

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

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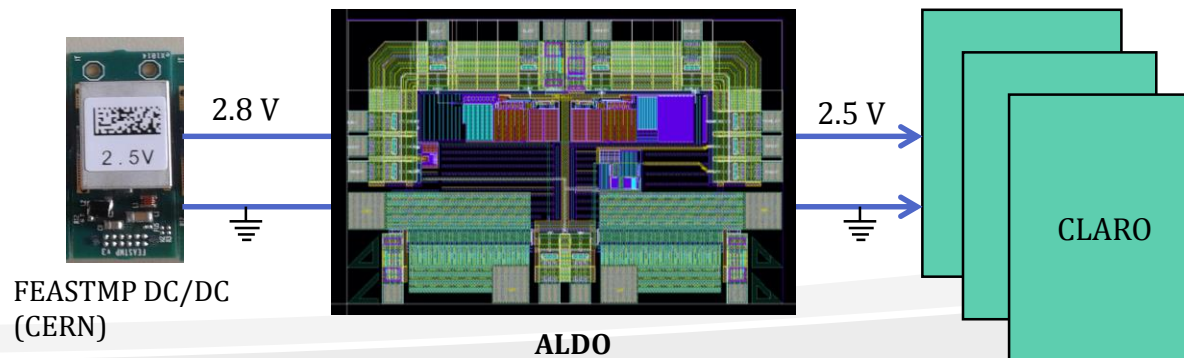
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- @2018: **LHCb RICH upgrade** → the detector opto-electronic chain will be completely redesigned for higher luminosity and rate.
- **New photodetectors**: Hamamatsu R11265 MaPMTs (qualified @ Milano Bicocca)¹
- **New front-end ASIC**: CLARO (designed @ Milano Bicocca, Ferrara and Krakow)²
- The power supply scheme currently foresees the use of the CERN rad-hard DC/DC regulator (FEASTMP) directly connected to the front-end boards.
- The CLARO preamplifier needs a **stable and low noise power supply** since its internal references are obtained from it and it is DC coupled to the input.
- For this purpose, a linear power supply could be inserted between the DC/DC regulator and the front-end chip without changing much of the opto-electronic chain layout.
- This approach will be beneficial both for **better noise filtering** and for achieving a **more stable line regulation** since a linear regulator can be installed much closer to the front-end ASIC.

→ ALDO was designed



¹ JINST 9 (2014) P06021

² JINST 7 (2012) P11026

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ALDO is an adjustable low dropout linear regulator prototype ASIC designed in AMS 0.35 μm CMOS technology.

Features:

- **Adjustable** output voltage, **200 mA** maximum output current
- **250 mV** output voltage **dropout** at full load
- Short circuit and overcurrent protection
- **Radiation tolerant** bandgap reference and output MOS

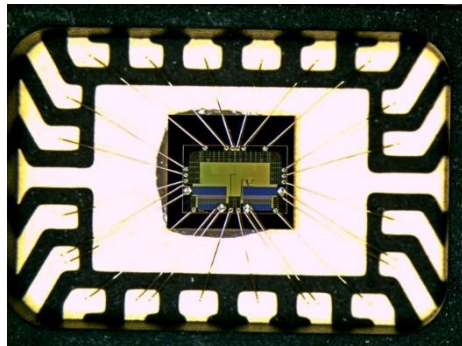
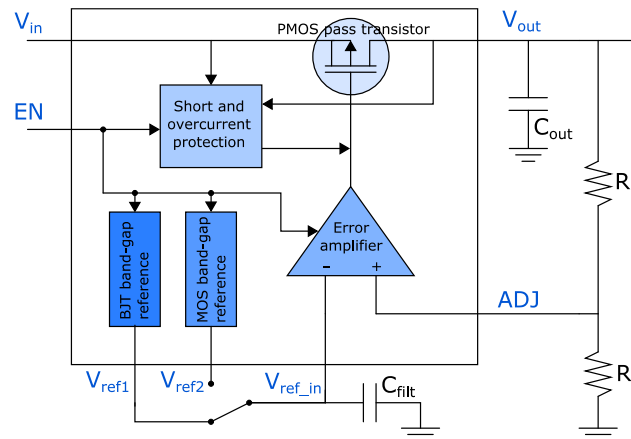


Photo of ALDO, die area 2.1 x 1.4 mm²



ALDO block schematic diagram



ALDO testboard

A testboard was designed and this allowed to test noise performance, temperature stability and will allow to perform the irradiation campaign and further tests with the LHCb RICH elementary cell. The measurements performed so far are presented in the poster.