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The ECP-Lite Space Radiation Sensor is a space-worthy device that can be hosted on satellite platforms to provide in situ sensing of the space weather environment. Collecting space weather information on-board the host satellite provides situational awareness of the radiation environment and hazards such as surface charging or single event effects (SEEs) that operators or algorithms can use to adjust the operating parameters of other instruments (e.g., switching to “safe mode”). The data also can be leveraged to explain anomalies in telemetry or unusual spacecraft behavior. Collected data can be used on board the spacecraft, at a dedicated ground station, or shared with a central database maintained by a Government agency to contribute to improved knowledge of the natural/ambient radiation environment in orbit regimes of operational relevance to satellite operators. This could be a “one stop shop” for space weather analysis data to complement observations from the Space Weather Prediction Center operated by the National Oceanic and Atmospheric Administration (NOAA).

The device contains 6 micro-sized radiation detectors, 2 photodiodes, an electrostatic discharge recorder, surface charging plate, and 1 surface dosimeter which measures plasma currents in a 2.5 kg, 1667 cc package. Each dosimeter will measure the total-ionization-dose (TID) behind a specified shield thickness. Shield thicknesses are chosen to create electron and proton integral energy channels that are used to derive a dose-depth curve data product for long-term assessment of total ionizing dose and near-instantaneous dose rates (and equivalent integral proton and electron flux) at various depths for shorter-term hazard assessments.

Compact Sensor Package Provides Adaptable Solution to Space Weather Awareness
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Background	Features / Specifications
<ul style="list-style-type: none">• Energetic Charged Particle (ECP) Lite Space Radiation Sensor is a space-qualified device that can be hosted on satellite platforms to provide in-situ sensing of the space weather environment• Measures ionizing radiation dose rates to allow for analysis of plasma currents, and external dose rates• Data can be used in multiple ways<ul style="list-style-type: none">• Inform mission "safe mode" algorithms of operators• Help operators understand system operations• Contribute to space weather database to improve knowledge of ambient radiation environment	<ul style="list-style-type: none">• 6 micro-sized radiation detectors (dosimeters)• 2 photodiodes• 1 charge discharge sensor• 1 surface dosimeter• Construction meets or exceeds Class 3 mission requirements of NASA ESD-001-002• Standard TO-46-08-402 (MIL-STD-883C) class tolerance• Overall Size: 6.8 x 8.1 x 2.8 inches (17.3 x 19.6 x 7.1 cm)• Mass: 5.2 lbs (2.3 kg)• Measuring Volume: 1667 cc (100 in³)
Instrument Configuration	Benefits
	<ul style="list-style-type: none">• Characterization of orbital environments• Provides ability to analyze and determine effects of space weather events and environments• Correlation monitoring / anomaly diagnosis support• Standard hardware and software interfaces• "Drop-in" design integrates easily with host spacecraft• Small footprint, low mass, low power (< 0.5 Watts)
Contact Information	Abbreviated References
 <p>TELEDYNE BROWN ENGINEERING www.tbengineering.com</p>	<ol style="list-style-type: none">1. U.S. Air Force Space Situation Awareness Policy for Energetic Charged Particle (ECP) Monitoring Capability (SAOAF Memo dated 11 March 1995)2. https://www.nasa.gov/centers/epsc/pdf/1520mainecp0206a.pdf3. https://www.teledynetb.com/~/media/Products/Space/Space%20Weather/Space%20Weather%20Sensor%20ECP-Lite.pdf4. https://www.teledynetb.com/~/media/Products/Space/Space%20Weather/Space%20Weather%20Sensor%20ECP-Lite.pdf

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Poster session day

Thursday, April 18, 2024

Poster location

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Meeting homepage

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