

Notes about power measurements with the AC701 board

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The AC701 is a Xilinx development board with a larger feature set than the Nexys-4 boards used so far during the project. In addition to an Artix-7 chip of type XC7A200T, it includes a Texas Instruments power management system, based on a UCD90120 controller. The UCD90120 controls DC/DC converters (one per supply voltage) and makes sure that the voltages are ramped up in the correct order, etc. In addition, it allows continuous measurement of voltage and current through each of these DC/DC converters, when used with the AMS101 daughter card, which plugs into a header on the AC701. Current and voltage plots can then be shown in a GUI on the host PC.

To use the power measurement features, it is necessary to include a piece of hardware when generating the bit file for the FPGA. A code example is provided as `xadc_eval_design_ac701_v1_3`; a bit file is also provided that will install the AMS interface functionality but nothing else. (This code also interfaces to the XADCs on the AMS101 daughter card.)

The GUI is called AMS101 Evaluator GUI. It uses National Instruments (LabView) components to display the plots, and will also compute and display power plots for each supply, based on the current and voltage plots.

User's guides are available in the Documents folder for the AC701 card and the AMS101 daughter card. The necessary software will be installed on one of the Windows PCs in the course lab. In the mean time, inspect `xadc_eval_design_ac701_v1_3` to find out how to include this functionality in your design.

[It should in principle be possible to talk to the UCD90120 directly via the same bus it uses to control the DC/DC converters, that is, without going through the AMS101 and without modifying the FPGA configuration. Previous generations of Xilinx boards supported this mode for power measurement, and the PM bus connector is still present also on the AC701. I have not succeeded in getting this to work though.]

Here's the link to the AC701 Design hub

<https://www.xilinx.com/support/documentation-navigation/design-hubs/dh0030-ac701-evaluation-kit-hub.html>

Here's the documentation for the AMS101 board:

https://www.xilinx.com/support/documentation/boards_and_kits/ams101/ug86-ams101-eval-card.pdf

The part below needs some updating. Note that the software has not yet

been installed anywhere! Chipscope has been updated since then.

The necessary software has now been installed on XDAT07, which is the workstation right inside the door in 4220. Here are some quick notes:

- You need to run Windows. Sorry about that
- The xadc design files can be found under C:\Xilinx\rdf...
- I used ChipScope Analyzer to download the bit file to the board; then you need to select Diligent under JTAG Chain, and then JtagSmt1.... ; ChipScope should then find the XC7A200T chip. Then Device > Configure, and select the xadc bit file found in the ready_to_run directory
- The AMS Evaluator application can be found under Start > Programs > Xilinx Design Tools
- Select the COM6 port, then click Connect. Hopefully you should now see the LabView-like diagrams in all their dubious glory
- Select the Power Monitor tab and watch the fireworks

Have fun!