

The 0.25um Token Bit Manager for CMS Pixel Readout

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To coordinate groupings of pixel readout chips, the Token Bit Manager (TBM), has been developed for the CMS experiment.

The TBM will coordinate passing of the readout token around a group readout chips (ROC). In addition it supplies the DAQ with a header and trailer record to facilitate event recognition.

Also present on the same chip is a Control Network Hub, which directs control commands to the TBM, as well as the ROC.

The Latest design details, and resent performance measurements will be presented, including the results of radiation and low temperature testing.

Summary

An intelligent coordinator for the readout of groupings of pixel readout chips, the Token Bit Manager (TBM), has been developed for the CMS experiment at LHC. To reduce readout dead time, the TBM needs to be located as close as possible to the readout chips. This forces developing this electronics in a rad-hard process.

Implied by its name, the Token Bit Manager will coordinate passing of the readout token around a group of from 8 to 24 readout chips. Each arriving Level 1 trigger will be assigned an 8 bit event number and 8-bits of error status. This information will be placed on a 32 event deep stack awaiting its associated token pass. This data will be supplied to the DAQ along with header, and trailer ID's as wrapper to the combined readout chip analog encoded data stream, to facilitate event recognition, and alert the DAQ of problems in the readout chain.

Also present on the same rad-hard chip is a Communication Control Hub, implemented with a 40 Mhz, differential, serial protocol similar in struction to I2c. This protocol will be used to provide command structures and parameter modifications for the TBM itself as well as for all readout chips. The procedure and timing constraints for setting and refreshing some 30M pixel trim settings will also be presented.

Several test results from resent submissions in 0.25u will be presented. These include radiation and low temperature testing, as well as results of using the TBM as the core of the control hardware for the Forward Pixel testbeam.

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