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This version (06 Nov 2018 22:30) was *approved* by Tony Meyers [https://ez.analog.com/members/TonyM]. The Previously approved version (/resources/eval/hsc-adc-evale?rev=1398891027) (30 Apr 2014 22:50) is available.

HSC-ADC-EVALEZ HIGH SPEED ADC CONVERTER EVALUATION PLATFORM

Preface

This user guide describes the HSC-ADC-EVALEZ [https://www.analog.com/hsadcevalboard] JESD-204B Data Capture eval board with a single FMC High Pin Count (HPC) interface. The application software tools used to interface with the product specific ADC Eval boards are also described.

The ADC data sheets and User Guides provide additional product specific information and should be consulted when using the evaluation board. All documents and software tools are available at High Speed ADC Eval Boards [https://www.analog.com/hsadcevalboard]. For additional information or questions, send an email to highspeed.converters@analog.com.

Product Highlights

1. Easy to Set Up. Connect the included power supply along with the CLK and AIN signal sources to the two evaluation boards. Then connect to the PC via the USB (Universal Serial Bus) port and use the ADI (Analog Devices, Inc.) provided software tools to evaluate the ADC performance.

2. USB (Universal Serial Bus) Port Connection to PC. PC interface is via a USB (Universal Serial Bus) 2.0 connection (1.1 compatible) to the PC. A USB (Universal Serial Bus) cable is provided in the kit.

3. 256 kB (kilobyte) FIFO (first-in first-out). The on-board FPGA contains an integrated FIFO (first-in first-out) to store data captured from the ADC for subsequent processing.

4. Support for eight (8) JESD-204B Lanes up to 6.5 Gbps (gigabits per second). Up to 644 MSPS (mega/millions of samples per second) SDR/1.2 GSPS DDR (Double Data Rate (memory)) Encode Rates on the Parallel LVDS/CMOS FMC I/O.

5. Supports ADCs with Serial Port Interface (SPI (Serial Peripheral Interface)). Some ADCs include a feature set that can be changed via the SPI (Serial Peripheral Interface). The HSC-ADC-EVALEZ capture board supports these SPI (Serial Peripheral Interface)-driven features through the existing USB (Universal Serial Bus) connection to the computer without additional cabling.

6. VisualAnalog™. VisualAnalog supports the HSC-ADC-EVALEZ hardware platform as well as enabling virtual ADC evaluation using ADIsimADC™, Analog Devices proprietary behavioral modeling technology. This allows rapid comparison between multiple ADCs, with or without hardware evaluation boards. For more information, see AN-737 at www.analog.com/VisualAnalog [http://www.analog.com/VisualAnalog].
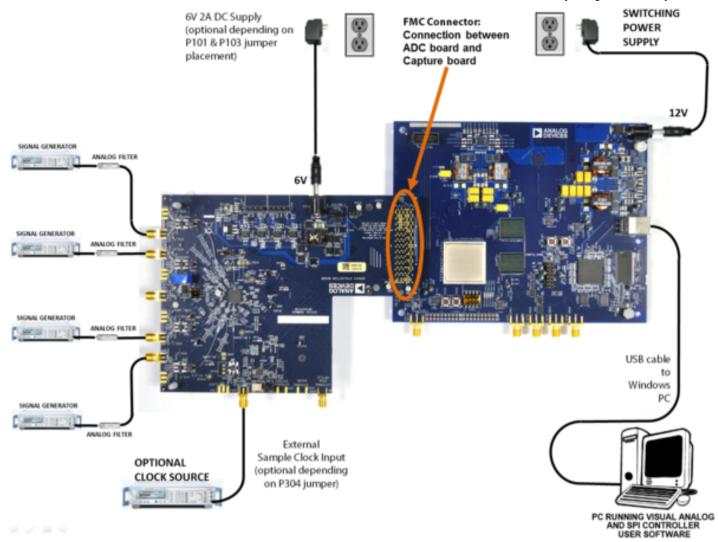
Typical Data Capture Setup

Figure 1. Evaluation Board Connection—AD9656EBZ [https://www.analog.com/AD9656] (on Left) and HSC-ADC-EVALEZ [https://www.analog.com/hsadcevalboard] (on Right)

Features

- Xilinx Virtex-6 FPGA-based buffer memory board used for capturing digital data from high speed JESD-204B ADC evaluation boards to simplify evaluation
- 256 kB (kilobyte) FIFO (first-in first-out) depth
- Support for up to eight (8) 6.5 Gbps (gigabits per second) JESD-204B Lanes
- Parallel input at 644 MSPS (mega/millions of samples per second) SDR and 1.2 Gbps (gigabits per second) DDR (Double Data Rate (memory))
- Supports 1.2V, 1.8 V (volt), 2.5 V (volt) CMOS, LVDS, and JESD204B interfaces
- Supports multiple ADC channels via single FMC-HPC interface connector
- Measures performance with VisualAnalog™
  - Real-time FFT and time domain analysis
  - Analyzes SNR, SINAD, SFDR, and harmonics
- Simple USB (Universal Serial Bus) port interface (2.0)
- Supports ADCs with serial port interfaces (SPI (Serial Peripheral Interface))
- FPGA reconfigurable via JTAG (Joint Test Action Group - low level interface to cpu) or USB (Universal Serial Bus)
- On-board regulator circuit speeds setup
- 12V, 3 A switching power supply included
- Compatible with Windows XP-Service Pack 3-32bit, Windows Vista-Service Pack 1-32&64bit, Windows 7-32&64bit

Helpful Documents

- AN-905 Application Note [https://www.analog.com/an-905], *VisualAnalog Converter Evaluation Tool Version 1.0 User Manual*
- AN-878 Application Note [https://www.analog.com/an-878], *High Speed ADC SPI (Serial Peripheral Interface) Control Software*
- AN-877 Application Note [https://www.analog.com/an-877], *Interfacing to High Speed ADCs via SPI (Serial Peripheral Interface)*
- AN-835 Application Note [https://www.analog.com/an-835], *Understanding ADC Testing and Evaluation*

Design and Integration Files

- Schematic, sch_hadv6fmc01d.pdf (/_media/resources/eval/user-guides/sch_hadv6fmc01d.pdf)
- Gerbers, art_hadv6fmc01d.zip (/_media/resources/eval/user-guides/art_hadv6fmc01d.zip)
- BOM, hsc-adc-evalez_hadv6fmc01d_bom01.xlsx (/_media/resources/eval/user-guides/hsc-adc-evalez_hadv6fmc01d_bom01.xlsx)

Equipment Needed

- Analog signal source and antialiasing filter
- Low jitter ADC sample clock source (if not using the on-board oscillator)
- High speed ADC evaluation board and ADC data sheet
- Switching power supply (12.0 V (volt), 3 A, provided)
- PC running Windows®
- Latest version of VisualAnalog and SPI (Serial Peripheral Interface) Controller Software
- USB (Universal Serial Bus) 2.0 port

Evaluation Board Description

The Analog Devices, Inc. high speed converter evaluation platform (HSC-ADC-EVALEZ) utilizes the latest version of VisualAnalog and an FPGA-based buffer memory board to capture blocks of digital data from the Analog Devices high speed analog-to-digital converter (ADC) evaluation boards. The ADC capture board is connected to the PC through a USB (Universal Serial Bus) port and is used with VisualAnalog to quickly evaluate the performance of high speed ADCs. Users can view an FFT for a specific analog input and encode rate to analyze SNR, SINAD, SFDR, and harmonic information.

The ADC capture board is easy to set up. Additional equipment needed includes an Analog Devices high speed ADC evaluation board, a signal source, and a clock source. Once the kit is connected and powered, the evaluation is enabled instantly on the PC.

The ADC capture board enables numerous expansion and evaluation possibilities by virtue of its powerful reconfigurable FPGA core.

The system can acquire JESD-204B digital data at speeds up to 6.5 Gbps (gigabits per second). The FPGA contains an integrated FIFO (first-in first-out) memory that allows capture of data record lengths up to a total of 256 kB (kilobyte). A USB (Universal Serial Bus) 2.0 microcontroller communicating with VisualAnalog allows for easy interfacing to computers using the USB (Universal Serial Bus) 2.0 interface.

The HSC-ADC-EVALEZ capture board provides all of the support circuitry required to accept eight lanes of JESD-204B data, as well as two 18-bit channels from an ADC's parallel CMOS or LVDS outputs. When using the HSC-ADC-EVALEZ in conjunction with an ADC evaluation board, it is critical that the signal sources used for the ADC board's analog input and clock have very low phase noise (<1 ps rms (root-mean-squared) jitter) to achieve the ultimate performance of the converter. Proper filtering of the analog input signal to remove harmonics and lower the integrated or broadband noise at the input is also necessary to achieve the specified noise performance.

Evaluation Board Hardware

EASY START Requirements

- HSC-ADC-EVALEZ ADC capture board, VisualAnalog, 12 V (volt) wall transformer, and USB (Universal Serial Bus) cable
- High speed ADC evaluation board and ADC data sheet
- Power supply for ADC evaluation board
- Analog signal source and appropriate filtering
- Low jitter clock source applicable for specific ADC evaluation, typically <1 ps rms (root-mean-squared) jitter
- PC running Windows®
- PC with a USB (Universal Serial Bus) 2.0 port

EASY START Steps

Important Note Administrative rights for the Windows operating systems are needed during the entire software installation procedure. Completion of every step before reverting to a normal user mode is recommended.

1. Download and Install VisualAnalog. For the latest updates to the software, check the Analog Devices website at High Speed ADC Eval Boards [https://www.analog.com/hsadcevalboard].

2. Connect the ADC capture board to the ADC evaluation board. If an adapter is required, insert the adapter between the ADC evaluation board and the ADC capture board.

3. Connect the provided USB (Universal Serial Bus) cable to the ADC capture board and to an available USB (Universal Serial Bus) port on the computer.

4. The ADC capture board is supplied with a wall mount switching power supply. Connect the supply end to an ac wall outlet rated for 100 Vac to 240 Vac at 47 Hz to 63 Hz. The other end is terminated with a plug that connects to the PCB at P1301. The supply is fused and conditioned before connecting to the regulators that supply the proper bias to the entire HSC-ADC-EVALEZ capture board.

5. Once the USB (Universal Serial Bus) cable is connected to both the computer and the HSC-ADC-EVALEZ board, and power is applied, the USB (Universal Serial Bus) driver starts to install. The Found New Hardware Wizard opens and prompts you through the automated install process.

6. (Optional) Verify in the Windows device manager that Analog Devices HADV6-FMC is listed under the USB (Universal Serial Bus) hardware.

7. Refer to the instructions included in the respective ADC data sheet found at www.analog.com [https://www.analog.com/] for more information about connecting the ADC evaluation board's power supply and other requirements. After verification of power supply connections, apply power to the ADC evaluation board and check the voltage levels on the ADC board to make sure they are correct.

8. Make sure the evaluation boards are powered on before connecting the analog input and clock. Connect the appropriate analog input (which should be filtered with a band-pass filter) and low jitter clock signal.

9. Refer to the VisualAnalog User Manual at High Speed ADC Eval Boards [https://www.analog.com/hsadcevalboard] for detailed software operating instructions.

HSC-ADC-EVALEZ Supported ADC Evaluation Boards

Refer to the Analog Devices High Speed ADC capture board product page at High Speed ADC Eval Boards [https://www.analog.com/hsadcevalboard] for a table of HSC-ADC-EVALEZ compatible ADC evaluation boards.

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