CALICE ECAL Readout Electronics: Readout Board Overview

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1 Function

An overview of the readout board is shown in Fig. 1. Each readout board handles signals from six VFE-PCB's. It is clocked with a 12.5MHz clock distributed by an LVDS signal on the custom backplane.

It can receive a trigger from any one of three sources; an LVDS differential signal from the custom backplane (originating on the trigger board, the normal trigger source), a push-button on the front panel and a VME command. In the case of the standard trigger, the trigger path across the board is unclocked until it is received in the slave FPGA and delayed on a 100MHz clock.

Upon receipt of a trigger, the board generates the control signals to operate the VFE-PCB's and to clock the analogue data onto the multiplexed lines. The readout board then digitises these data and stores them until they are read out via VME.

The VFE-PCB control is handled by a "slave" FPGA, one per VFE-PCB, while the readout board as a whole is controlled by a "master" FPGA, which also handles the VME interface. The master FPGA loads configuration data to the slaves via a read/write data bus when these data are read and written via VME. It also receives the event data on a one-way point-to-point data path from the slaves and stores it until read via VME.

The whole board will repeat the trigger sequence on a second trigger, even if the first has not been read out.

2 Cost

All the following prices include VAT and are in FY02/03 £. The NRE costs are estimated at £800. The master FPGA could be a XC2S100, costed at £50, while the slave FPGA set could be six XC2S30 components, each £26. Analog AD7664 ADCs are estimated at £25 each. An Analog AD5543, 0.5 μsec settling time DAC is £33. Other IC components are estimated at £300 and other hardware at £200. The board fabrication and assembly costs are estimated by comparing with similar boards. A estimated cost per readout board, in addition to the £800 NRE costs, is therefore:

- ADCs; £25 per ADC $\times$ 36 ADCs = £900.
- Master FPGA; £50 per FPGA = £50.
- Slave FPGAs; £26 per FPGA $\times$ 6 FPGAs = £156.
- DACs; £33 per DAC $\times$ 6 DACs = £198.
- Other ICs; total = £300.

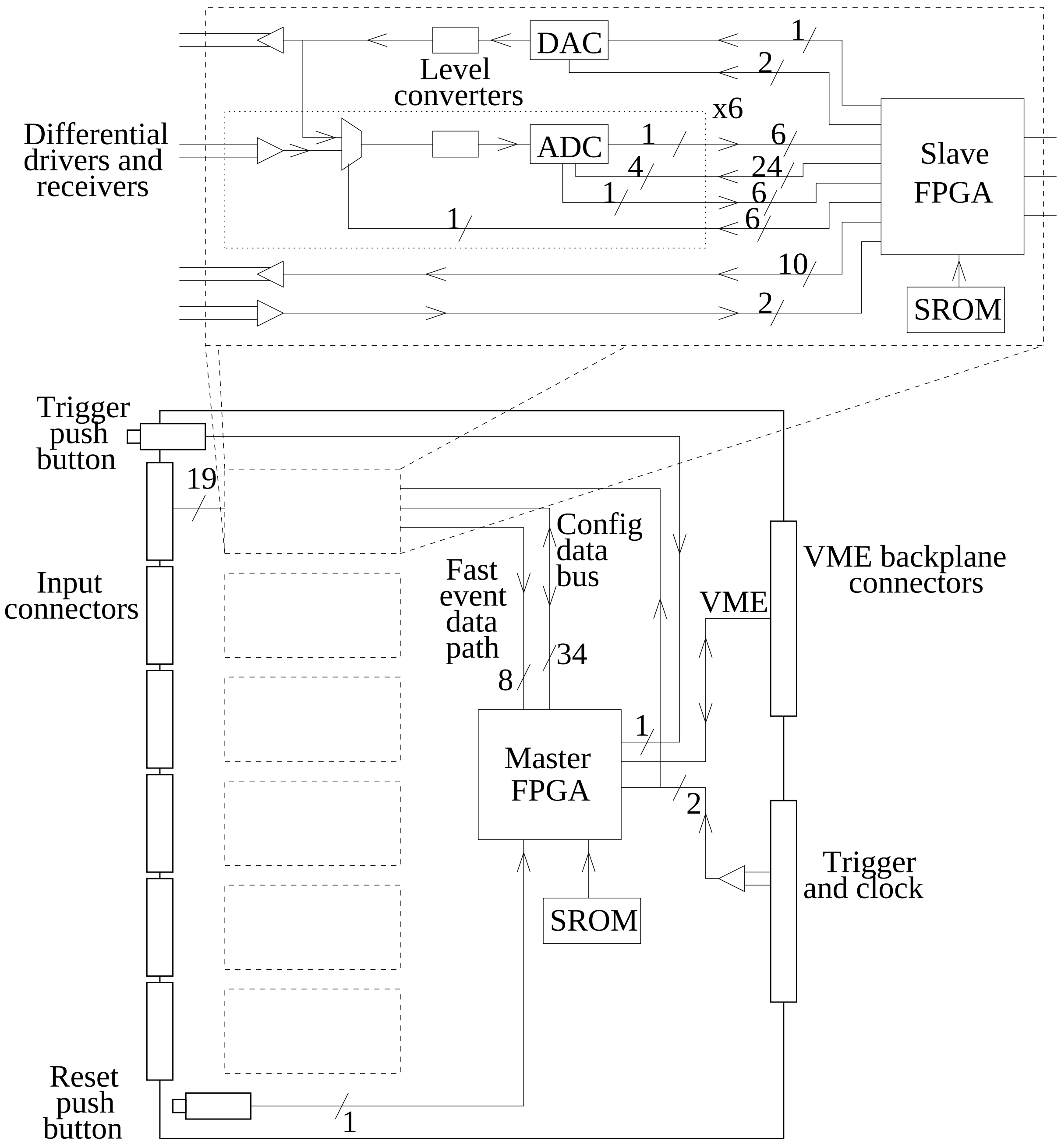

Figure 1: Overview of the readout board

- Other hardware; total = £200.
- PCB fabrication and assembly; total = £850.

The total cost per readout board is therefore approximately £2700.