

## Dependable Space Weather/Radiation Detection



### Measuring kinetic energy for energetic charged particle radiation in space

The NORM instrument is engineered for autonomous operation, seamlessly collecting particle event data /statistics as the satellite traverses its orbit. Designed for continuous functionality, it buffers data until the satellite is ready to transmit it to the ground. The collected data is organized into histograms, divided into nine energy bins, separated for electrons and protons, and then transmitted at regular intervals.

Once on the ground, this data is processed to determine particle count rates and from that, calculate the particle flux for specific locations along the orbit.

This particle flux information serves for space weather monitoring, supporting nowcasting, improving radiation models, and providing detailed spectra for radiation exposure calculations.

For telemetry and telecommands, NORM leverages a customizable communication protocol based on ECSS-E-ST-70-41C PUS, allowing it to adapt to specific mission requirements.

IDEAS also provides complementary ground processing software for TM/TC encoding and decoding, and for deriving integral and differential radiation flux products, offering a comprehensive solution for space weather analysis.



#### VERSATILITY

The instrument is designed to withstand a total ionizing dose of 100 kRAD over 15 years, and it meets the requirements of ESA and Northrop Grumman for the GEOStar satellite bus.



#### PROVEN IN ORBIT

NORM was launched in August 2024 as part of Space Norway's Arctic Satellite Broadband Mission (ASBM), which provides broadband coverage in the Arctic while crossing Earth's outer radiation belts. Its data will be key for developing the second-generation Galileo satellites, improving radiation protection, and optimizing mission design.



#### RELIABILITY

NORM is designed as a highly adaptable space radiation monitor for satellite missions in GEO, LEO, and HEO. Features such as communication interface, power supply, and radiation hardness can be customized to meet the specific requirements of the host satellite.

# TECHNICAL SPECIFICATIONS

Physical Properties		
Mass	2.9 kg. Two units and a cable.	
Detector Unit	1080 g	
Data Handling Unit	1670 g	
Cable Assembly	157 g	
Size Detector Unit	152.7 × 76.1 × 68.1mm	
Size Data Handling U.	140.0 × 153.1 × 64.8mm	
Power	3 W	
Supply voltage	18 – 37 VDC	Possibility to tailor to different
Radiation tolerance	100 krad (Si)	Designed for 5+ years in HEO orbit. In LEO, shielding and mass can possibly be reduced.
	SEL > 62 MeV cm <sup>2</sup> /mg	
Operating temperature	-20 °C to +55 °C	

Data and Interface	
Data budget	Configurable, ~ 500 bits/s at 60s data acquisition interval, incl. housekeeping data.
I/O interface	MIL-STD-1553B (qualified), electronics capable of CAN-BUS and, with additional changes SpaceWire.

- NORM uses a detector stack composed of silicon diodes and absorbers.
- Particles enter via a collimator and generate electrical currents in the diodes, analyzed to determine particle type and energy.
- **NORM is designed for a minimum of 5 years in the ASBM HEO orbit**

Particle detection capabilities		
Protons	7 – 200 MeV (9 bins)	
Electrons	0.5 – 7 MeV (9 bins)	
Max. instrument incident particle rate	10 <sup>8</sup> particles / (cm <sup>2</sup> s)	
Field of View	20 degrees	Collimator opening
Time Resolution of data acquisition	5 s – 90 min	Data budget calculated with science data: 60 s interval, housekeeping data 5 min. interval.
Storage Capacity	3.5 days at 60s data acquisition interval	



To make an inquiry, request a quotation or learn more about our products and services, please contact: us at [sales@ideas.no](mailto:sales@ideas.no)