

pFREYA DAQ documentation

Paolo LAZZARONI
μLab
Università degli Studi di Bergamo

May 25, 2023

Summary

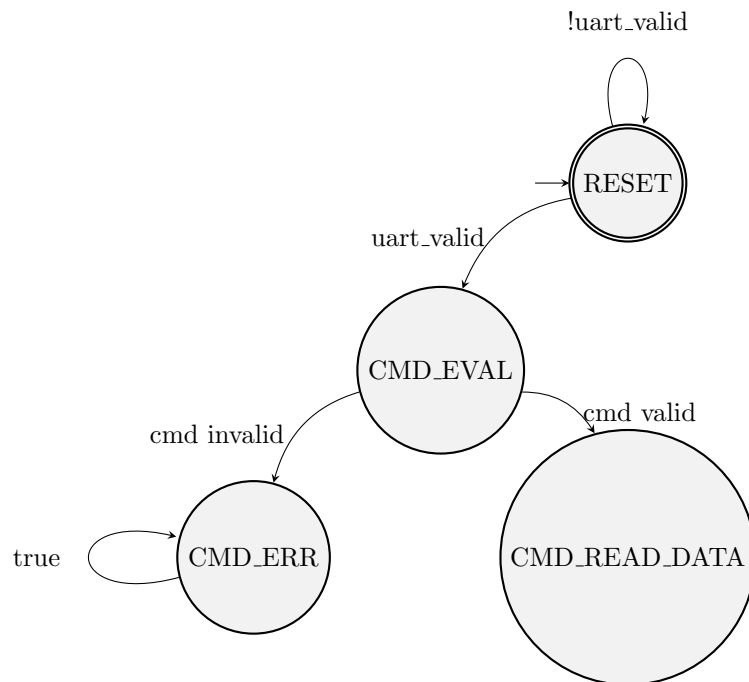
This document provides information on the Data Acquisition (DAQ) system to test the pFREYA16 and pFREYATS ASICs. The system is based on a Xilinx Ultrascale+ FPGA Evaluation Board (KCU116) and it is written in SystemVerilog/Verilog.

1 State machine

2

1 State machine

This section illustrate the state machine on the FPGA.



References

- [1] .
- [2] C. Jacobsen, *X-ray Microscopy* (Advances in Microscopy and Microanalysis). Cambridge: Cambridge University Press, 2019. DOI: 10.1017/9781139924542.
- [3] C. Jacobsen, J. Deng, and Y. Nashed, “Strategies for high-throughput focused-beam ptychography,” *J. Synchrotron Radiat.*, vol. 24, no. 5, pp. 1078–1081, 2017.
- [4] J. Deng, D. J. Vine, S. Chen, *et al.*, “X-ray ptychographic and fluorescence microscopy of frozen-hydrated cells using continuous scanning,” *Sci. Rep.*, vol. 7, no. 1, p. 445, 2017.
- [5] X. Huang, K. Lauer, J. N. Clark, *et al.*, “Fly-scan ptychography,” *Sci. Rep.*, vol. 5, 9074, p. 9074, Mar. 2015. DOI: 10.1038/srep09074.
- [6] S. Streiffer, S. Vogt, P. Evans, *et al.*, “Early science at the upgraded Advanced Photon Source,” Argonne National Laboratory, Tech. Rep., Oct. 2015.
- [7] M. Hammer, K. Yoshii, and A. Miceli, “Strategies for on-chip digital data compression for X-ray pixel detectors,” *J. Inst.*, vol. 16, no. 01, P01025, Jan. 2021. DOI: 10.1088/1748-0221/16/01/P01025. [Online]. Available: <https://dx.doi.org/10.1088/1748-0221/16/01/P01025>.
- [8] S. Stremper, T. Zhou, K. Yoshii, *et al.*, “A lightweight, user-configurable detector ASIC digital architecture with on-chip data compression for MHz X-ray coherent diffraction imaging,” *J. Inst.*, vol. 17, no. 10, P10042, Oct. 2022. DOI: 10.1088/1748-0221/17/10/P10042. [Online]. Available: <https://dx.doi.org/10.1088/1748-0221/17/10/P10042>.
- [9] P. Lazzaroni, M. Hammer, M. Manghisoni, A. Miceli, L. Ratti, and V. Re, “FALCON readout channel for X-ray ptychography applications,” in *2022 17th Conference on Ph.D Research in Microelectronics and Electronics (PRIME)*, 2022, pp. 193–196. DOI: 10.1109/PRIME55000.2022.9816837.