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CN0178 FMC-SDP Interposer & Evaluation Board / Xilinx KC705 Reference Design

Supported Devices

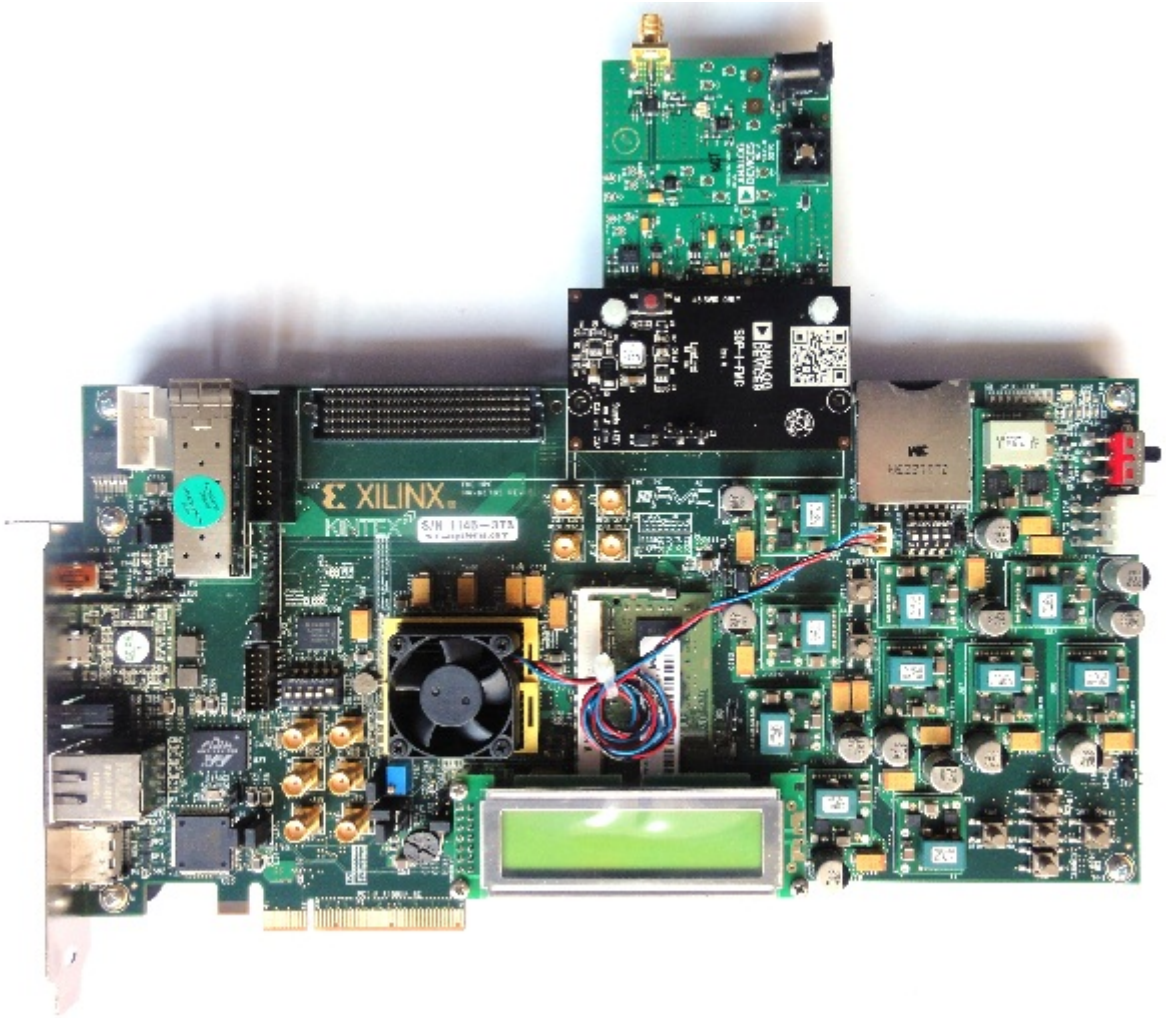
- ADL5902
- AD7466

Reference Circuits

- CN0178

Overview

This document presents the steps to setup an environment for using the **EVAL-CN0178-SDPZ** evaluation board together with the Xilinx KC705 FPGA board and the Xilinx Embedded Development Kit (EDK). Below is presented a picture of the EVAL-CN0178-SDPZ Evaluation Board with the Xilinx KC705 board.



For component evaluation and performance purposes, as opposed to quick prototyping, the user is directed to use the part evaluation setup. This consists of:

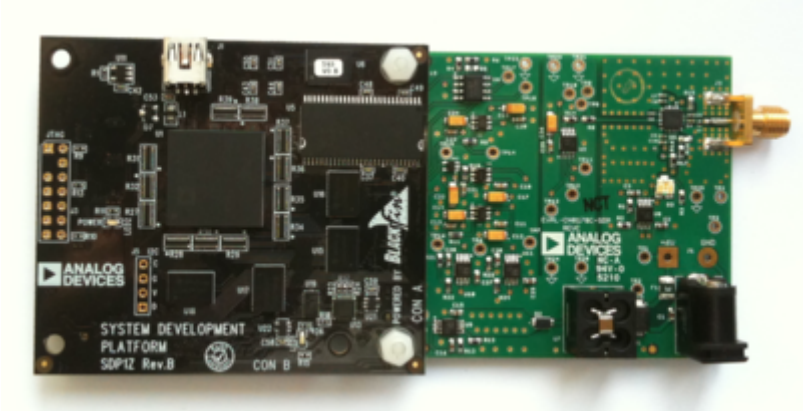
- 1. A controller board like the SDP-B (EVAL-SDP-CS1Z)
- 2. The component SDP compatible product evaluation board
- 3. Corresponding PC software (shipped with the product evaluation board)

The SDP-B controller board is part of Analog Devices System Demonstration Platform (SDP). It provides a high speed USB 2.0 connection from the PC to the component evaluation board. The PC runs the evaluation software. Each evaluation board, which is an SDP compatible daughter board, includes the necessary installation file required for performance testing.

Note: it is expected that the analog performance on the two platforms may differ.

28 Sep 2012 09:32 · Adrian Costina

Below is presented a picture of **SDP-B** Controller Board with the **EVAL-CN0178-SDPZ** Evaluation Board.



The CN0178 circuit uses the ADL5902 TruPwr™ detector to measure the rms signal strength of RF signals with varying crest factors (peak-to-average ratio) over a dynamic range of approximately 65 dB and operates at frequencies from 50 MHz up to 9 GHz.

The measurement result is provided as serial data at the output of a 12-bit ADC (AD7466).

The ADL5902 is a true rms responding power detector that has a 65 dB measurement range when driven with a single-ended 50 O source. This feature makes the ADL5902 frequency versatile by eliminating the need for a balun or any other form of external input tuning for operation up to 9 GHz. The ADL5902 provides a solution in a variety of high frequency systems requiring an accurate measurement of signal power. Requiring only a single supply of 5 V and a few capacitors, it is easy to use and capable of being driven single-ended or with a balun for differential input drive. The ADL5902 can operate from 50 MHz to 9 GHz and can accept inputs from -62 dBm to at least +3 dBm with large crest factors, such as GSM, CDMA, W-CDMA, TD-SCDMA, WiMAX, and LTE modulated signals.

The AD7466 is 12-bit, high speed, low power, successive approximation analog-to-digital converter (ADC). The part operates from a single 1.6 V to 3.6 V power supply and feature throughput rates up to 200 kSPS with low power dissipation. The part contains a low noise, wide bandwidth track-and-hold amplifier, which can handle input frequencies in excess of 3 MHz.

The **EVAL-CN0178-SDP** board contains the circuit to be evaluated, as described in this note. To power the EVAL-CN0178C-SDP evaluation board supply +6V between the +6 V and GND inputs.

More information

- CN0178 Info - circuit note information
- ADL5902 Product Info - pricing, samples, datasheet
- AD7466 Product Info - pricing, samples, datasheet
- EVAL-CN0178-SDP evaluation board user guide
- Xilinx KC705 FPGA board

Getting Started

The first objective is to ensure that you have all of the items needed and to install the software tools so that you are ready to create and run the evaluation project.

Required Hardware

- Xilinx KC705 FPGA board
- FMC-SDP adapter board
- **EVAL-CN0178-SDPZ** evaluation board

Required Software

- Xilinx ISE 14.6.
- UART Terminal (Termite/Tera Term/Hyperterminal), baud rate 115200.
- The EVAL-CN0178 reference project for Xilinx KC705 FPGA.

Downloads

- **AD7466 Driver:** https://github.com/analogdevicesinc/no-OS/tree/master/device_drivers/AD7466
- **CN0178 Commands:** https://github.com/analogdevicesinc/no-OS/tree/master/device_commands/CN0178
- **Xilinx Boards Common Drivers:** https://github.com/analogdevicesinc/no-OS/tree/master/platform_drivers/Xilinx/SDP_Common
- **EDK KC705 Reference project:** https://github.com/analogdevicesinc/fpgahdl_xilinx/tree/master/cf_sdp_kc705

Run the Demonstration Project

Hardware setup

Before connecting the ADI evaluation board to the Xilinx KC705 make sure that the VADJ_FPGA voltage of the KC705 is set to 3.3V. For more details on how to change the setting for VADJ_FPGA visit the Xilinx KC705 product page.

- Use the FMC-SDP interposer to connect the ADI evaluation board to the Xilinx KC705 board on the FMC LPC connector.
- Connect the JTAG and UART cables to the KC705 and power up the FPGA board.

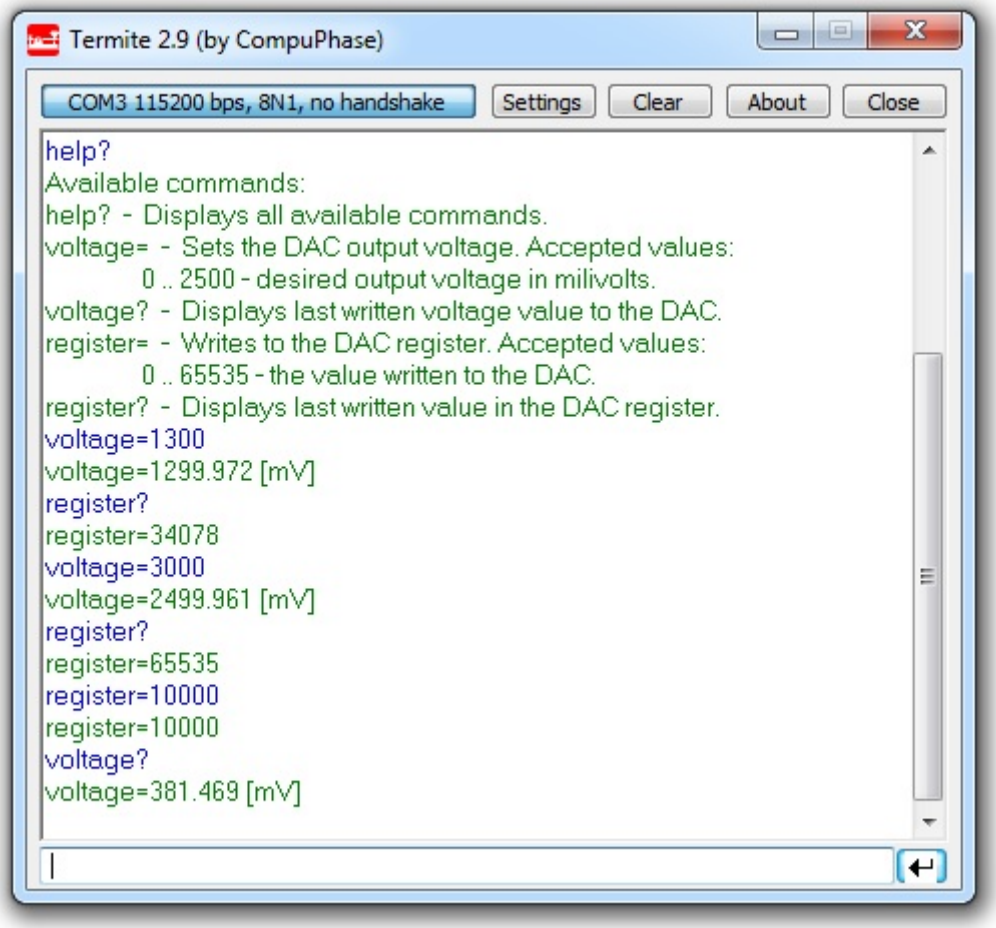
Reference Project Overview

The following commands were implemented in this version of EVAL-CN0178 reference project for Xilinx KC705 FPGA board.

Command	Description
help?	Displays all available commands.
calibration=	Makes a four points calibration. Accepted values: power input1(lowest value): -60 .. 0 - first point input power in [dBm]. power input2: -60 .. 0 - second point input power in [dBm]. power input3: -60 .. 0 - third point input power in [dBm]. power input3(highest value): -60 .. 0 - fourth point input power in [dBm].
pinCalc?	Displays the calculated input power in [dBm].
error?	Displays the error associated with the last input power calculation. Accepted values: -60 .. 0 - true input power in [dBm].

Commands can be executed using a serial terminal connected to the UART peripheral of Xilinx KC705 FPGA.

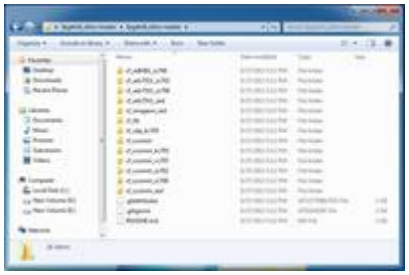
The following image shows a generic list of commands in a serial terminal connected to Xilinx KC705 FPGA's UART peripheral.



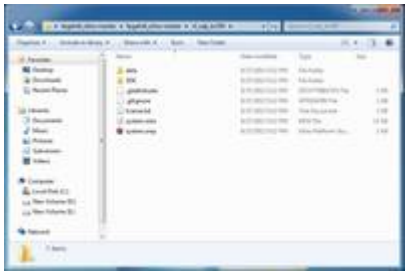
Software Project Setup

The hardware platform for each reference projects with FMC-SDP interposer and KC705 evaluation board is common. The next steps should be followed to recreate the software project of the reference design:

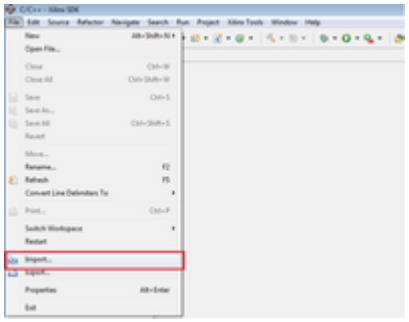
- First download the **KC705 Reference project** from Github on your computer. You can do this by clonning this repository: https://github.com/analogdevicesinc/fpgahdl_xilinx.



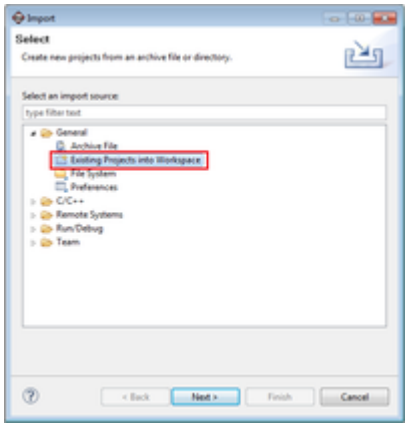
- From this entire repository you will use **cf_sdp_kc705** folder. This is common for all KC705 projects.



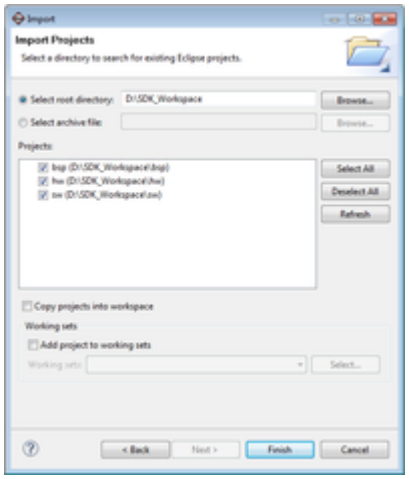
- Open the Xilinx SDK. When the SDK starts, it asks you to provide a folder where to store the workspace. Any folder can be provided. Make sure that the path where it is located does not contain any spaces.
- In the SDK select the ***File→Import*** menu option to import the software projects into the workspace.



- In the *Import* window select the ***General→Existing Projects into Workspace*** option.

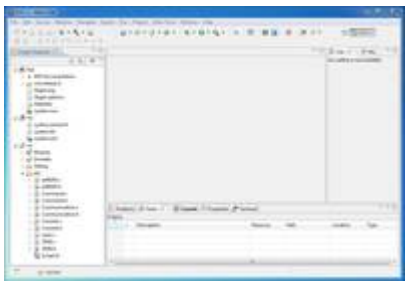


- In the *Import Projects* window select the **cf_sdp_kc705** folder as root directory and check the **Copy projects into workspace** option. After the root directory is chosen the projects that reside in that directory will appear in the *Projects* list. Press *Finish* to finalize the import process.

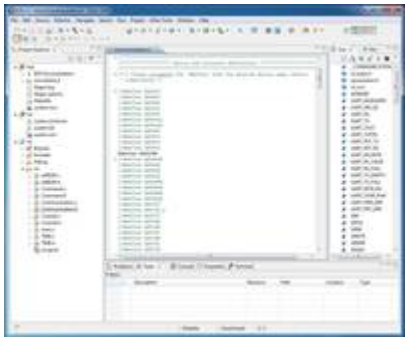


- The *Project Explorer* window now shows the projects that exist in the workspace without software files.

- Now the software must be added in your project. For downloading the software, you must use 3 links from Github given in **Downloads** section. From there you'll download the specific driver, the specific commands and the Xilinx Boards Common Drivers(which are commons for all Xilinx boards). All the software files downloaded must be copied in **src** folder from sw folder.



- Before compilation in the file called **Communication.h** you have to uncomment the name of the device that you currently use. In the picture below there is an example of this, which works only with AD5629R project. For another device, uncomment only the respective name. You can have one driver working on multiple devices, so the drivers's name and the uncommented name may not be the same for every project.



- The SDK should automatically build the project and the *Console* window will display the result of the build. If the build is not done automatically, select the ***Project→Build Automatically*** menu option.
- If the project was built without any errors, you can program the FPGA and run the software application.

13 Aug 2013 08:22 · Lucian Sin

More information

- AD7476 IIO Single channel Serial ADC Linux Driver

- ask questions about the FPGA reference design
- Example questions:
  - Adding IP by harikrishnan
  - 5V power from your AD-FMCOMMS1-EBZ by Kaos
  - FMCDAQ2+KCU105 DHCP issues by ic70
  - What's the width and deepth of the FIFO in Fmcomms2 adc_dmac? by l312361206
  - Have you any JESD204B reference design that has not microblaze and MIG7 Axi_ddr_cntrl? by saban

28 May 2012 14:18