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Radiation-hard ASICs for Optical Data Transmission in the ATLAS Pixel Detector PAUL JACKSON, K.K. GAN, AMIR RAHIMI, The Ohio State University, ATLAS COLLABORATION[1] — We have developed two radiation-hard ASICs for optical data transmission in the ATLAS pixel detector at the CERN Large Hadron Collider (LHC). The first circuit is a driver chip for a Vertical Cavity Surface Emitting Laser (VCSEL) diode for 80 Mbit/s data transmission from the detector. The second circuit is a Bi-Phase Mark decoder chip to recover the control data and 40 MHz clock which is received optically by a PIN diode on the detector side. During ten years of operation at the LHC, the ATLAS optical link circuitry will be exposed to a maximum total fluence of 10^{15} equivalent n/cm^2. We have successfully implemented both ASICs in deep submicron (0.25 micron) CMOS technology using enclosed layout transistors and guard rings for increased radiation hardness. The driver and the decoder chips are four-channel devices compatible with common cathode PIN and VCSEL arrays. We present comprehensive results from the final engineering run and from irradiation studies of both circuits with 24 GeV protons up to a total dose of 62 Mrad. Furthermore we report on the current status of the production run.

[1]Information is presented on behalf of the Atlas collaboration pixel detector group.

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