

The TOTEM T1 ReadOutCard motherboard

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The TOTEM Read-Out Card (ROC) is the main component of the T1 forward telescope front-end electronic system. It is mounted in the “Local Detector region” of the T1 detector structure between the “On Detector Region” represented by the front-end hybrids and the “Counting Room”. The ROC main objectives are to acquire tracking data and trigger information from the T1 Cathode Strip Chamber (CSC) detectors. It handles up to 16 front-end hybrids for a total of 2048 detector signals. The ROC performs data conversion from electrical to optical format and transfer the data streams to the next level of the system over a fiber through a 0.8 Gbit/s Ethernet 8B/10B parallel-to-serial encoder. The trigger bits are transferred at a rate of LHC 40 MHz clock and synchronized with the global TOTEM trigger system through the LHC Bunch Crossing 0 (BC0) fast command. The ROC implements Slow Control modules which are able to receive, decode and distribute the LHC machine low jitter clock and fast commands. The ROC manages the control information to/from the front-end hybrids through 16 individual I2C channels. Slow control skip fault architecture for additional redundancy is also implemented. The ROC provides a spy mezzanine based on programmable FPGA and USB2.0 for laboratory and portable DAQ debugging system. The TOTEM Read-Out Card motherboard, its components and connectivity are presented in this paper.

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