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ALDO: a radiation-tolerant, low-noise, adjustable low dropout linear regulator in 0.35 micron CMOS technology

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In the current work we present ALDO, an adjustable low dropout linear regulator designed in AMS 0.35 μm CMOS technology. It is specifically tailored for the use in the upgraded LHCb RICH detector in order to improve the power supply noise filtering for the front end readout chip (CLARO). ALDO is designed with radiation-tolerant solutions such as an all-MOS band gap voltage reference and other layout techniques that make it able to operate successfully in harsh environments like High Energy Physics accelerators. It is capable of sourcing up to 200 mA while keeping a power supply rejection ratio of at least 40 dB in a very wide frequency range from 10 Hz up to 100 MHz. This property allow to suppress the high frequency spikes generated by the DC-DC regulator that is responsible of the first stage of the supply voltage conversion in the upgraded LHCb RICH front end. ALDO also demonstrated a very low noise of 50 μV RMS in the same frequency range. Its output is protected with over-current and short detection circuits for a safe integration in tight packaged environments. Design solutions and measurements of the first prototypes are presented in this work.

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