EVM User's Guide: ADC3660EVM, ADC3644EVM, ADC3643EVM

ADC3660x and ADC364x Evaluation Module

Description

The ADC3660/ADC364x evaluation module (EVM) evaluates the ADC36xx family of high-speed, analog-to-digital converters (ADCs). This family includes the ADC3660, ADC3644, and ADC3643. All these devices feature a serial low-voltage CMOS (LVCMOS) interface.

Get Started

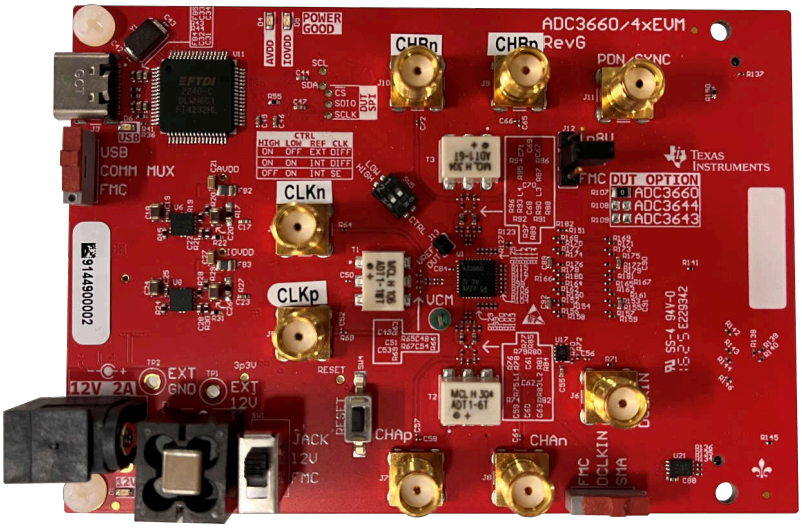
1. Order the ADC3660EVM, ADC3644EVM, or ADC3643EVM
2. Download the latest revision of the data sheet
3. Download the latest software
4. Download the comprehensive reference design files from the tools page of the EVM

Features

- Single-ended and differential options for AC-coupled analog input with onboard balun
- Single-ended and differential options for sampling clocking input
- Powered with an external 12V connection and onboard power regulation
- Flexible switch controlled ADC configuring thru USB-C connection or FMC connector
- FMC connector to interface with TI data capture card or third-party FPGA development kit

Applications

- Software defined radio
- Communications infrastructure
- Spectrum analyzer
- Medical and healthcare
- Control systems



ADC3660/ADC364xEVM

1 Evaluation Module Overview

1.1 Introduction

The ADC3660/ADC364xEVM is an evaluation board used to evaluate the ADC36xx family of analog-to-digital converters (ADC) from Texas Instruments. The ADC36xx uses a serial LVCMOS interface to output the digital data. The ADC36xx can be operated in 'oversampling + decimating' mode using the internal decimation filter to improve the dynamic range.

By default, the EVM is configured to receive external inputs for the sampling clock and analog input using AC-coupled transformer (balun) inputs. The transformer performs the single-ended to differential conversion, and provides a low noise/distortion passive input.

This user's guide describes the characteristics, operation, and use of the ADC3660/ADC364x evaluation module (EVM). This user's guide also discusses how to set up and configure the software and hardware.

1.2 Kit Contents

The following equipment is included in the EVM evaluation kit:

Table 1-1. Included Equipment

ITEM	DESCRIPTION	QUANTITY
ADC3660/ ADC364xEVM	PCB	1
DC Jack Power Cable	Cable	1
USB-C Cable	Cable	1
JTAG Dongle and Micro USB Cable	PCB and Cable	1

1.3 Device Information

There are three variants of the ADC3660/ADC364xEVM which cover the devices in this family with LVDS output interfaces: the ADC3660EVM, the ADC3644EVM, and the ADC3643EVM.

The following is a list of the devices that these EVM variants can be used to evaluate:

Table 1-2. Devices Evaluated Using the ADC3660EVM

ADC3660EVM			
DEVICE	**NUMBER of CHANNELS**	**RESOLUTION**	**MAX SAMPLE RATE**
ADC3660	2	16	65MHz

Table 1-3. Devices Evaluated Using the ADC3644EVM

ADC3644EVM			
DEVICE	**NUMBER of CHANNELS**	**RESOLUTION**	**MAX SAMPLE RATE**
ADC3644	2	14	125MHz

Table 1-4. Devices Evaluated Using the ADC3643EVM

ADC3643EVM			
DEVICE	**NUMBER of CHANNELS**	**RESOLUTION**	**MAX SAMPLE RATE**
ADC3643	2	14	65MHz
ADC3642	2	14	25MHz
ADC3641	2	14	10MHz

2 Hardware

This section details the required hardware tools and connections necessary to effectively use the ADC3660 and ADC364x EVM, which covers the ADC3660, ADC3644 and ADC3643 variant EVMs

2.1 Required Hardware

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

- TSWDC155EVM data capture board and related items
- Three low-noise signal generators for the analog input, sample clock, and DCLKIN signals. (These signal generators must share the same reference frequency)
- Two bandpass filters for your desired sample clock frequency and analog input frequency.
- One power supply capable of supplying 12V, 1A
- PC running Microsoft® Windows® 10 or 11.

TI recommends the following low phase noise signal generators for analog inputs and clocking inputs:

- Rohde & Schwarz SMA100A
- Rohde & Schwarz SMA100B
- Keysight E8257D
- Hewlett Packard HP8644B
- Rohde & Schwarz SMHU
- Or other equivalents

A bandpass filter is required for all signal generators to remove spurious components or noise. The DCLKIN input does not require a bandpass filter. If bandpass filters are not used, then the true performance of the ADC is not always clearly seen, and is limited by the performance of the signal generators used.

The bandpass filter used is recommended to have:

- Greater than or equal to 60dB harmonic attenuation
- Less than or equal to 10% bandwidth
- Greater than 18dBm power
- Less than 5dB insertion loss

2.2 Hardware Setup

1. Connect the ADC3660/ADC364xEVM to the TSWDC155EVM using the FMC connectors.
2. Connect the USB-C connector to J3 on the ADC3660/ADC364xEVM to your PC using the included USB-C Cable.
3. Connect the USB-C connector to J8 on the TSWDC155EVM to your PC using the included USB C cable.
4. Connect the Micro USB Cable to the JTAG dongle and connect the JTAG dongle to the JTAG header J7 on the TSWDC155EVM. Then connect the Micro USB Cable to your PC.
5. Verify that the jumper J2 on the TSWDC155EVM is installed across pins 1-2 to power the board through the USB-C connector

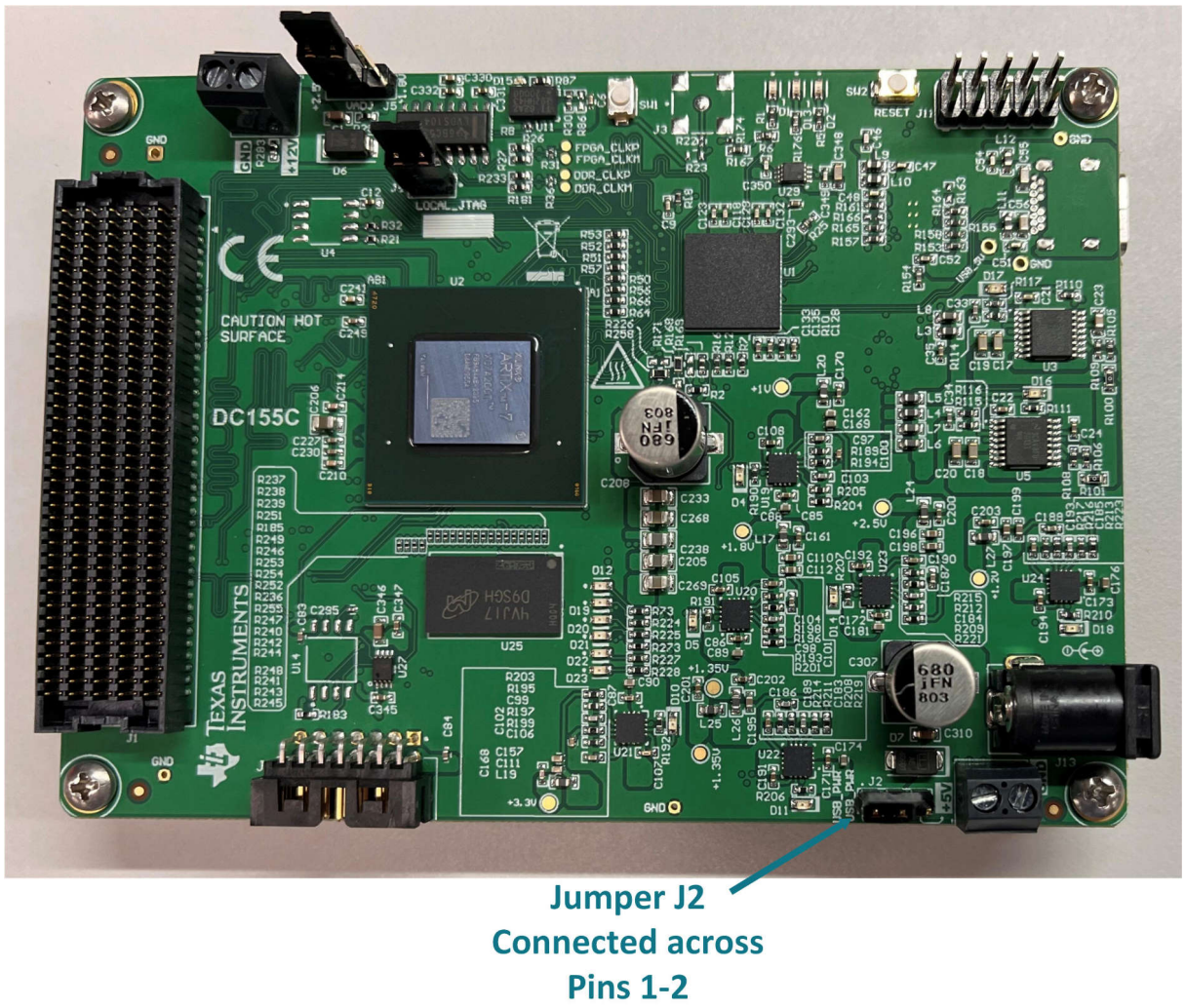


Figure 2-1. TSWDC155EVM Jumper J2

6. Verify that the following Switches and Jumpers are in the following configurations on the ADC3660/ADC364xEVM:
   a. Verify that the 12V Power Switch (SW1) is switched to Jack.
   b. Verify that the Comms Mux switch (SW2) is switched to USB.
   c. Verify that the DCLKIN switch (SW3) is switched to SMA.
   d. Verify that the both switches on the VREF CTRL Switch bank (SW5) are switched to ON.
   e. Verify that the VREF Jumper (J13) is populated.
   f. Verify that the PDN/SYNC Jumper (J12) is not connected.

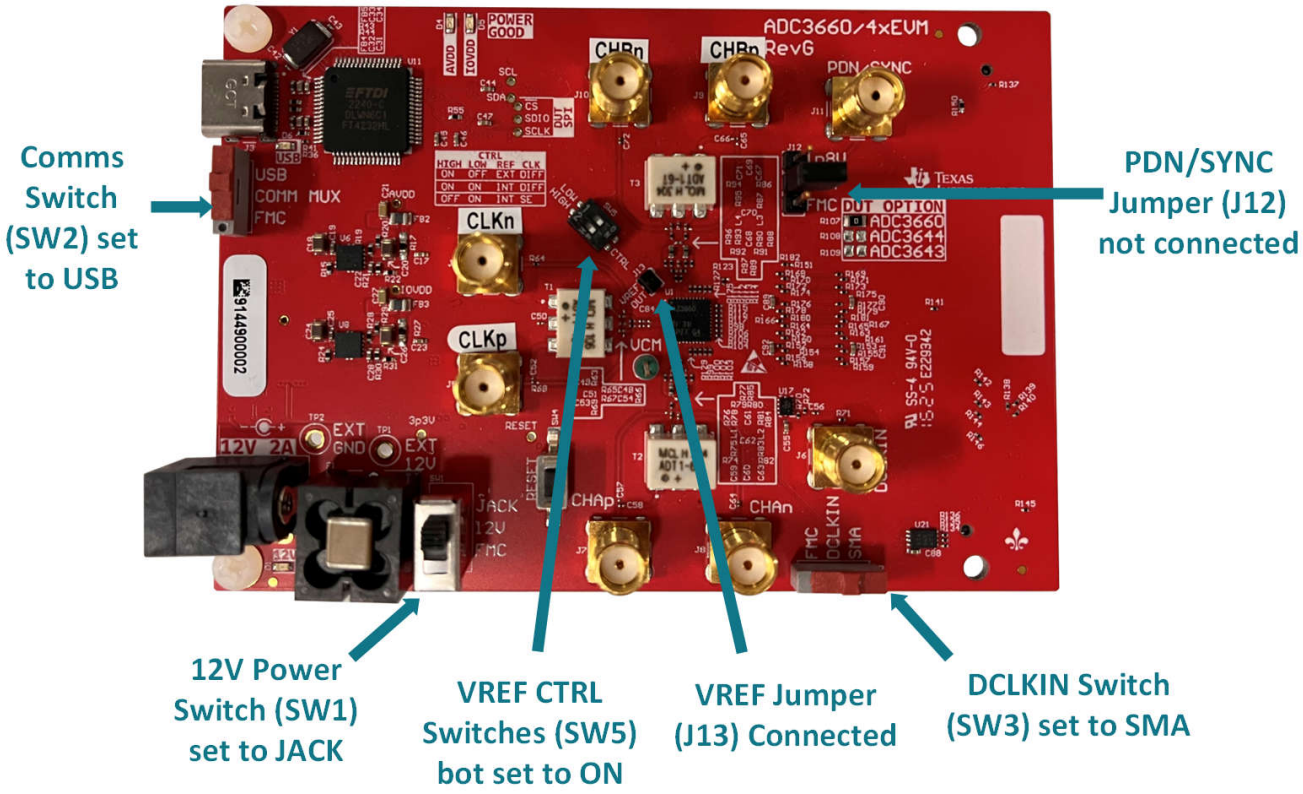


Figure 2-2. ADC3660/ADC364xEVM Switches and Jumpers

3 Software

This section details the required software tools and applications necessary to effectively use the ADC3660/ADC364xEVM, which covers the ADC3660, ADC3644 and ADC3643 variant EVMs.

3.1 Required Software

Below is a list of required software to evaluate the ADC3660/ADC364xEVM:

- ADC36xxEVM GUI
- Texas Instruments HSDC Pro Software
- Vivado Lab Solutions

3.2 Software Setup

1. Download and install the ADC36xxEVM GUI.
   a. While installing the ADC36xxEVM GUI, verify that the FX3 USB drivers are also installed.
2. Download and install HSDC Pro. This is used to view the captured data.
3. Download and install Vivado Lab Solutions from the AMD website. This is required to capture data from the FPGA.
4. Verify that the Vivado Lab bin folder is added to your PATH system environment variable:
   a. Search for "Edit the system environment variables" in the start menu
   b. Select on "Environment Variables…"
   c. Under "System variables", locate and select on the "Path" variable
   d. Select on "Edit…"
   e. Select on "New" to add a new path
   f. Add the path to your Vivado Lab installation, which is dependent on where you installed Vivado Lab and what version you installed. The path to the bin folder typically looks something like this: *C:\Xilinx\Vivado_Lab\2023.1.1\bin*

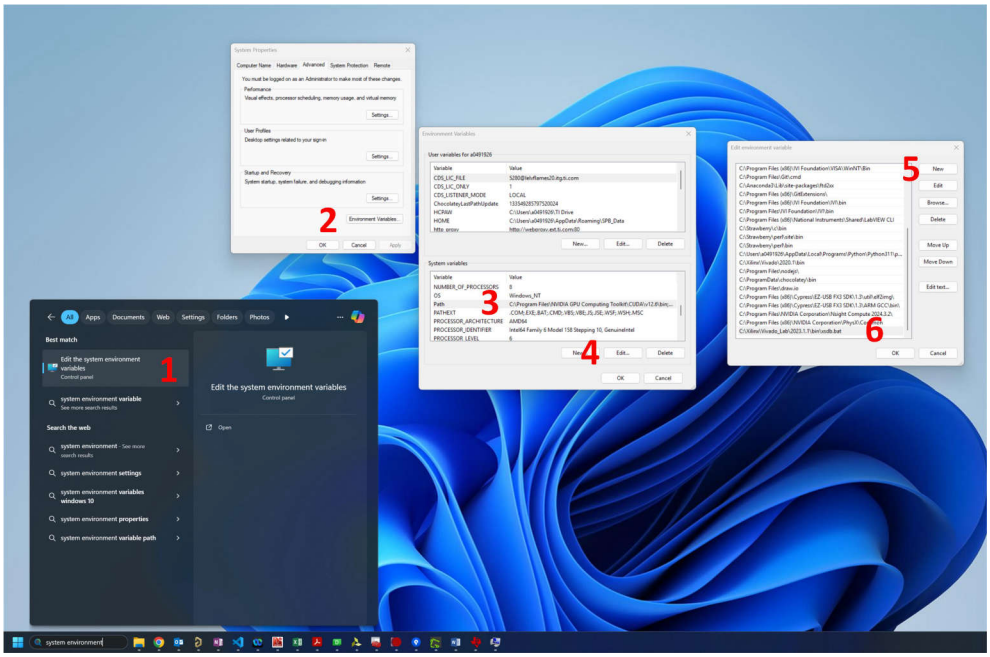


Figure 3-1. Environment Variable Setup

4 Setup Procedure

The following setup procedures detail how to setup and use the hardware and software required for evaluation of all three variants of the ADC3660/ADC364xEVM.

4.1 Setting up the ADC3660EVM

1. Verify that the software is set up according to the Software Setup section.
2. Verify that the hardware is set up according to the Hardware Setup section
3. To provide the CLK signal:
   a. Using an SMA cable and an inline 65MHz band pass filter, connect the signal generator to the CLKp SMA connector (J5) on the ADC3660EVM.
   b. Set the output signal frequency of the signal generator to 65MHz and the signal amplitude to +10dBm.
4. By default, the EVM is configured to take a single ended input, so analog inputs must be applied to connectors CHAp (J7) for Channel A or CHBp (J9) for Channel B. To provide an analog input:
   a. Using an SMA cable and an inline 5MHz band pass filter, connect the signal generator to analog input channel A.
   b. Set the output signal frequency of the signal generator to 5.135MHz (prime number) and 0dBm.
5. To provide a DCLK signal:
   a. Using an SMA cable, connect the signal generator to the DCLKIN SMA connector (J6).
   b. Set the output signal frequency of the signal generator to 260MHz (16-bit, 2-wire, DDC bypass) and the signal amplitude to +2dBm.
6. Verify that all signal generators for clock, analog input and DCLK are referenced locked using the 10MHz REF on the back of the signal generators. For an example of this, please see figure below.

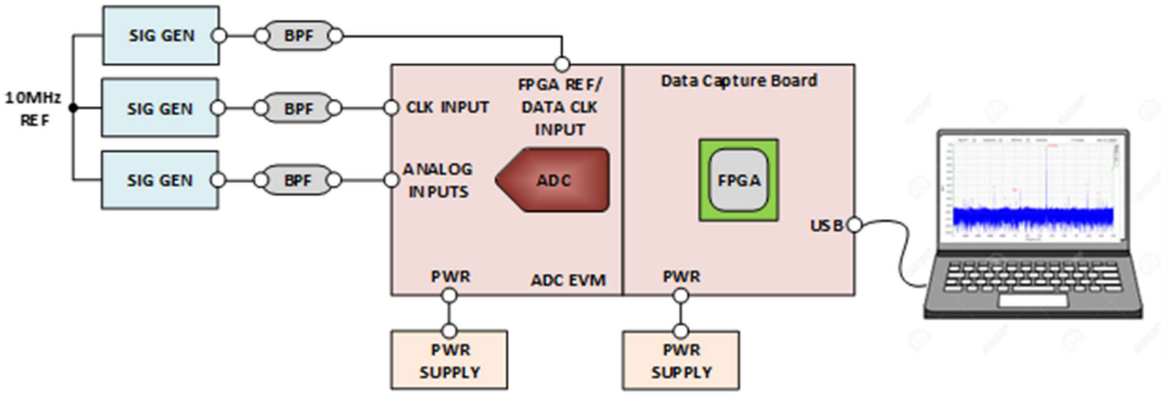


Figure 4-1. Basic Test Measurement Setup

7. Your setup now looks like the following:

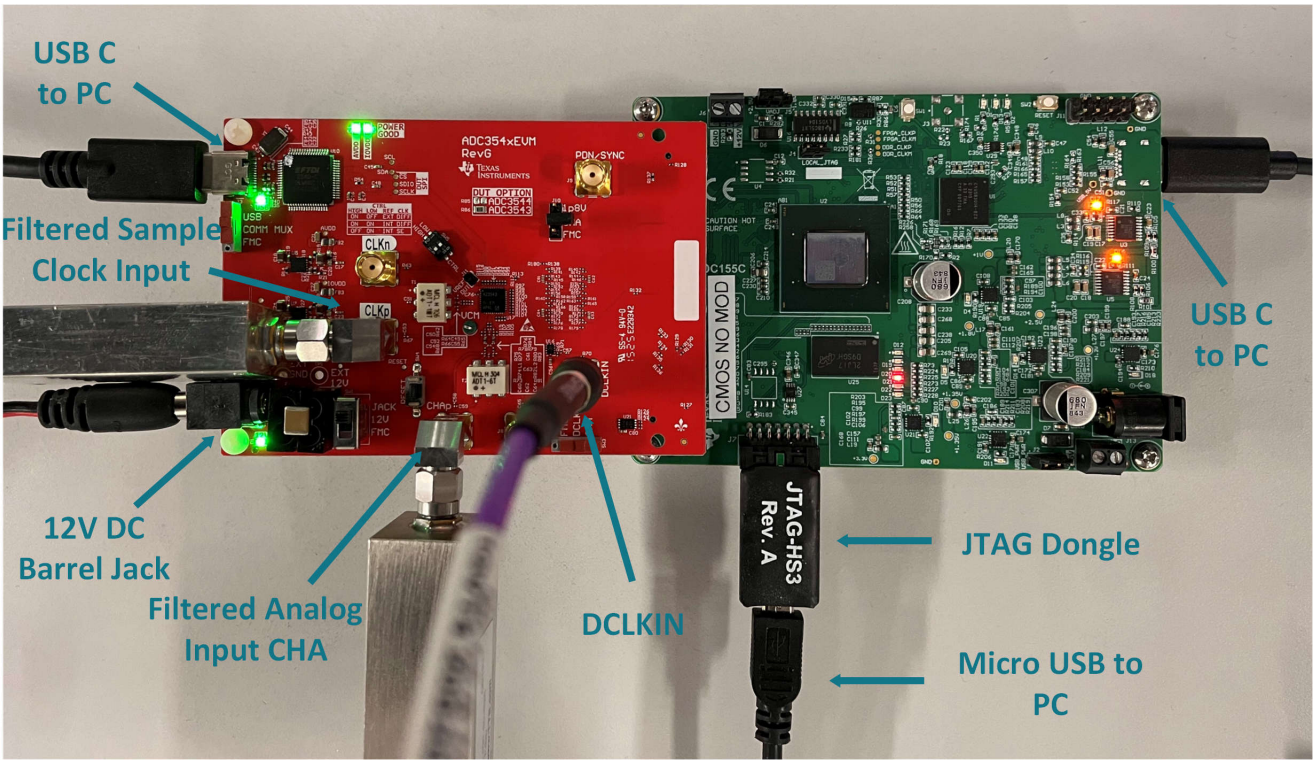


Figure 4-2. ADC3660EVM Hardware Setup

8. Open HSDC Pro. Always verify that HSDC Pro is open **before** opening the ADC36xxEVM GUI.
9. Select on cancel when prompted to connect to a board. The GUI handles all of the other HSDC Pro capture and configuration related operations.

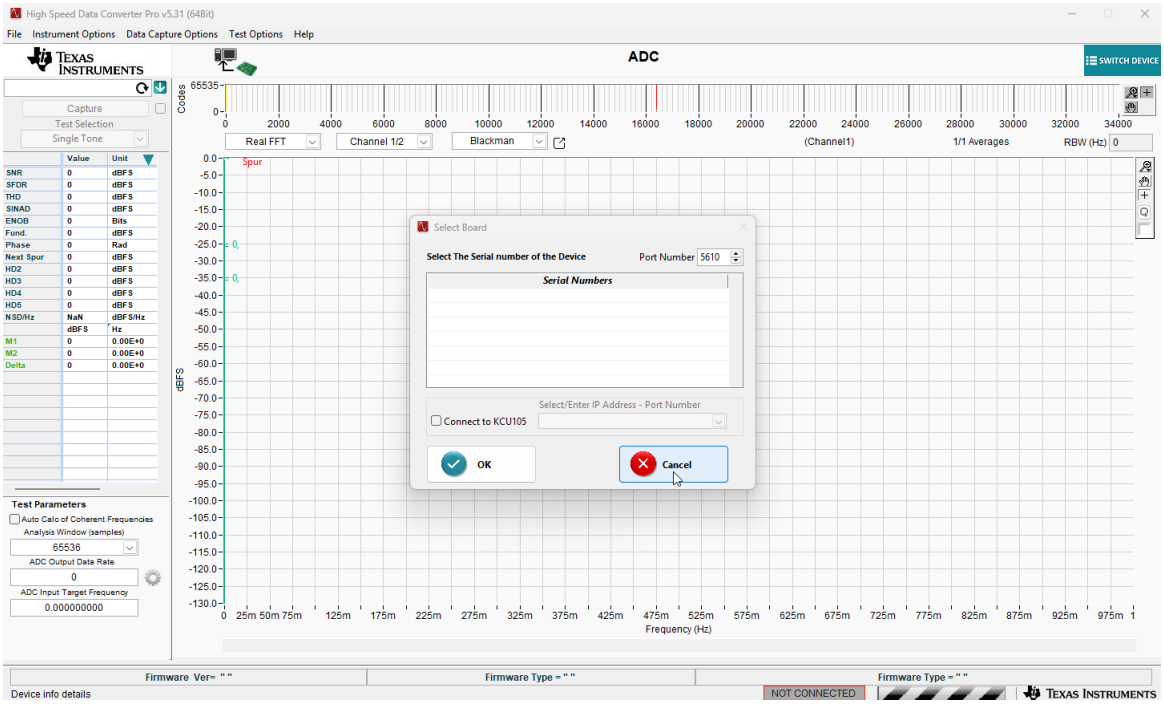


Figure 4-3. HSDC Pro

10. Open the ADC36xxEVM GUI. Allow a few seconds for the GUI to connect to the TSWDC155EVM FPGA Capture board. The TSWDC155EVM powers on, and several LEDs become illuminated, as shown below.

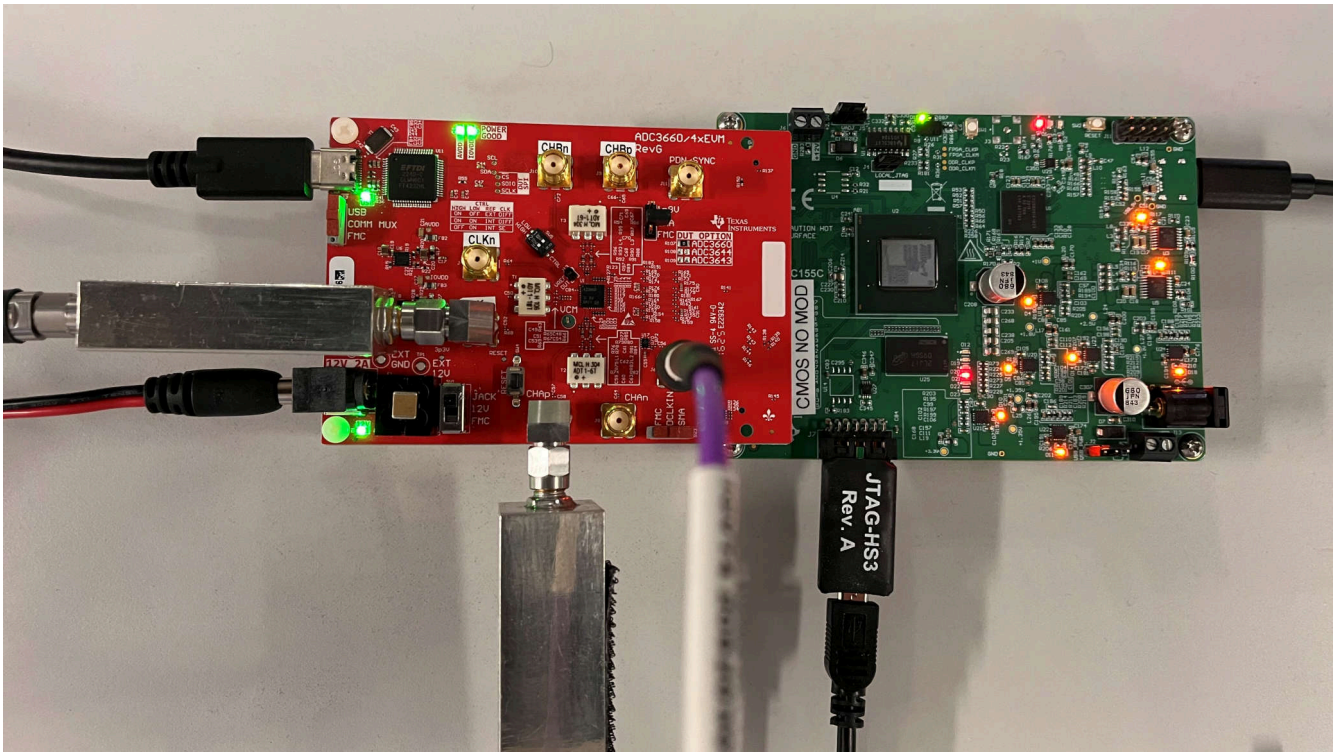


Figure 4-4. TSWDC155EVM Powered On

11. Once the GUI is opened, ensure the ADC mode options are correct and click on the “Calculate” button to calculate the necessary DCLK. For this mode, the DCLK must be 260MHz. Verify that this signal is provided to the DCLK input on the hardware setup.

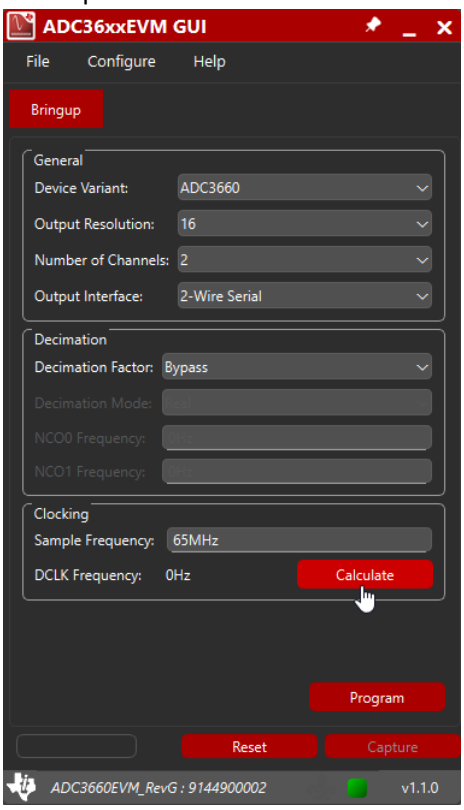


Figure 4-5. Calculating DCLK Frequency for ADC3660

12. Select the “Program” button. Allow a few seconds to program the ADC, program the FPGA, and configure the FPGA firmware.

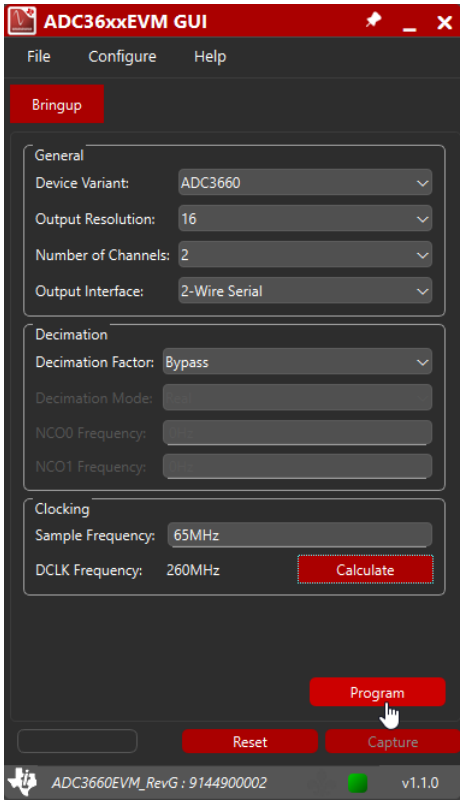


Figure 4-6. Programming the ADC3660EVM

13. Once programming is complete, select the "Capture" button to take an FFT data capture.

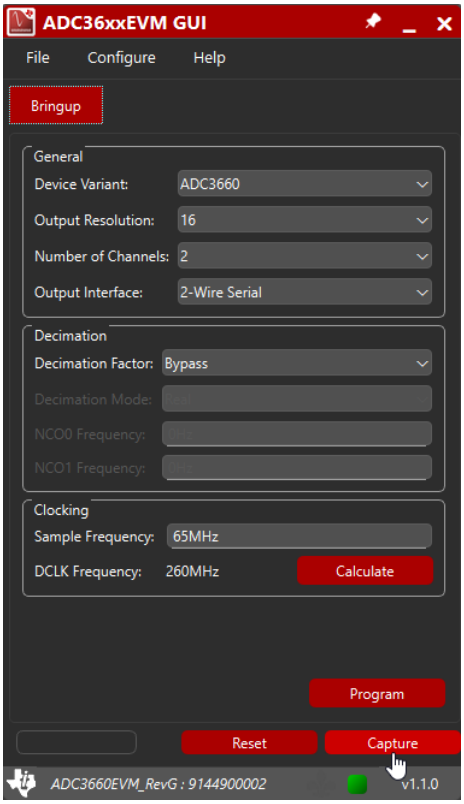


Figure 4-7. Capturing the FFT

14. After a few seconds, the captured data appears in the HSDC Pro window, where you can view the performance of the device. For more functions and features of HSDC Pro, see the HSDC Pro User Guide.

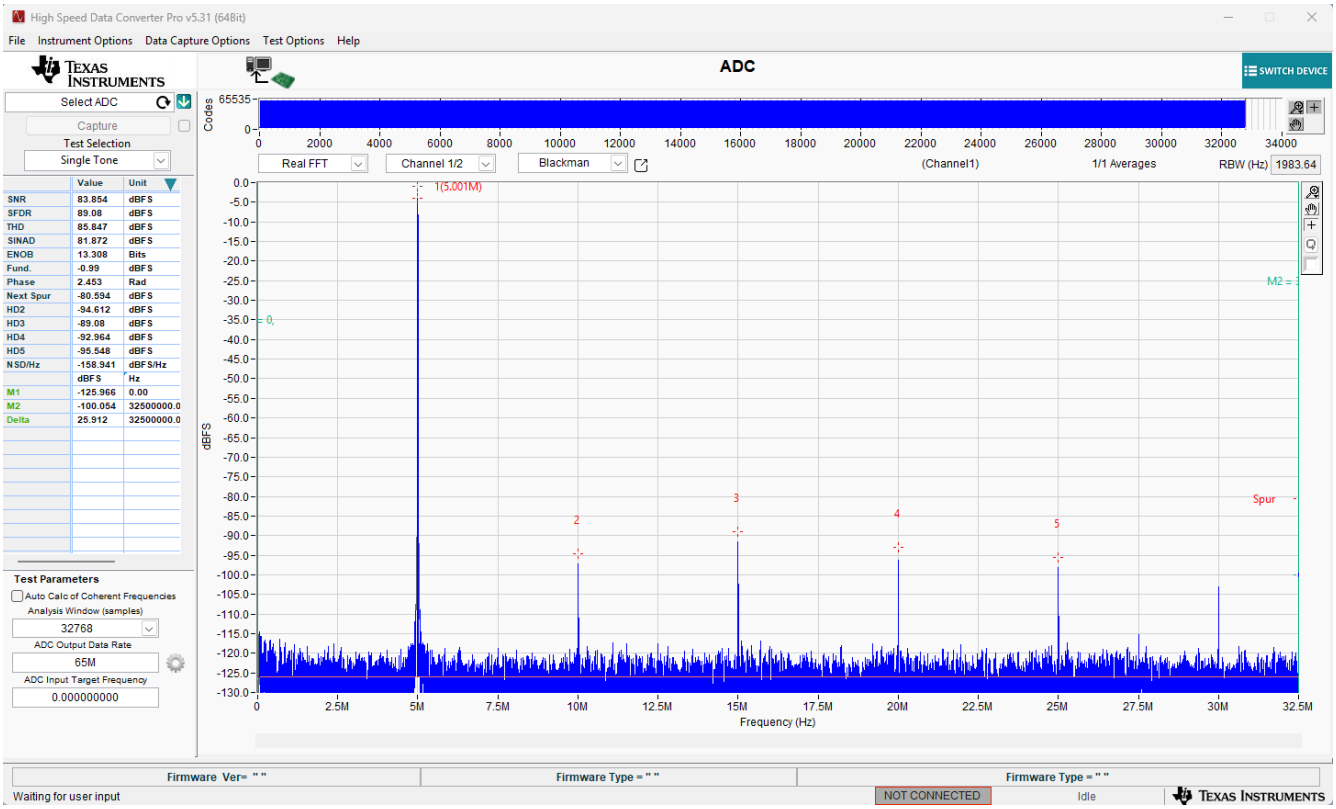


Figure 4-8. ADC3660EVM FFT Data Capture in HSDC Pro

15. If an error occurs when running the capture function, restart the GUI and follow steps 5-8 again.

4.2 Setting up the ADC3644EVM

1. Verify that the software is set up according to the Software Setup section.
2. Verify that the hardware is set up according to the Hardware Setup section
3. To provide the CLK signal:
   a. Using an SMA cable and an inline 125MHz band pass filter, connect the signal generator to the CLKp SMA connector (J5) on the ADC3644EVM.
   b. Set the output signal frequency of the signal generator to 125MHz and the signal amplitude to +10dBm.
4. By default, the EVM is configured to take a single ended input, so analog inputs must be applied to connectors CHAp (J7) for Channel A or CHBp (J9) for Channel B. To provide an analog input:
   a. Using an SMA cable and an inline 5MHz band pass filter, connect the signal generator to analog input channel A.
   b. Set the output signal frequency of the signal generator to 5.135MHz (prime number) and 0dBm.
5. To provide a DCLK signal:
   a. Using an SMA cable, connect the signal generator to the DCLKIN SMA connector (J6).
   b. Set the output frequency of the signal generator to 227.5MHz (14-bit, 2-wire, DDC bypass) and the signal amplitude to +2dBm.

6. Verify that all signal generators for clock, analog input and DCLK are referenced locked using the 10MHz REF on the back of the signal generators. For an example of this, please see figure below.

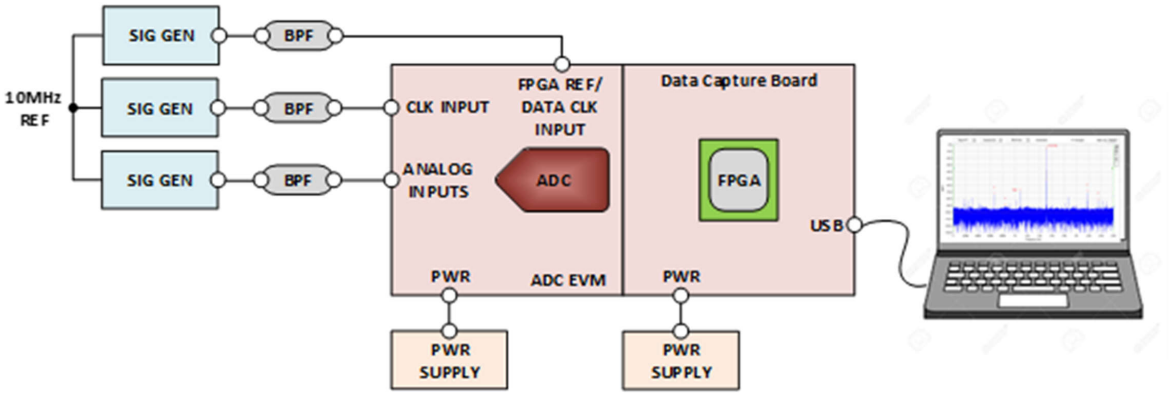


Figure 4-9. Basic Test Measurement Setup

7. Your setup now looks like the following:

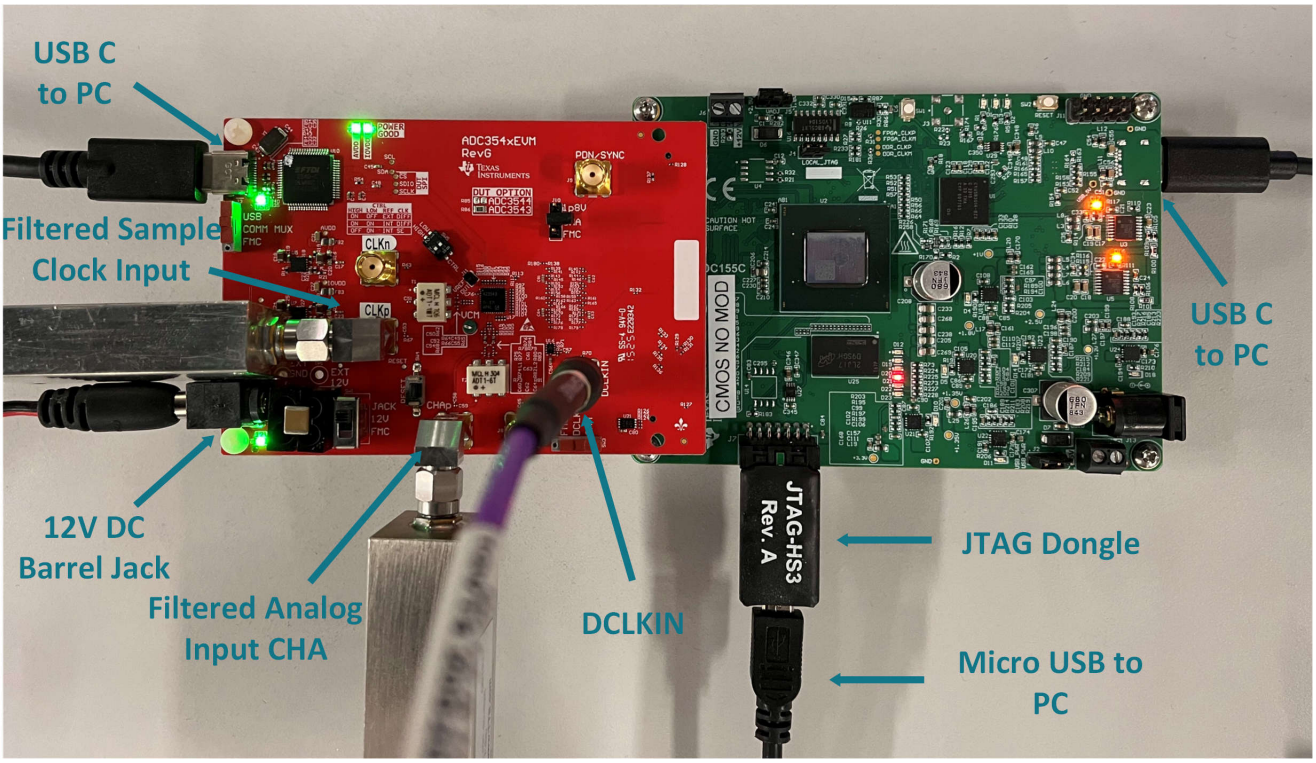


Figure 4-10. ADC3644EVM Hardware Setup

8. Open HSDC Pro. Always verify that HSDC Pro is open **before** opening the ADC36xxEVM GUI.

9. Select on cancel when prompted to connect to a board. The GUI handles all of the other HSDC Pro capture and configuration related operations.

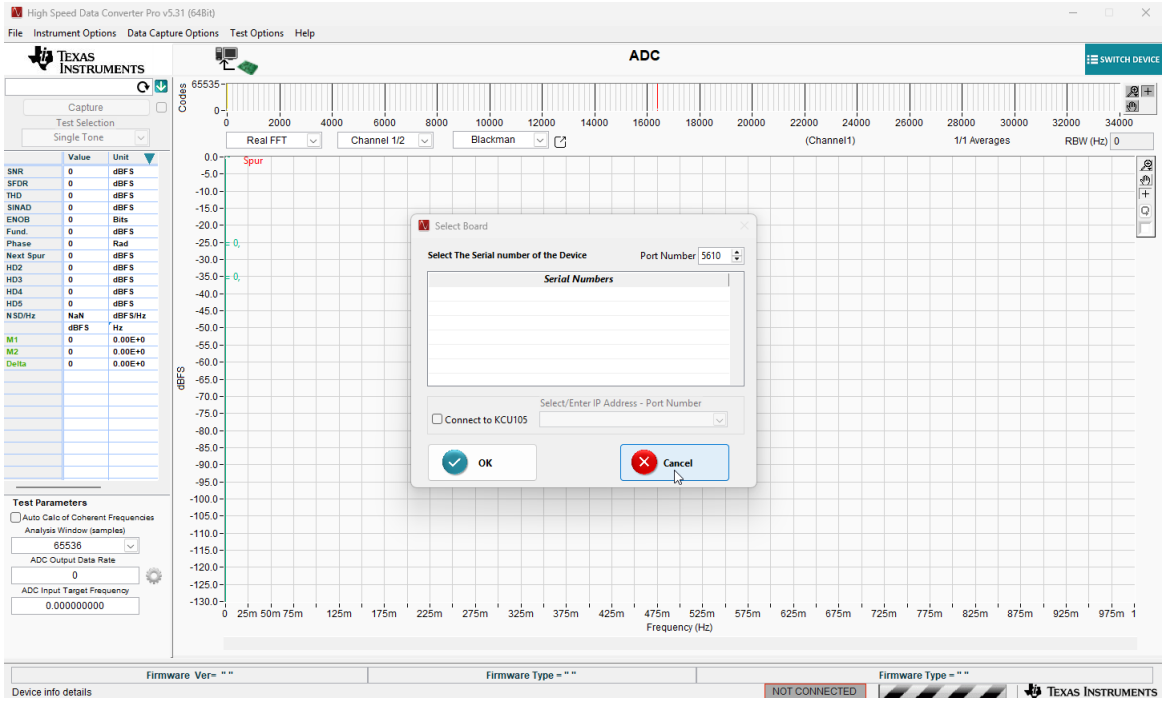


Figure 4-11. HSDC Pro

10. Open the ADC36xxEVM GUI. Allow a few seconds for the GUI to connect to the TSWDC155EVM FPGA Capture board. The TSWDC155EVM powers on, and several LEDs illuminates, as shown below.

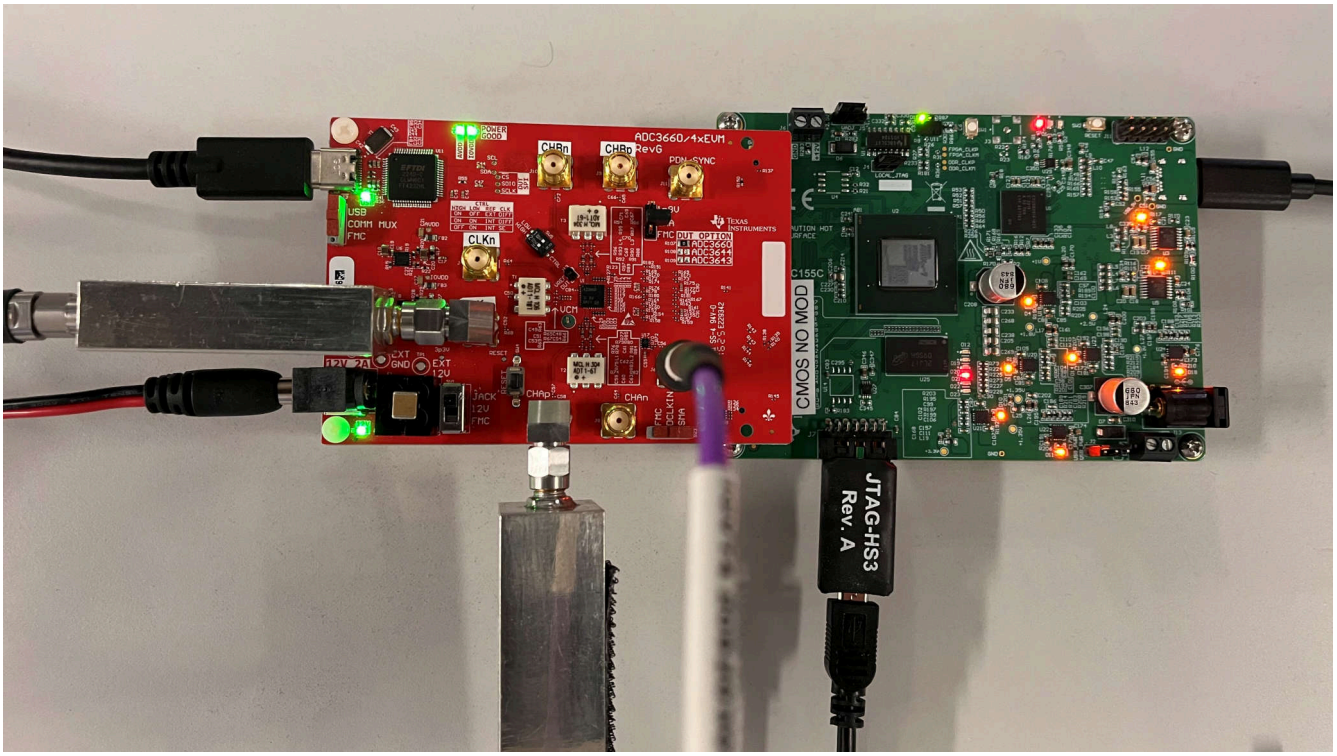


Figure 4-12. TSWDC155EVM Powered On

11. Once the GUI is opened, verify that the correct ADC mode parameters are selected, then click on the “Calculate” button to calculate the necessary DCLK. For this mode, the DCLK must be 437.5MHz. Verify that this signal is provided to the DCLK input on the hardware setup.

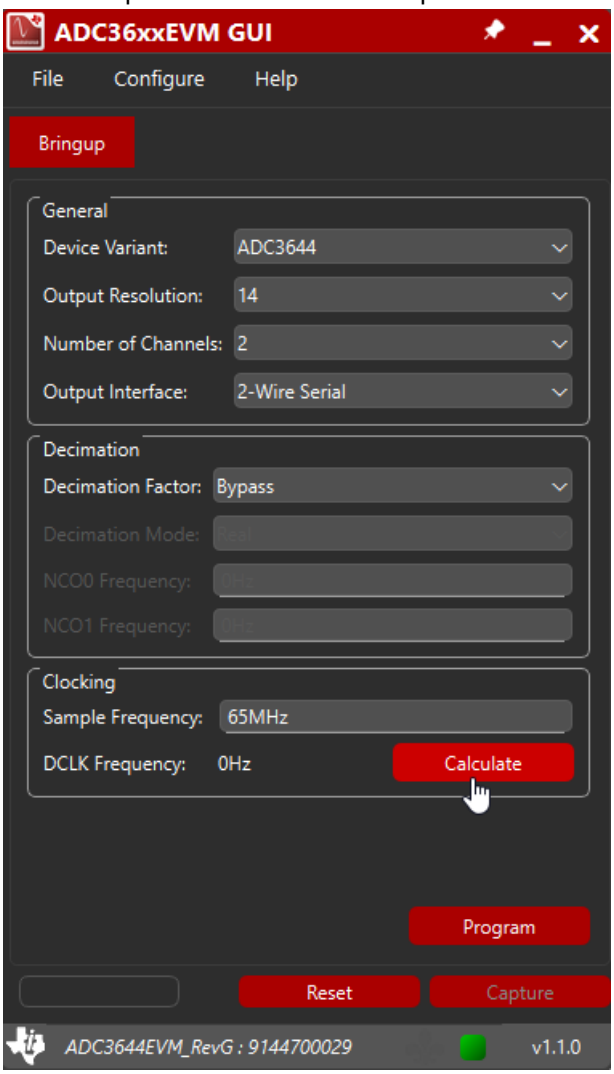


Figure 4-13. Calculating DCLK Frequency for ADC3644

12. Select the “Program” button. Allow a few seconds to program the ADC, program the FPGA, and configure the FPGA firmware.

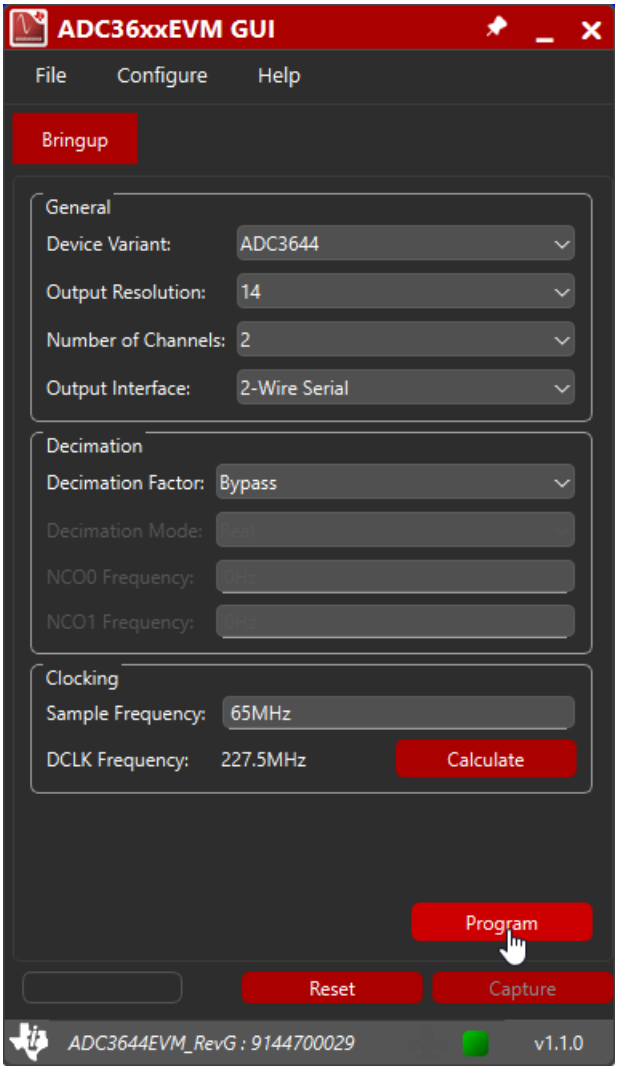


Figure 4-14. Programming the ADC3644EVM

13. Once programming is complete, select the "Capture" button to take an FFT data capture.

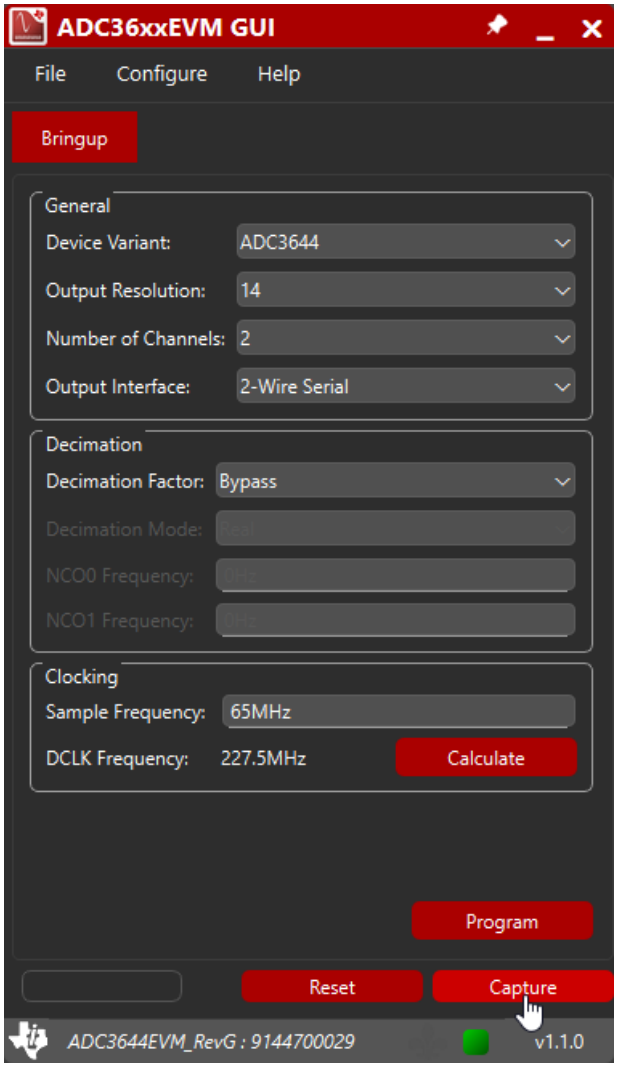


Figure 4-15. Capturing the FFT

14. After a few seconds, the captured data appears in the HSDC Pro window, where you can view the performance of the device. For more functions and features of HSDC Pro, see the HSDC Pro User Guide.

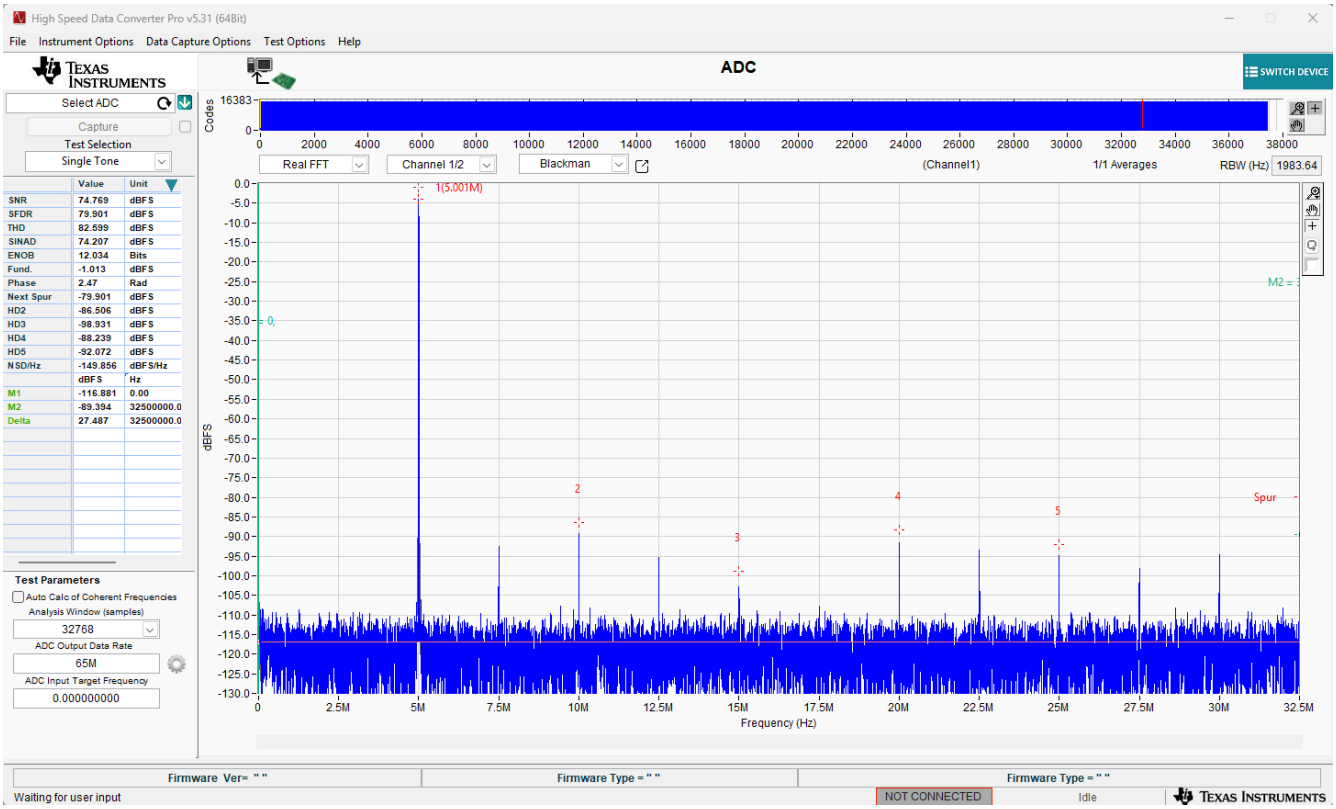


Figure 4-16. ADC3644EVM FFT Data Capture in HSDC Pro

15. If an error occurs when running the capture function, restart the GUI and follow steps 5-8 again.

4.3 Setting up the ADC3643EVM

1. Verify that the software is set up according to the Software Setup section.
2. Verify that the hardware is set up according to the Hardware Setup section
3. To provide the CLK signal:
   a. Using an SMA cable and an inline 65MHz band pass filter, connect the signal generator to the CLKp SMA connector (J5) on the ADC3643EVM.
   b. Set the output signal frequency of the signal generator to 65MHz and the signal amplitude to +10dBm.
4. By default, the EVM is configured to take a single ended input, so analog inputs must be applied to connectors CHAp (J7) for Channel A or CHBp (J9) for Channel B. To provide an analog input:
   a. Using an SMA cable and an inline 5MHz band pass filter, connect the signal generator to analog input channel A.
   b. Set the output signal frequency of the signal generator to 5.135MHz (prime number) and 0dBm.
5. To provide a DCLK signal:
   a. Using an SMA cable, connect the signal generator to the DCLKIN SMA connector (J6).
   b. Set the output frequency of the signal generator to 227.5MHz (14-bit, 2-wire, DDC bypass) and the signal amplitude to +2dBm.
6. Verify that all signal generators for clock, analog input and DCLK are referenced locked using the 10MHz REF on the back of the signal generators. For an example of this, please see figure below.

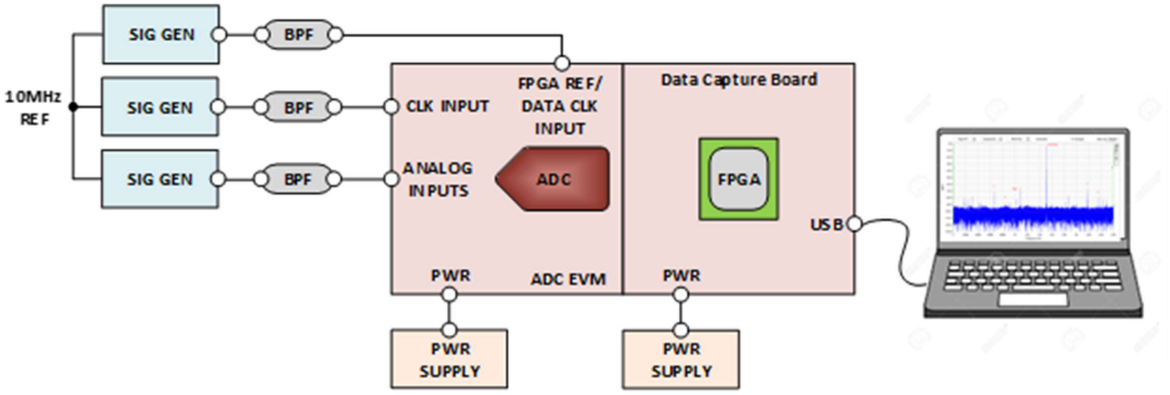


Figure 4-17. Basic Test Measurement Setup

7. Your setup now looks like the following:

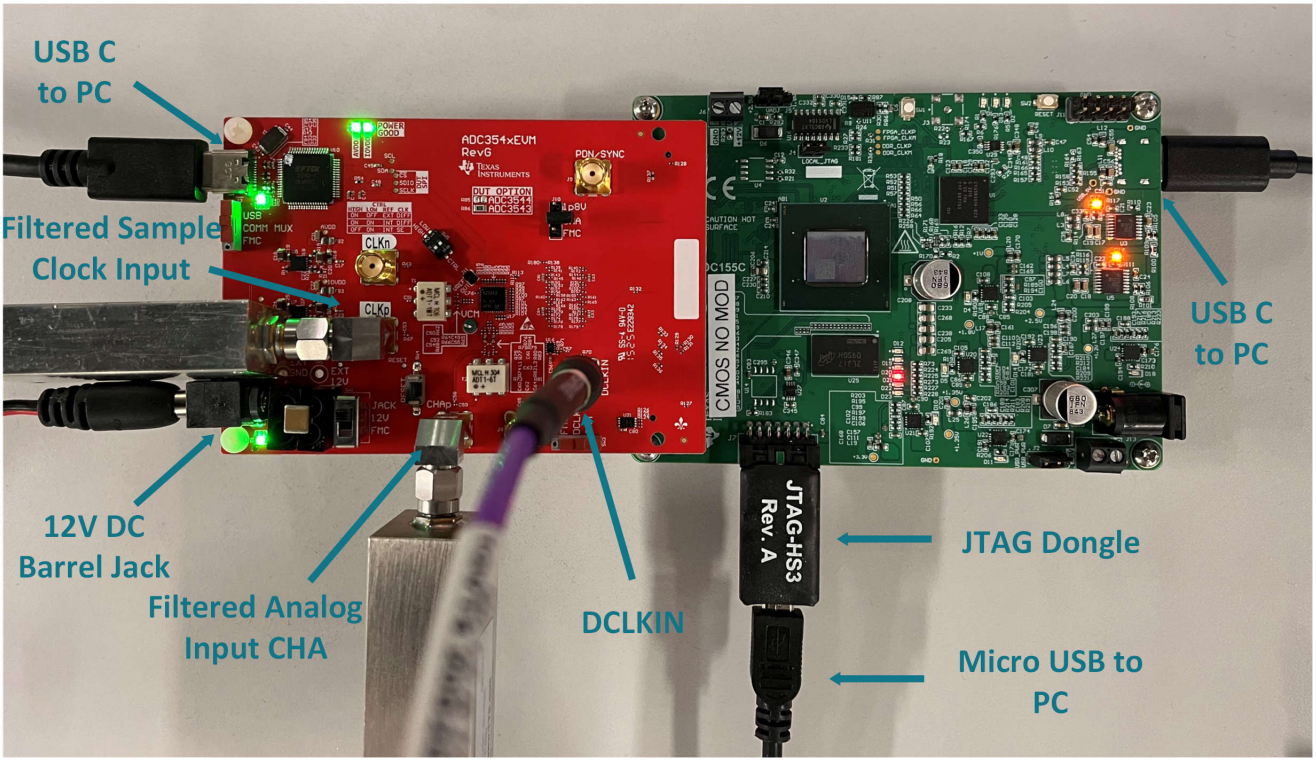


Figure 4-18. ADC3643EVM Hardware Setup

8. Open HSDC Pro. Always verify that HSDC Pro is open **before** opening the ADC36xxEVM GUI.

9. Select on cancel when prompted to connect to a board. The GUI handles all of the other HSDC Pro capture and configuration related operations.

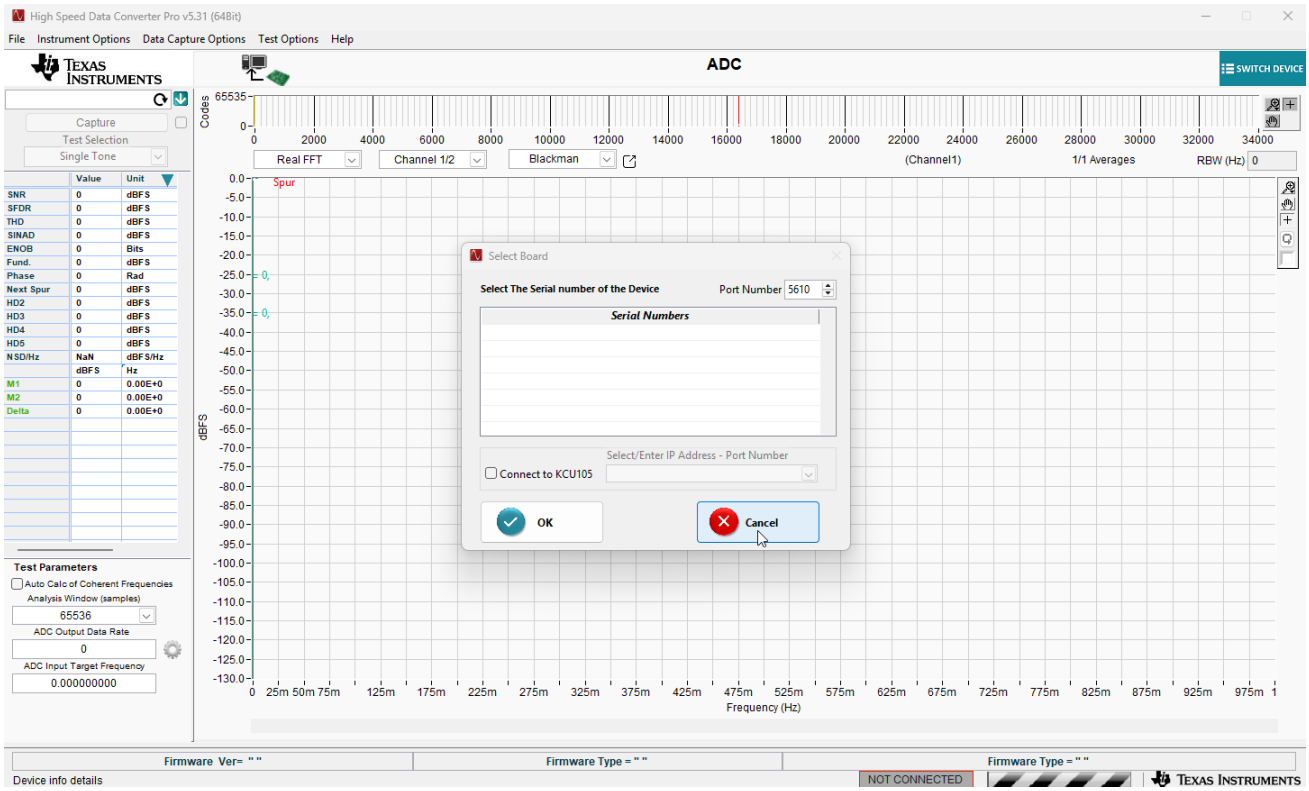


Figure 4-19. HSDC Pro

10. Open the ADC36xxEVM GUI. Allow a few seconds for the GUI to connect to the TSWDC155EVM FPGA Capture board. The TSWDC155EVM powers on, and several LEDs become illuminated, as shown below.

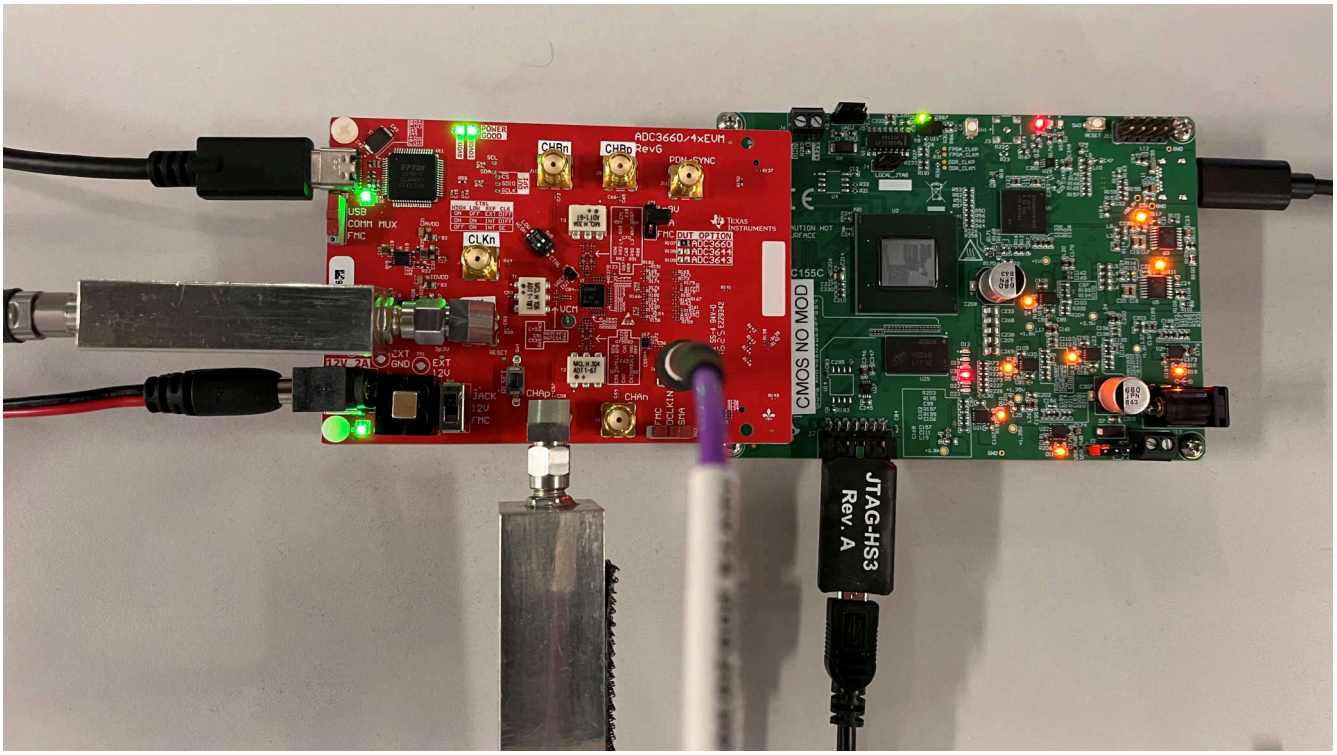


Figure 4-20. TSWDC155EVM Powered On

11. Once the GUI is opened, verify that the correct ADC mode parameters are selected, then click on the “Calculate” button to calculate the necessary DCLK. For this mode, the DCLK must be 227.5MHz. Verify that this signal is provided to the DCLK input on the hardware setup.

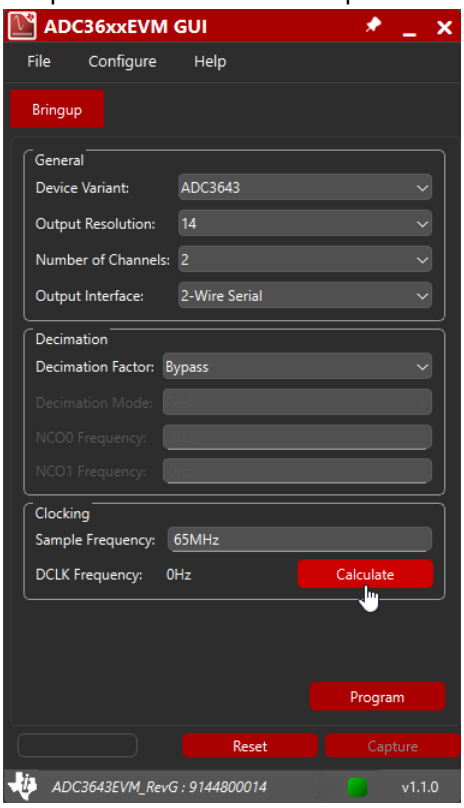


Figure 4-21. Calculating DCLK Frequency for ADC3643

12. Select the “Program” button. Allow a few seconds to program the ADC, program the FPGA, and configure the FPGA firmware.

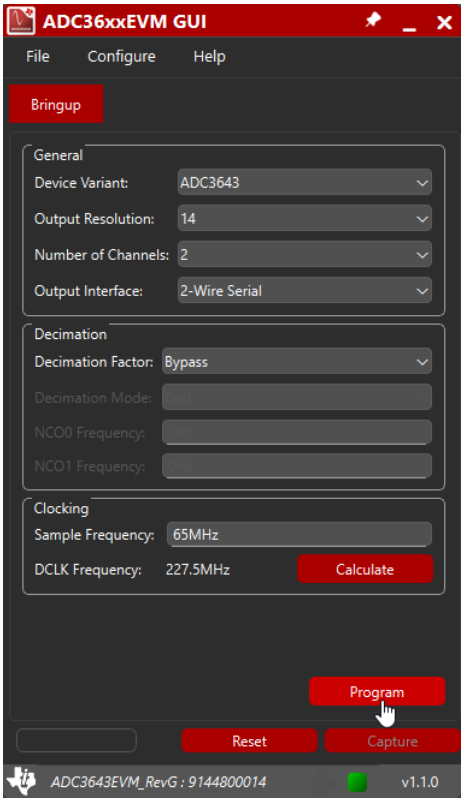


Figure 4-22. Programming the ADC3643EVM

13. Once programming is complete, select the "Capture" button to take an FFT data capture.

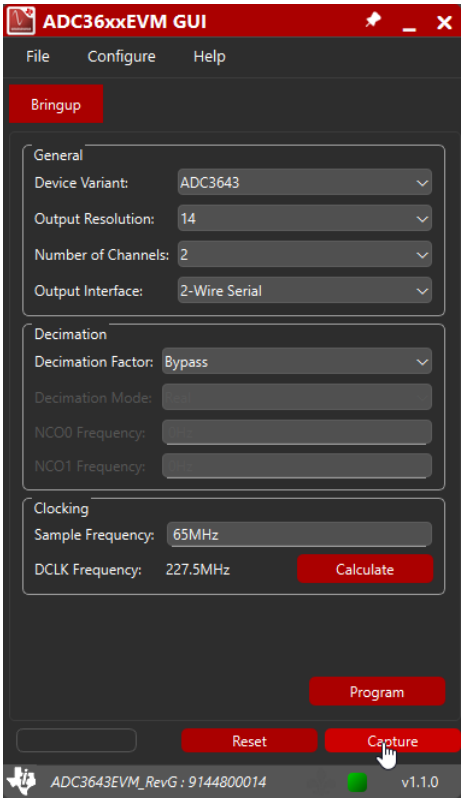


Figure 4-23. Capturing the FFT

14. After a few seconds, the captured data appears in the HSDC Pro window, where you can view the performance of the device. For more functions and features of HSDC Pro, see the HSDC Pro User Guide.

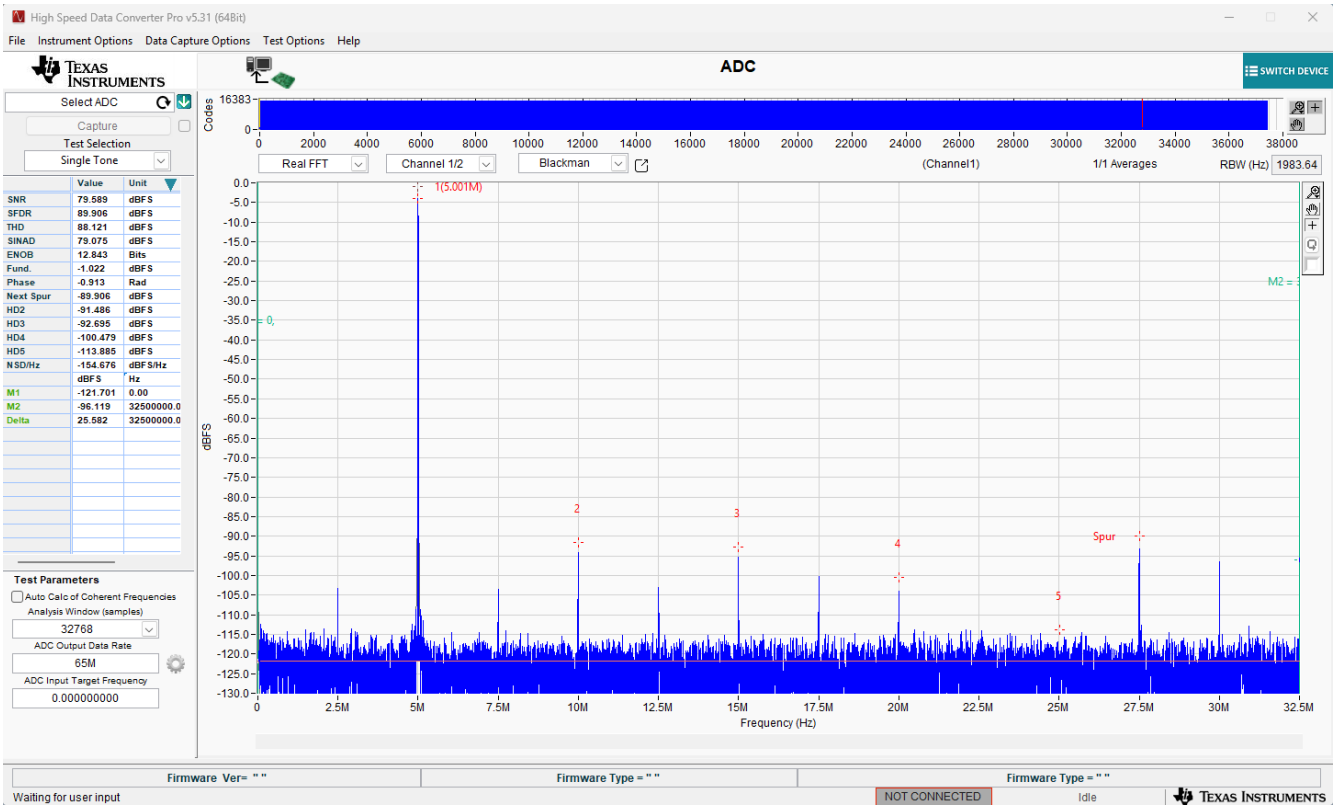


Figure 4-24. ADC3643EVM FFT Data Capture in HSDC Pro

15. If an error occurs when running the capture function, restart the GUI and follow steps 5-8 again.

5 Hardware Design Files

The design files (schematics, PCB layout, and bill of materials (BOM) are available on the product page: ADC3660EVM, ADC3644EVM, and ADC3643EVM.

6 Additional Information

6.1 Trademarks

Microsoft® and Windows® are registered trademarks of Microsoft Corporation.
All trademarks are the property of their respective owners.

7 References

- Texas Instruments, ADC3660EVM product page
- Texas Instruments, ADC3644EVM product page
- Texas Instruments, ADC3643EVM product page
- Texas Instruments, TSWDC155 Evaluation Module, user's guide
- Texas Instruments, High Speed Data Converter Pro GUI, user's guide
- Texas Instruments, ADC3660 16-Bit, 0.5 to 65MSPS, Low-Noise, Low Power Dual Channel ADC, data sheet
- Texas Instruments, ADC3644 14-bit, 125MSPS, Low-noise, Low Power Dual Channel ADC, data sheet
- Texas Instruments, ADC364x 14-bit, 10MSPS to 65MSPS, Low-Noise, Low Power Dual Channel ADC, data sheet

8 Revision History

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

Changes from Revision * (October 2020) to Revision A (November 2025)	Page
• Updated the document format to the latest EVM user's guide template	1
• Updated the numbering format for tables, figures, and cross-references throughout the document	1

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   2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

WARNING

Evaluation Kits 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 shall operate the Evaluation Kit within TI’s recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI’s recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI’s instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGREDATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3 *Regulatory Notices:*

3.1 *United States*

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

FCC NOTICE: 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 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. 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。

https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

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 to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

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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3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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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.

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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.

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Last updated 10/2025