

T10-O2: Design and characterization of thin-film sensor and RADFET modules for radiation monitoring on the BIRDS-RPM satellite

A. Birnaz¹, A. Martiniuc², V. Melnic³, C. Creciunel⁴, I. Negut⁵

¹*Center for Nanotechnology and Nanosensors, Department of Microelectronics and Biomedical Engineering, Technical University of Moldova, 168 Stefan cel Mare Av., MD-2004 Chisinau, Republic of Moldova*

²*Space technologies Center, Technical University of Moldova, 168 Stefan cel Mare Av., MD-2004 Chisinau, Republic of Moldova*

³*Space technologies Center, Technical University of Moldova, 168 Stefan cel Mare Av., MD-2004 Chisinau, Republic of Moldova*

⁴*National Center for Materials Study and Testing, Technical University of Moldova, 168 Stefan cel Mare Av., MD-2004 Chisinau, Republic of Moldova*

⁵*National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Street, P.O. Box MG 36, 077125 Magurele, Romania*

This article describes the design and operational principles of two modules, the Sensor module and the RADFET module, developed as part of the Technical University of Moldova (TUM)

payload for the BIRDS-RPM satellite platform [1]. The Sensor module (Fig. 1), is designed to study changes in current through four thin-film sensors under the influence of cosmic radiation. A key challenge in the development of this module was the accurate acquisition of current due to the high resistance of the thin-film sensors, which can vary from 100 k Ω to 10 M Ω . The RADFET module, which utilizes a PIN diode for real-time dose rate and a RADFET transistor for total accumulated dose, will provide a crucial reference for the sensor data. This module is capable of measuring a dose range from 1 cGy to 1 kGy and a dose rate from 0.1 μ Sv/h to 100 mSv/h [2, 3]. The design of both modules prioritized simplicity, reliability, and low cost. Data from modules will be collected via the I²C protocol for logging and transmission to Earth, providing valuable in-orbit data for the development of future radiation sensors.

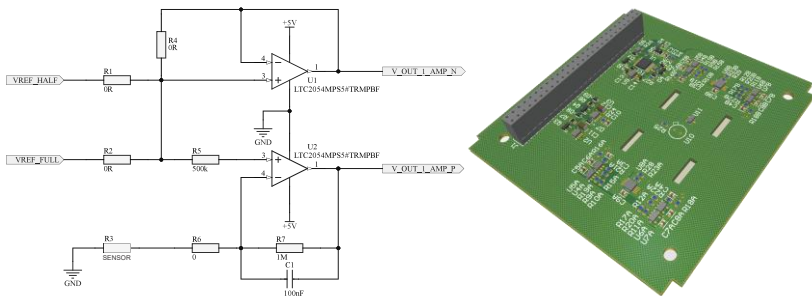


Fig. 1. Sensor module: a) Electrical scheme for current acquisition from thin film sensor; b) entry printed circuit board of this module.

- [1] https://birds-rp.birds-project.com/satellite_documentation/
- [2] https://www.teviso.com/documents/al54-data_specification.pdf
- [3] [RM-VT01-A Datasheet- rev1p3.pdf](https://www.teviso.com/documents/RM-VT01-A_Datasheet_rev1p3.pdf)