

SPACE SYSTEMS SYMPOSIUM (D1)  
Enabling Technologies for Space Systems (2)

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## ADVANCED SOLAR ARRAY PERFORMANCE MONITORING

**Abstract**

Nowadays electrical power system standards require in situ measurement of the solar cell performance during the mission using so-called witness cells. Telecom operators want to have in-orbit performance of new technologies demonstrated with significant duration. Agencies issue study programs to investigate the effect of inverted voltage gradients on the solar panels. However, in-orbit health monitoring of deployable solar arrays is limited by the low number of sliprings offered to the solar array manufacturer for signal lines. The innovative SAPeM concept offers an extensive number of performance data to the on-board data handling system originating from temperature sensors, esd detectors, contamination sensors, ion erosion sensors and solar cell and string performance measurements. It does so by using only two power and two signal lines per solar array wing. The SAPeM system enables satellite and solar array designers to optimize their (sub-)system design based on real time performance and environmental degradation phenomena recordings gathered in space. In particular it allows for the recording of primary electrostatic discharges on solar panels - a novel and unprecedented technique, which gives insight in the effectivity of design measures taken to prevent degradation. The paper will present results of the engineering program and will reveal cost price and physical properties of the unit itself, such as mass, power consumption, databus types etc and the thermal and mechanical interfaces.