

PUMPKIN

SPACE SYSTEMS

TM

PMDSASTM Solar Panels & Arrays

Profile

- Pumpkin Modular Deployable Solar Array System
- Lightweight, flexible, volume-efficient and space-proven technology.
- Available in multiple configurations, from 2W to 300W:
 - Fixed panels
 - Deployable panels
 - Deployable arrays
- Available in COTS and custom shapes and sizes.
- Compatible with a wide range of Electrical Power Systems.
- Designed, manufactured, assembled and tested in the USA.

Specifications¹

- Operating Temperature Range (°C): -50 to +105
- Specific Power (W/kg): > 90
- Stowed Volume Efficiency (kW/m³): > 140
- Lifetime (yr): > 2
- Fill Factor (8-cell winglet panel, %): 77
- Minimum Bend Radius (mm): < 500
- Random Vibe Survival (Grms): > 11 in all axes
- Power per Solar Cell (W, BOL, AM0): 1.05
- Maximum Size (cm x cm): 400 x 550
- Mass of CubeSat-class panels (g):
 - 22 (1U, 2.1W)
 - 50 (2U, 4.2W)
 - 77 (3U, 7.3W)
 - 82 (3U, 8.4W)

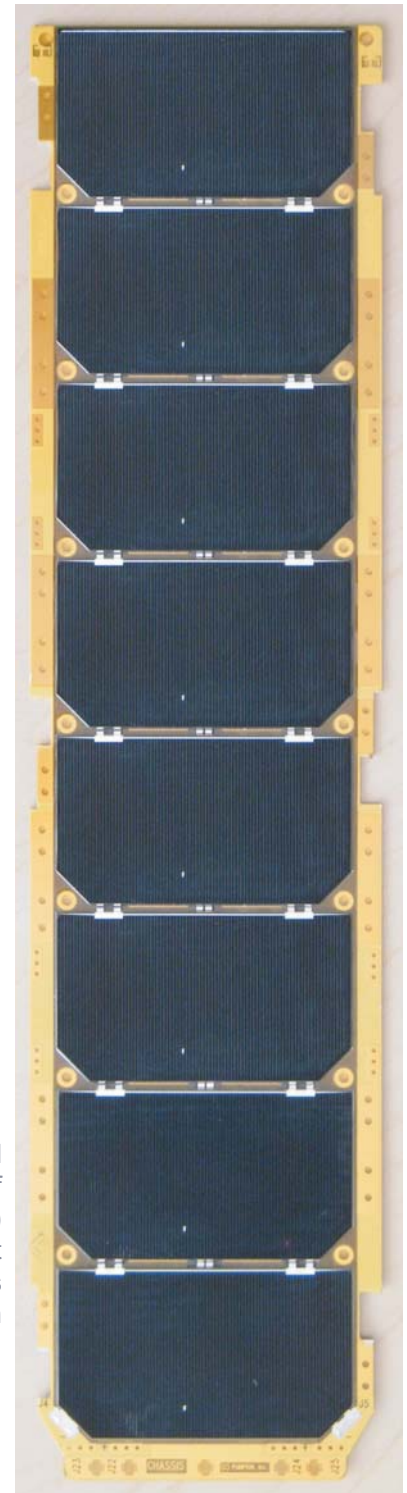
Benefits

- PMDSAS technology delivers extraordinary flatness and light weight, reducing thermal resistance while exhibiting remarkable flexibility and toughness.
- Flexible and modular architecture. Can be customized for a wide range of mission requirements.
- Rapid deliveries (under 1 week from stock).
- Highest-quality panels, made in U.S.A.

You

- Choose COTS or custom panels.
- Enjoy higher power, greater payload mass and survive extreme vibe levels with PMDSAS solar panels & arrays.

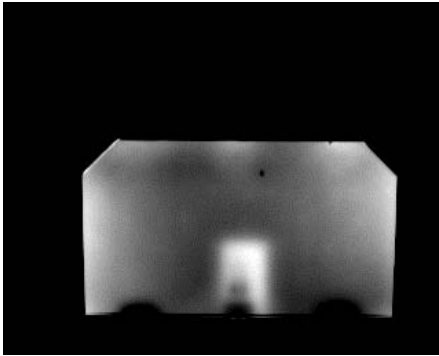
PMDSAS 3 8-cell winglet panel. Part of PMDSAS 56W (8S7P) solar panel array that flew on NGC's Caerus/Mayflower in Dec. 2010.



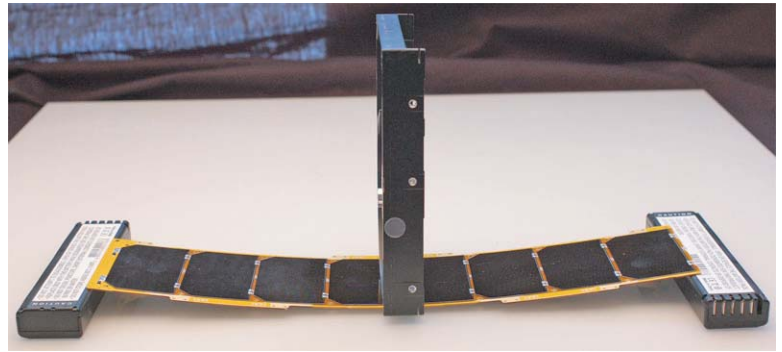
Construction

- Each panel's construction is overseen by a skilled technician.
- All materials used meet NASA outgassing guidelines.
- Multiple redundancies (interconnects, blocking diodes, connections) are employed where appropriate.
- Panels utilize Spectrolab® or comparable triple-junction (min. 28% efficiency) solar cells with integral interconnects, bypass diode and coverglass (CIG).
- Solar cells are affixed to panels via a proprietary and patent-pending PSA-centric procedure. Derived from the Aerospace Corporation's pioneering approach in 2009 that utilized NuSil® CV4-1161-5, with advancements for enhanced flatness, reduced mass, speed of assembly and thermal performance.
- Thermal encapsulation, where required, is achieved via a thermally conductive epoxy.
- Substrate-to-PSA-to-cell design is inherently devoid of trapped bubbles, validated via thermographic testing.
- Panels are built using a variety of substrate materials, optimized for specific applications.
- Integral Kapton® coverlay is used on top and/or bottom surfaces.
- No discrete or hand-wired point-to-point interconnects. All interconnects are integral to the solar cells or the panel substrates themselves.
- Copper layers on substrate material are carefully mapped to ensure maximum possible symmetry and coverage for enhanced heat flux and to minimize local hotspots.
- Panels use a "sea of vias" and other PCB layout and construction techniques specifically tailored for best heat flux and minimal magnetic signature.
- Interconnects and components are soldered with leaded solder to preclude tin whiskers.
- LM335 precision temperature sensors and coarse sun sensors available on most models.
- Custom harnesses available for all models.
- CubeSat-standard Hirose® DF13-series connector fitted as standard. Optional connectors available.
- Isolation resistor connects solar array substrate ground to chassis ground as per NASA-HDBK-4002A.
- Compatible with CubeSat Kit Solar Panels Clips, screw fasteners and RTV/epoxy bonding methods.
- Flatness is maintained throughout the manufacturing process.
- Every unit is laser serialized for tracability.

Thermographic validation of PMDSAS 2



Simple bend test of PMDSAS 3 winglet panel



Fourteenth C1B (AFRL). Has PMDSAS 4 panels



Hinge detail from 56W PMDSAS 3 array



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1. All power figures assume 28.5% efficient solar cells of 26.62cm² area under AM0 illumination. Specifications are representative of PMDSAS 5. Masses shown are for 0.031" (0.8mm) thick panels. Larger sizes possible.

Specifications subject to change without notice. Made in USA.

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