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Characteristics of the MTx optical transmitter in Total Ionizing Dose

The dual channel multi-mode 850 nm optical Miniature Transmitter (MTx) is developed for data transmission of the ATLAS experiment at LHC. The MTx's are exposed to radiation field of proton-proton collisions. Tolerance in Total Ionizing Dose (TID) is required. The characteristics of MTx to the accumulated TID is investigated with X-ray and Co-60 gamma ray for the active components of the 850 nm multi-mode VCSELs (Vertical Cavity Surface Emitting Laser) and the customized LOCld laser driver developed in 0.25 um CMOS Silicon on Sapphire technology. The irradiation tests were conducted at increasing dose rates. The response to TID is observed with degradation on laser currents at the initial TID of less than 1 kGy, which anneals partially to a stable output to 90 % of the original. The optical eye-diagram after exposure is noisier, and remains well suitable for the required 5 Gbps in operation.

Submission declaration

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