

The diagnostics' back-end system based on the in-house developed A|D|A and A|D|O boards

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Abstract

Several diagnostic instruments for the FERMI@Elettra FEL, among them the Bunch Arrival Monitor (BAM) and the Cavity Beam Position Monitor (C-BPM), require accurate readout, processing, and control electronics. All systems must be also integrated within the main machine control system. The back-end platform, based on the MicroTCA standard, provides a robust environment for accommodating such electronics, including reliable infrastructure features. Two types of Advanced Mezzanine Cards (AMC) had been developed in-house and manufactured for meeting the demanding performance requirements. The first is a fast (160MSps) and high-resolution (16 bits) Analog to Digital and Digital to Analog (A|D|A) Convert Board, hosting 2 A-D and 2 D-A converters controlled by a large FPGA (Virtex-5). The FPGA is also responsible for service and host interface handling. The latter board is Analog to Digital Only (A|D|O) Converter, derived from the A|D|A, with an analog front side stage made of four A-D converters. The overall systems' architectures, together with the specific AMCs' functionalities, are described. Results on performance measurements are also presented.



Conclusion

Presently both modules' prototypes (4 boards each) had been successfully tested and debugged, showing performances well within specifications. The A|D|A modules are in the process of a mini-series production of 20 pieces, expected to be delivered by June. While the A|D|O modules production will start later this summer. The development of the firmware is continuously growing, including both infrastructural features' improvement and application specific algorithm implementation. Moreover the usage of such cards in other interesting fields of application are being fostered.

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