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Magnetometer front-end ASIC (MFA)

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The development of an instrument front-end ASIC for magnetic field sensors (fluxgate principle) was proposed by the Space Research Institute of the Austrian Academy of Sciences in cooperation with the Fraunhofer Institute for Integrated Circuits in order to reduce size, mass and power consumption of the near sensor electronics while increasing its robustness against radiation at the same time. It is based on the combination of the conventional fluxgate magnetometer readout electronics with the control loop of a sigma-delta modulator. The chip (20mm2 of Silicon in a 100-pin CQFP package) contains three fluxgate channels and one voltage channel with a total power consumption of 65mW. The fluxgate channels achieve a dynamic range of 94dB for field ranges of $\pm$4,000nT.

Two chip versions (MFA1 and MFA2) have been manufactured and tested so far. Here we will present the MFA2 system level design, the radiation tests performed with the MFA1 (radiation tolerance of more than 250 krad of total ionization dose and a LETth for single event latch-ups of 14.1 MeV.cm2/mg) and the performance status of the MFA2 (noise, temperature and long term stability).