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## Powering SiPMs and front-end electronics in HEP detectors: the ALDO2 ASIC

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SiPMs (also known as MPPCs) are becoming widely used in HEP experiments thanks to their excellent photon counting performance, compactness, and immunity to magnetic fields.

Powering these devices, apparently simpler than high-voltage photosensors, still poses several challenges due to the dependence of their performance on bias voltage and the significant increase of leakage current after radiation damage.

To help integrate SiPMs in HEP detectors, we designed the ALDO2 ASIC, a rad-hard, multi-function, adjustable, low dropout linear regulator in onsemi I3T80 0.35  $\mu\text{m}$  HV CMOS technology.

ALDO2 allows for precise and stable regulation of the bias voltage of SiPM arrays, as well as its adjustment using an external DAC.

By providing a mirrored copy of the output current, the chip enables on-detector I-V curve characterization and fine-tuning of the SiPMs' working points as radiation damage accumulates.

The chip also features auxiliary low-dropout linear regulators to filter and stabilize the supply voltage of the front-end chips, making it a complete power management solution for SiPM-based readout systems in HEP detectors, like the CMS Barrel Timing Layer (BTL) and the High-granularity Calorimeter (HGCal).

In this contribution, we present a general overview of the chip and the powering scheme adopted, together with selected measurements and radiation hardness qualification of samples from the final production.

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