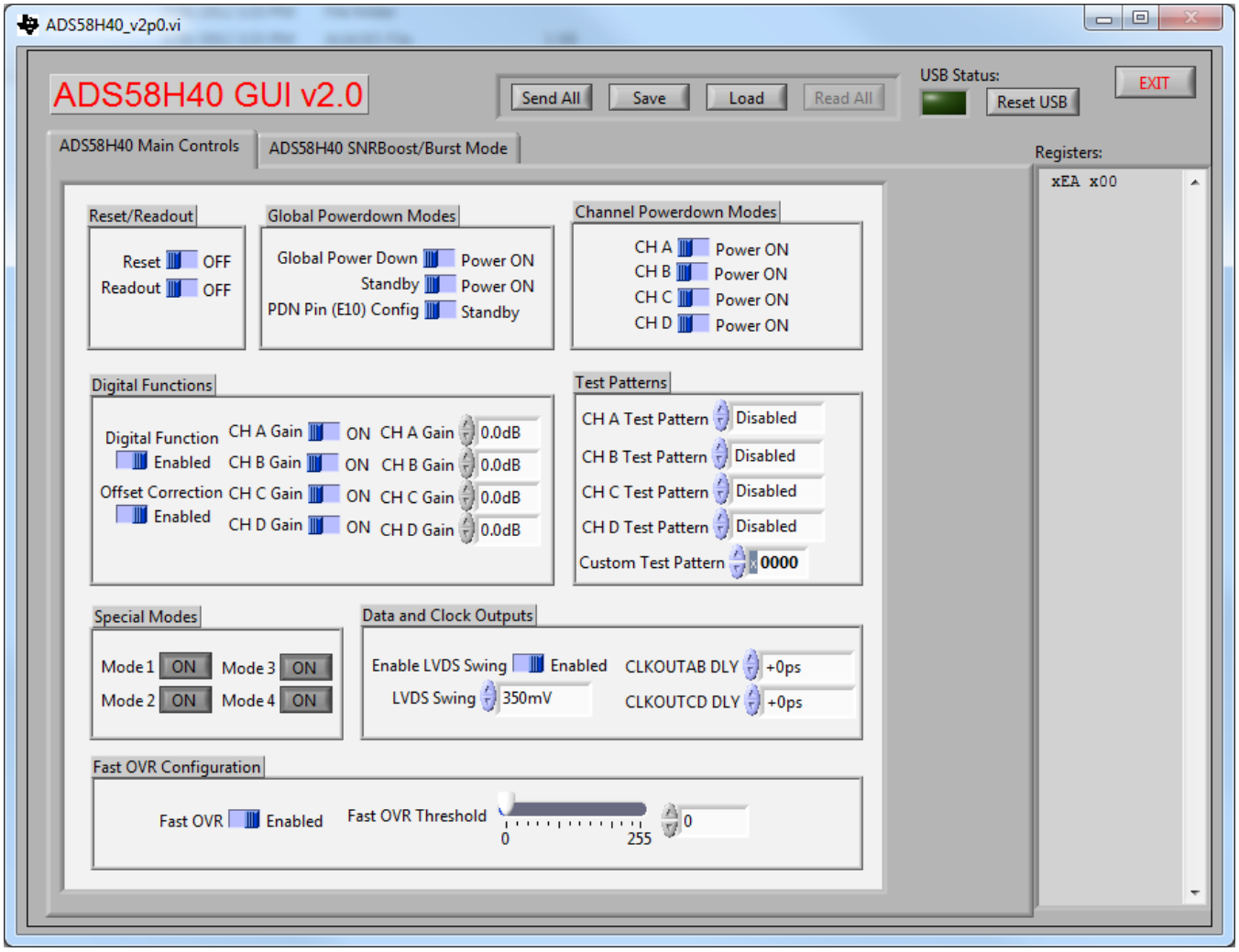

Figure 6. ADS58H4x Main Panel

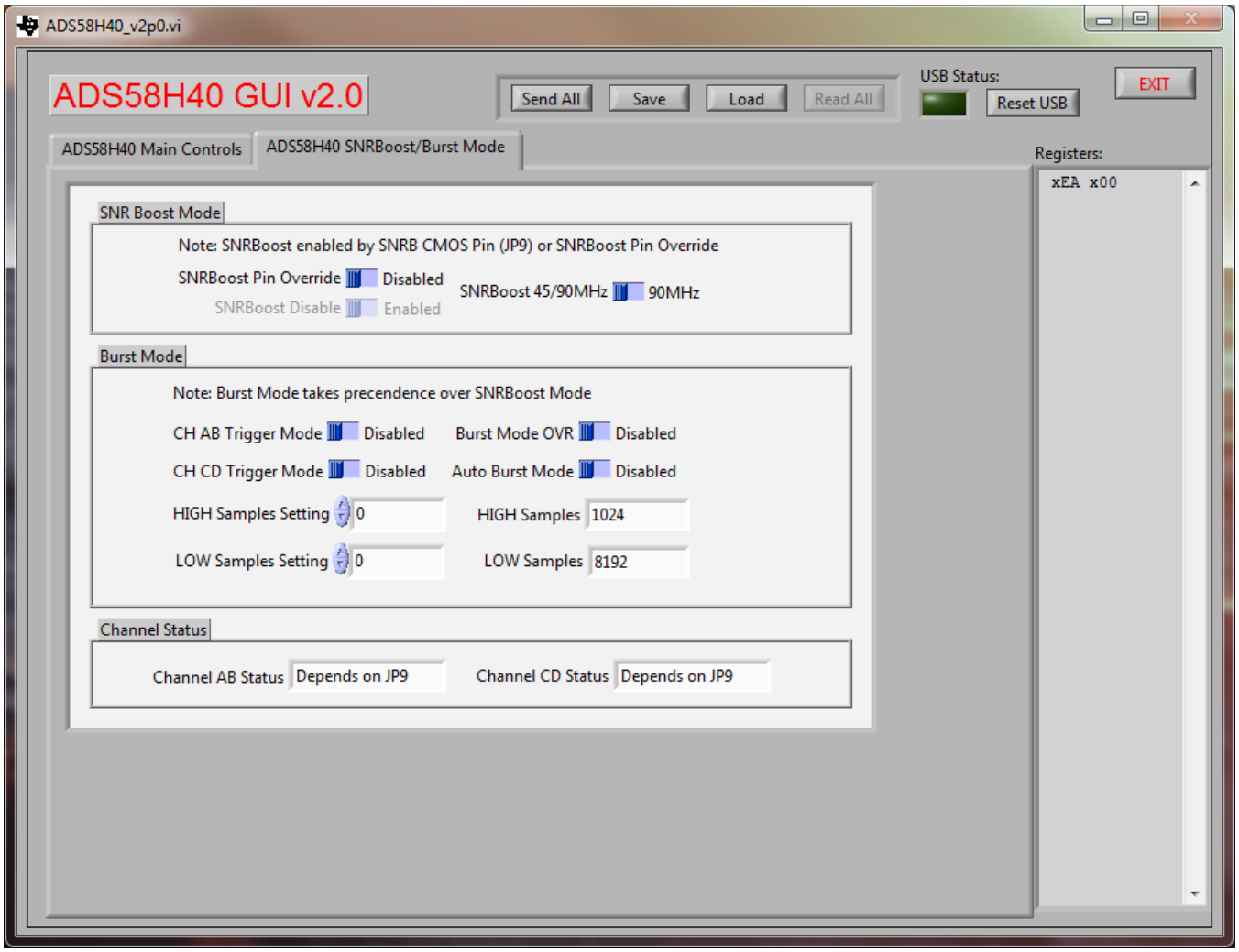

Figure 7. ADS58H4x SNRBoost/Burst Mode Panel

2.2.2 Register Control

- **Send All:** Sends the register configuration to all devices
- **Save Regs:** Saves the register configuration for all devices
- **Load Regs:** Load a register file for all devices.
  - Select *Load Regs* button
  - Double click on the *data* folder
  - Double click on the desired register file
  - Click *Send All*, ensuring all of the values are loaded properly

2.2.3 Miscellaneous Settings

- **Reset USB:** Toggle this button if the USB port is not responding. This generates a new USB handle address

  Note: Reset the board after every power cycle and click the **Reset USB** button on the GUI
- **Exit:** Stops the program

3 Basic Test Procedure

This section outlines the basic test procedure for testing the EVM.

3.1 Test Block Diagram

The test set-up for evaluation of the EVM with the TSW1400 Capture Card is shown in Figure 8. As seen in this figure, the evaluation setup involves a clock from a high-quality signal generator and a sine wave for the analog input from a high-quality signal generator. High-order, narrow-bandpass filters are usually required on clock and input frequency to remove phase noise and harmonic content from the input sine waves. If the two signal generators are not synchronized by an external reference signal to make the clock and input frequency coherent, then the resulting FFT first needs a windowing function, such as Hanning or Blackman-Harris, applied to the data.

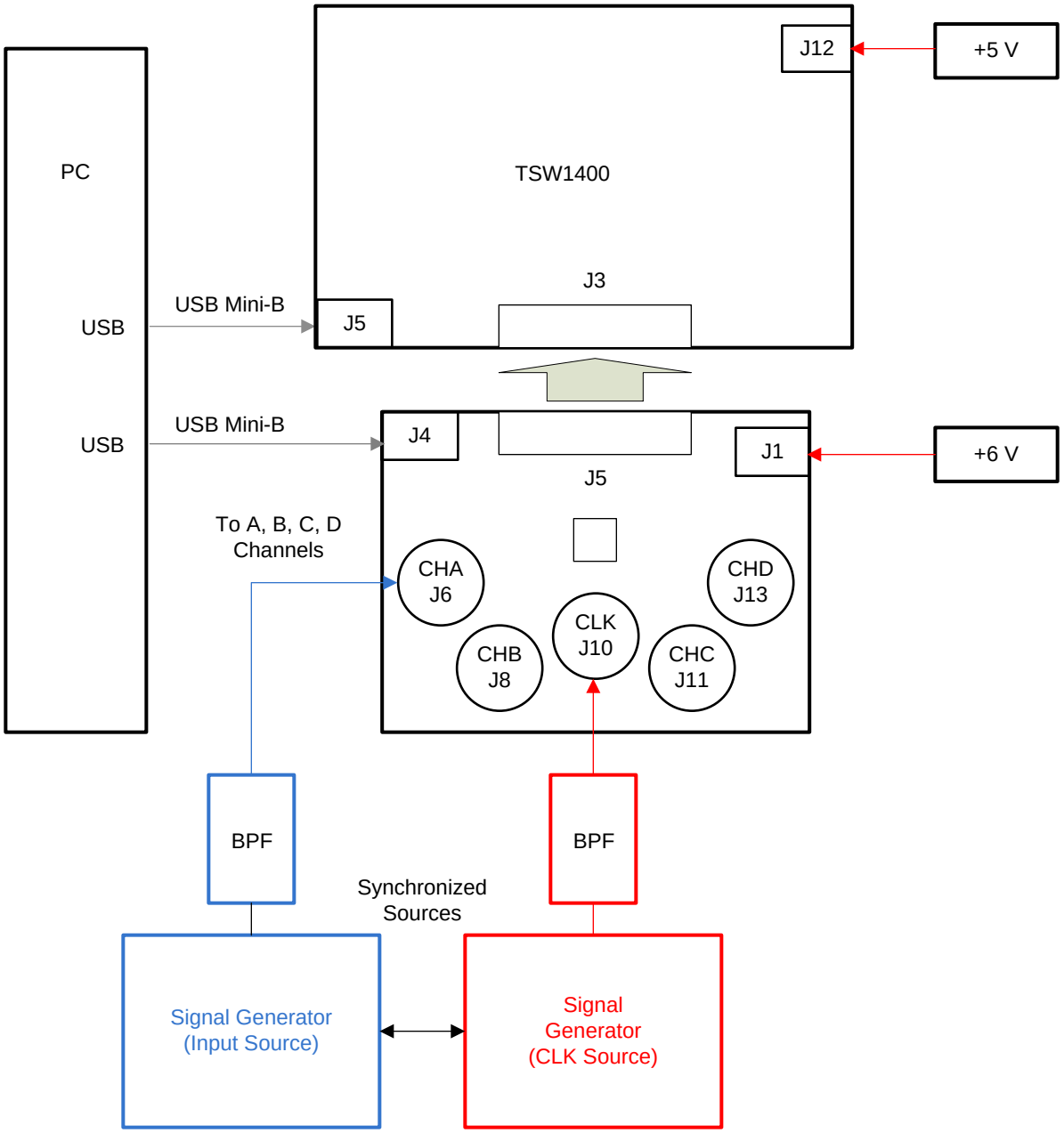

Figure 8. ADS58H4x and TSW1400 Test Setup Block Diagram

3.2 Test Set-up Connection

TSW1400 Pattern Generator Setup

1. Connect the EVM-supplied, 18-AWG wires to the DC plug cable (Tensility 10-01776) to a qualified lab bench power supply. The 18-AWG red wire is the 5-V wire while the 18-AWG black wire is the ground wire.
2. Connect the 5-V power supply cable to J12, the 5V_IN jack of the TSW1400 EVM.
3. Connect the USB port on the PC to J5 USB port of the TSW1400 EVM. The cable should be a standard A to mini-B connector cable.

ADS58H4x EVM Setup

1. Connect the J5 HSMC connector of the ADS58H4x EVM to J3 HSMC connector of the TSW1400 EVM.
2. Connect the EVM-supplied, 18-AWG wires to the DC plug cable (Tensility 10-01776) to a qualified lab bench power supply. The 18-AWG red wire is the 6-V wire while the 18-AWG black wire is the ground wire.
3. Connect the 6-V power supply cable to J1, the *Power In* jack of the ADS58H4x EVM.
4. Connect the USB Port of the PC to J4 USB port of the ADS58H4x EVM. The cable should be a standard A to mini-B connector cable.

3.3 ADS58H4x Software Quick Start Guide

Figure 6 introduced the front panel of the ADS58H4x SPI GUI. This section covers the initial use of the SPI GUI necessary for most evaluations of the ADS58H4x.

1. Press the **Reset USB Port** button if the USB connection has been disrupted since last use, or if an error message pops up warning that the USB connection is not valid.
2. Use the mouse to select the *reset* position of the reset switch. This switch is self-clearing.
3. Press **Send All** to send all the register settings.
4. From this point, select digital functions as desired such as SNRBoost, or set test pattern modes if desired. All register bits listed in the register map of the ADS58H4x data sheet have a *switch* on the front panel of the SPI GUI for easy configuration of the ADS58H4x.

Note that any greyed-out front panel switches are unavailable for use because they have a dependency upon other switch settings, as indicated in the ADS58H4x datasheet. For example, the Channel A Gain selection is unavailable because the default state of the Channel A Gain Enable switch is off. Select the Channel A Gain Enable switch, toggling the switch to the enabled state, and then the Channel A Gain selection becomes available for use.

3.4 ADS58H4x and TSW1400 Setup Guide

Reference the TSW1400 User's Guide (SLWU079A) for more detailed explanations of the TSW1400 set-up and operation. This document assumes the High Speed Data Converter Pro software and the TSW1400 hardware are installed and functioning properly. This EVM requires High Speed Data Converter Pro software version 1.5 with TSW1400 hardware of Rev D (or higher).

Single-tone FFT test (ADS58H4x 11-bit Operating Mode)

1. Start the High Speed Converter Pro GUI program. **When the program starts, select the ADC tab and then select either the ADS58H40-11b or the ADS58H40-14b device in the Select ADC menu. The selections are compatible for both ADS58H40 and ADS58H43 devices**. For this example, select the *ADS58H40-11b* device.

   (a) For 11-bit Operating Mode or 11-bit SNRBoost Mode, select the *ADS58H40-11b* device.

   (b) For 14-bit High Resolution Burst Mode, select the *ADS58H40-14b* device.

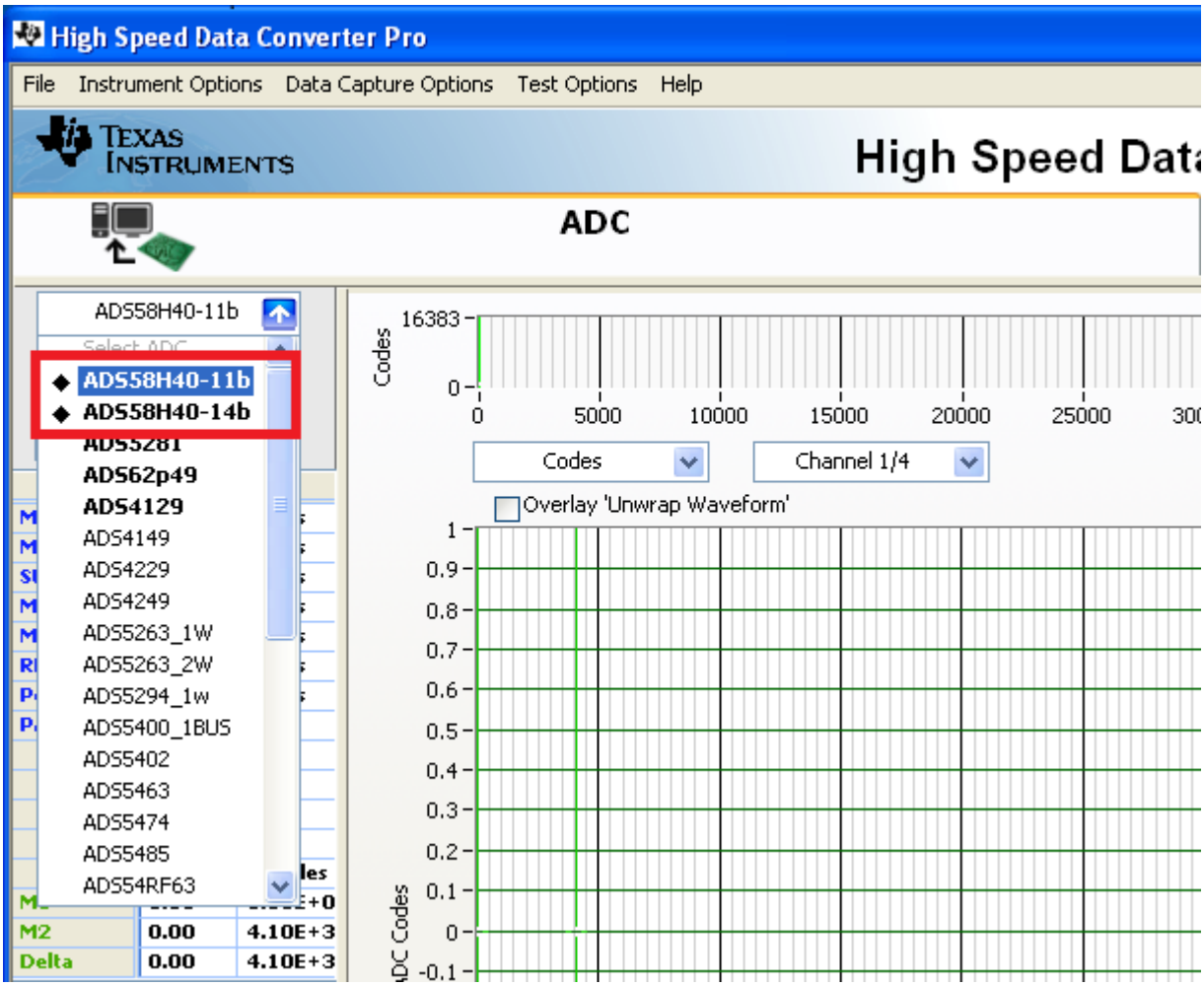

Figure 9. Select ADS58H40 in the High Speed Converter Pro GUI Program

2. When prompted *Do you want to update the Firmware for ADC?*, select **Yes**

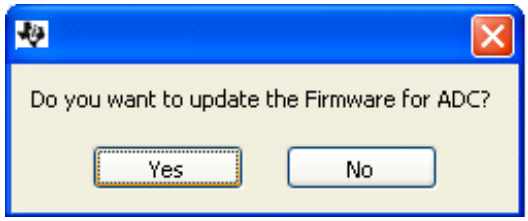

Figure 10. Load ADC Firmware Prompt

3. Select *Single Tone* FFT Test under *Test Selection*
4. Select the number of sample points (and resulting number of FFT bins). The example shown in Figure 11 has 65536 samples.
5. Enter the ADS58H4x sampling rate. The example shown in Figure 11 has the sample rate set at 245.76 MSPS.
6. Enter the input frequency desired. If the clock and input frequency signal generators are synchronized, then make sure the checkbox for coherent frequency is checked and set the input frequency signal generator to the input frequency displayed. The example shown in Figure 11 has the input frequency set at 170 MHz.
7. Select channel A, B, C, or D depending on which channel is connected to the signal generator.

8. Press the **Capture** button on the High Speed Data Converter Pro GUI.
   Observe an FFT result similar to that of Figure 11.

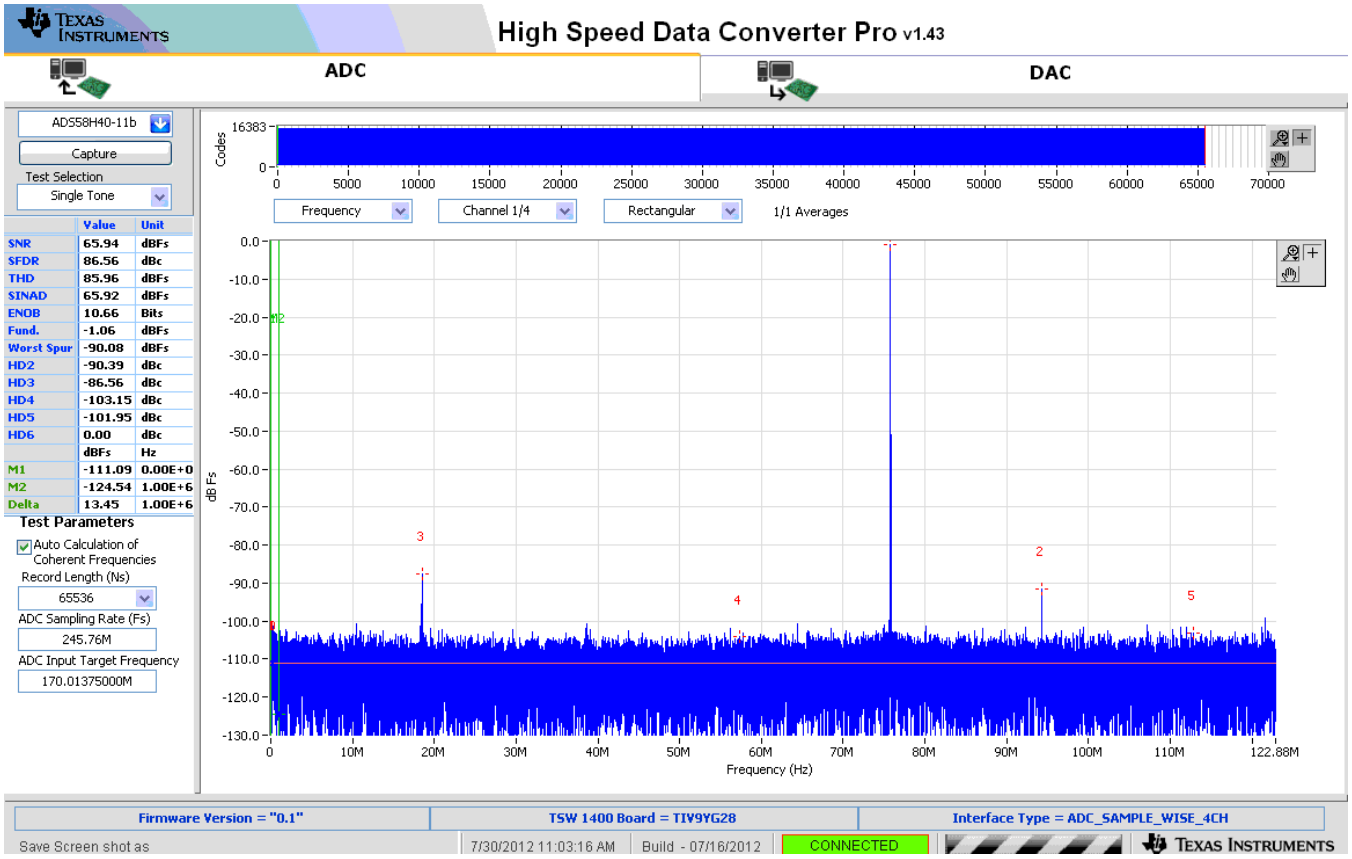

Figure 11. ADS58H4x 11-bit Operating Mode, Single Tone Test Result: Fs = 245.76 MSPS, Fin = 170 MHz

If the basic capture at this point is correct, then the front panel options of the SPI GUI and the front panel options of the TSW1400 GUI may be varied. The two examples below show the 11-bit SNRBoost mode and the 14-bit High Resolution Burst Mode.

Single tone FFT test (ADS58H4x 11-bit SNRBoost Mode)

1. Select the ADS58H40-11b device.
2. After selecting Single Tone FFT Test under *Test Selection*, enter the sample rate, input frequency, and the number of samples.
3. Select channel A, B, C, or D depending on which channel is connected to the signal generator.
4. To enable the SNRBoost Mode, set the JP9 connector to 1-2 position or enable *SNRBoost Pin Override* in the ADS58H40 GUI. Also, in the ADS58H40 EVM GUI, disable High Resolution Burst Mode of the channels under evaluation since High Resolution Burst Mode takes precedence over SNRBoost Mode.
5. Press the **Capture** button on the High Speed Data Converter Pro GUI.
6. Observe an FFT result similar to that of Figure 12.
7. Select *Bandwidth Integration Markers* option under *Test Options* to set the proper integration calculation for SNR. Set the bandwidth integration markers, BM0 and BM1, by either dragging the markers on the FFT screen or by entering the frequency location at the lower left-hand side of the High Speed Data Converter GUI.

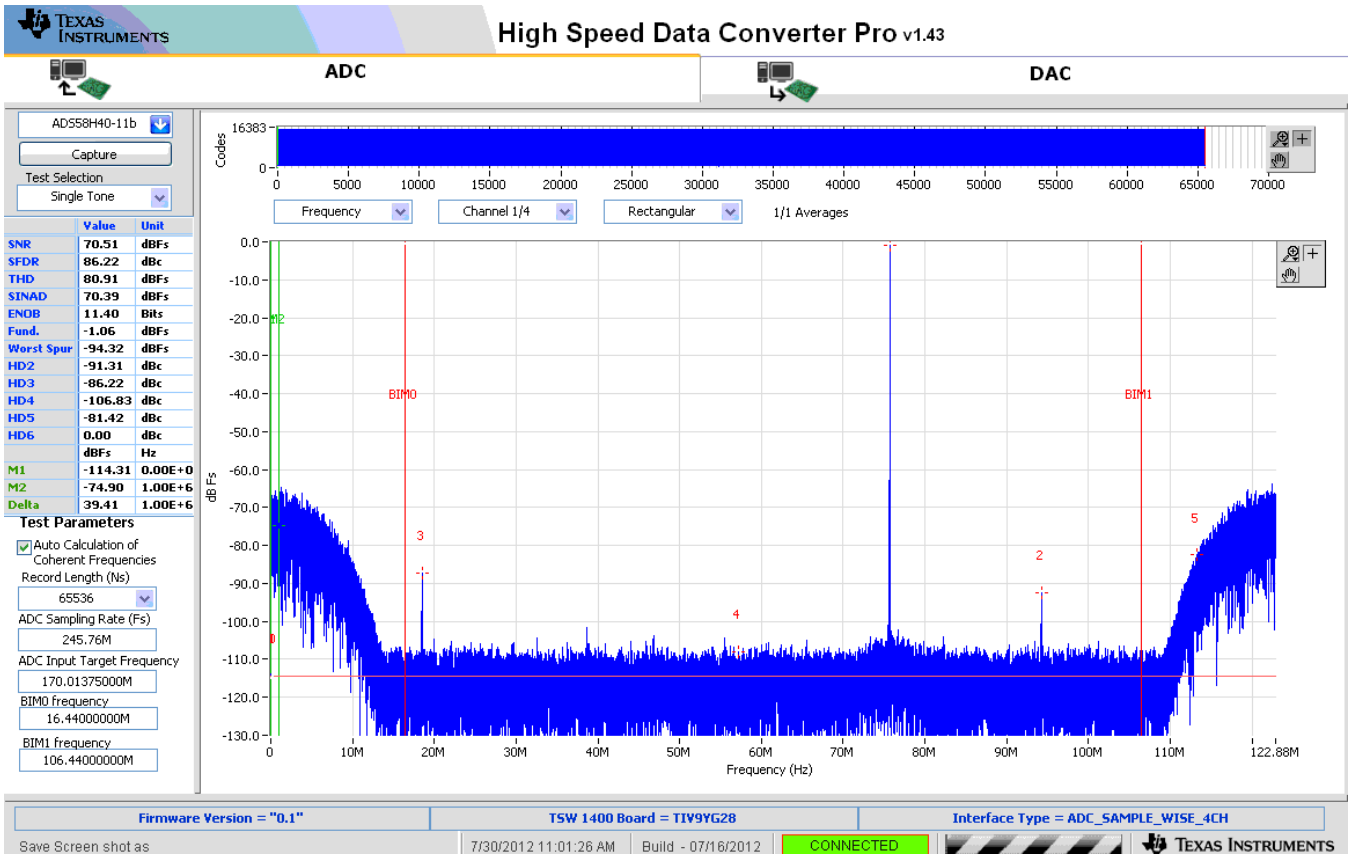

Figure 12. ADS58H4x 11-bit SNRBoost Mode, Single Tone Test Result: Fs = 245.76 MSPS, Fin = 170 MHz

Single tone FFT test (ADS58H4x 14-bit High Resolution Burst Mode)

1. Select the ADS58H40-14b device.
2. After selecting Single Tone FFT Test under *Test Selection*, enter the sample rate, input frequency, and the number of samples.
3. Select channel A, B, C, or D depending on which channel is connected to the signal generator.
4. On the High Speed Data Converter Pro menu, select *Data Capture Options* → *Trigger Option*. Check both *Trigger Mode Enable* and *Software Trigger Enable*.

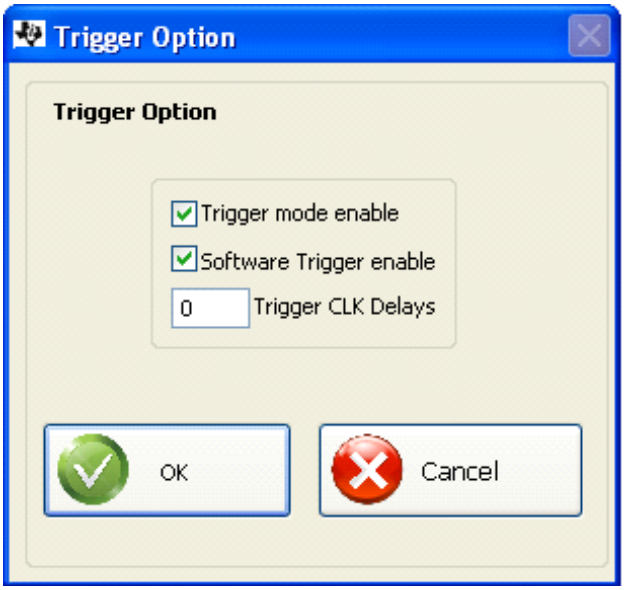

Figure 13. TSW1400 Trigger Option

5. In the EVM GUI, enable High Resolution Burst Mode of the channels under evaluation. Set the desired high- and low-resolution samples. The example shown in Figure 14 has both high samples and low samples set to maximum. This ensures that the entire FFT is analyzed with 14-bit capture for accurate SNR and SFDR calculations.
6. ADS58H4x Trigger Options
   - If the ADS58H4x has auto-trigger enabled, set the J12 jumper to the 2-3 position. Start the auto-trigger process by pressing the SW2 pushbutton.
   - TSW1400 Trigger Generation (External Trigger)
     – On the EVM, remove the jumper at J12, ensuring the ADS58H4x TRIG_EN (pin G3) is floating.
     – Using an SMA to grabber cable, connect SYNC1 SMA connector at J14 of the TSW1400 to jumper J2, pin 2 header of the EVM.
     – Using an SMA to SMA cable, connect SYNC3 SMA connector at J16 to EXT_TRIG_INPUT SMA connector at J11 of the TSW1400.
7. Press the **Capture** button on the High Speed Data Converter Pro GUI.
8. Observe an FFT result similar to that of Figure 14.

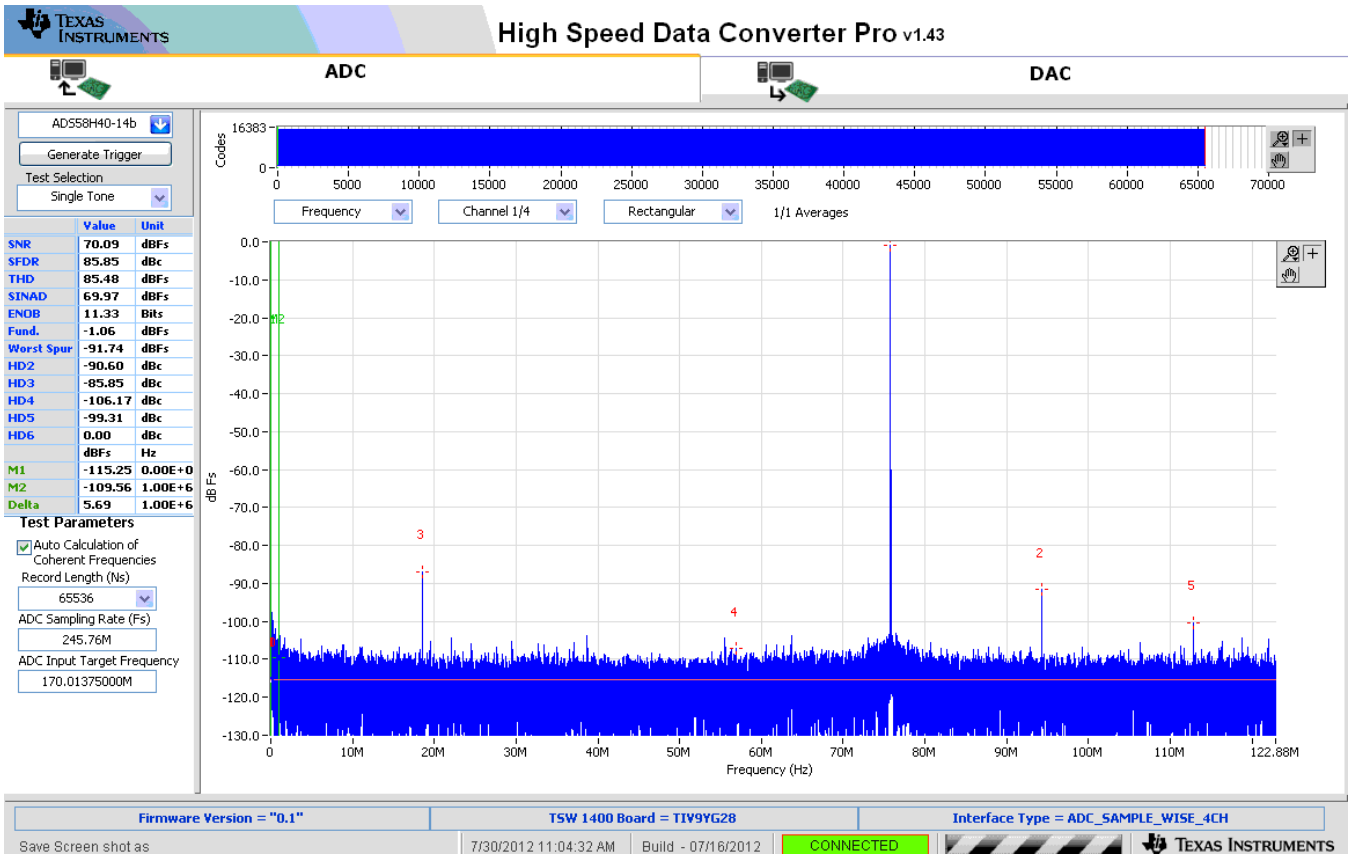

Figure 14. ADS58H4x 14-Bit High-Resolution Mode, Single Tone Test Result: Fs = 245.76 MSPS, Fin = 170 MHz

Revision History

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

Changes from A Revision (October 2012) to B Revision	Page
• Changed the entire *Test Set-up Connection* section.	11

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   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *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.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用いただく。
2. 実験局の免許を取得後ご使用いただく。
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西新宿三井ビル

3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

電力線搬送波通信についての開発キットをお使いになる際の注意事項については、次のところをご覧ください。http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user 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, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

   6.1 EXCEPT AS SET FORTH ABOVE, EVMS AND ANY WRITTEN DESIGN MATERIALS PROVIDED WITH THE EVM (AND THE DESIGN OF THE EVM ITSELF) ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

   6.2 EXCEPT FOR THE LIMITED RIGHT TO USE THE EVM SET FORTH HEREIN, NOTHING IN THESE TERMS AND CONDITIONS SHALL BE CONSTRUED AS GRANTING OR CONFERRING ANY RIGHTS BY LICENSE, PATENT, OR ANY OTHER INDUSTRIAL OR INTELLECTUAL PROPERTY RIGHT OF TI, ITS SUPPLIERS/LICENSORS OR ANY OTHER THIRD PARTY, TO USE THE EVM IN ANY FINISHED END-USER OR READY-TO-USE FINAL PRODUCT, OR FOR ANY INVENTION, DISCOVERY OR IMPROVEMENT MADE, CONCEIVED OR ACQUIRED PRIOR TO OR AFTER DELIVERY OF THE EVM.

7. *USER'S INDEMNITY OBLIGATIONS AND REPRESENTATIONS.* USER WILL DEFEND, INDEMNIFY AND HOLD TI, ITS LICENSORS AND THEIR REPRESENTATIVES HARMLESS FROM AND AGAINST ANY AND ALL CLAIMS, DAMAGES, LOSSES, EXPENSES, COSTS AND LIABILITIES (COLLECTIVELY, "CLAIMS") ARISING OUT OF OR IN CONNECTION WITH ANY HANDLING OR USE OF THE EVM THAT IS NOT IN ACCORDANCE WITH THESE TERMS AND CONDITIONS. THIS OBLIGATION SHALL APPLY WHETHER CLAIMS ARISE UNDER STATUTE, REGULATION, OR THE LAW OF TORT, CONTRACT OR ANY OTHER LEGAL THEORY, AND EVEN IF THE EVM FAILS TO PERFORM AS DESCRIBED OR EXPECTED.

8. *Limitations on Damages and Liability:*

   8.1 *General Limitations*. IN NO EVENT SHALL TI BE LIABLE FOR ANY SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF THESE TERMS ANDCONDITIONS OR THE USE OF THE EVMS PROVIDED HEREUNDER, REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCLUDED DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, COST OF REMOVAL OR REINSTALLATION, ANCILLARY COSTS TO THE PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, RETESTING, OUTSIDE COMPUTER TIME, LABOR COSTS, LOSS OF GOODWILL, LOSS OF PROFITS, LOSS OF SAVINGS, LOSS OF USE, LOSS OF DATA, OR BUSINESS INTERRUPTION. NO CLAIM, SUIT OR ACTION SHALL BE BROUGHT AGAINST TI MORE THAN ONE YEAR AFTER THE RELATED CAUSE OF ACTION HAS OCCURRED.

   8.2 *Specific Limitations.* IN NO EVENT SHALL TI'S AGGREGATE LIABILITY FROM ANY WARRANTY OR OTHER OBLIGATION ARISING OUT OF OR IN CONNECTION WITH THESE TERMS AND CONDITIONS, OR ANY USE OF ANY TI EVM PROVIDED HEREUNDER, EXCEED THE TOTAL AMOUNT PAID TO TI FOR THE PARTICULAR UNITS SOLD UNDER THESE TERMS AND CONDITIONS WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED. THE EXISTENCE OF MORE THAN ONE CLAIM AGAINST THE PARTICULAR UNITS SOLD TO USER UNDER THESE TERMS AND CONDITIONS SHALL NOT ENLARGE OR EXTEND THIS LIMIT.

9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

10. *Governing Law:* These terms and conditions shall be governed by and interpreted in accordance with the laws of the State of Texas, without reference to conflict-of-laws principles. User agrees that non-exclusive jurisdiction for any dispute arising out of or relating to these terms and conditions lies within courts located in the State of Texas and consents to venue in Dallas County, Texas. Notwithstanding the foregoing, any judgment may be enforced in any United States or foreign court, and TI may seek injunctive relief in any United States or foreign court.

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