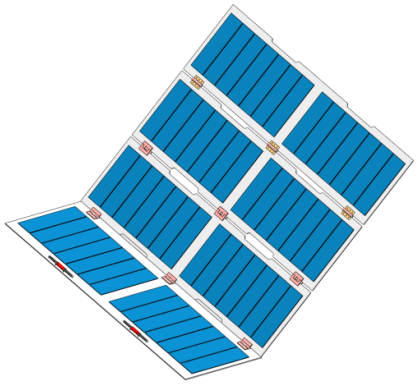

DMSA 3U/A: Deployable Multifunction Solar Array

PRODUCT NAME

DMSA 3U/A: Deployable Multifunction Solar Array with embedded antennas, magnetorquers and sensors

SUMMARY

The EXA DMSA 3U/A (Deployable Multifunction Solar Array for 3U) is one of our 3U size products of a family of deployable solar arrays based on artificial muscles for CubeSats in the range of 1U to 6U. The arrays fold into a panel attached to the CubeSat structure just as another solar panel and once in orbit it deploys to full extension, it includes deploy and release contact sensors and its own deploy control board.

Now, in a world's first, it includes embedded antennas that range from VHF to L band, no longer you need to buy and manage antenna systems separately, the DMSA has them embedded in its structure as 2 monopoles or 1 dipole and they deploy with the solar array, you just connect the cable to your radio.

It also has an embedded magnetorquer, sun and temperature sensors. You can configure your choice of solar cells like our low-cost solar cells to high efficiency cells for very high-power missions; the maximum folded thickness is 6.25 mm for the 3-panel array. Every array is tested and qualified in our own facilities and shipped with full reports, the DMSA 3U/A yields the best results when coupled with our high-capacity batteries.

FEATURES

- Heritage release with artificial muscles, spring operated deploy
- Release within 5 seconds, Deploys immediately
- Embedded antennas can be configured as 2 monopoles or 1 dipole, frequency range from VHF to L-band
- Includes Release control board and contact sensors
- Sun sensors and temperature sensors embedded

- Designed for LEO missions and requirements
- Manufactured according to space standards and custom mission design
- Functional, performance, thermal bake out and vibration tests provided with documentation.
- Very thin, 6.25mm folded, each panel is only 1.5mm thick
- Discounts for complete mission sets
- Compatible with ISIS and Pumpkin Structures
- Compliant to CubeSat Standard
- Compatible with QuadPack and ISIPOD Launch Adapters

PERFORMANCE

- Supply Voltage (depends on configuration):
    - Voltage and current are user defined
    - From 10W to 52W
- 2A@20V Schotky diodes integrated
- Power Delivered:
    - Condition full sunlight in LEO
    - Low-cost solar cells: 10 W minimum
    - Medium-cost solar cells: 12 W minimum
    - High power solar cells: 26 W minimum
- Cell Efficiency:
    - Low-cost solar cells: 19%
    - Medium-cost solar cells: 22%
    - High-power solar cells: 30%
- Release within 5 seconds
- Deploys immediately
- 3 Separate Embedded Magnetorquers MT02, each with parameters:
    - Working Voltage: From 1.25V to 16V
    - Working Current: From 100mAh to 2000 mAh
    - Nominal Magnetic moment: >0.14 Am2
    - Saturation Magnetic moment: >0.48 Am2
    - Linearity: +/- 4% across operating design range
    - Residual moment: <0.0075 Am2
    - Torque: 3.66 µNm @ 3.2 mTesla (1U mass)
    - Angular acceleration: 1.75 Rad/sec-2 (1U mass)
    - B-center = 3.0 Gauss
    - B-corners = 3.1 Gauss
    - Typical resistance: 14.1 to 14.7 ohms @ 25°C
    - Random Vibration: 16g rms
- Embedded Antennas:
    - Band Range: VHF to L-band
    - Gain:
        - Monopole configuration = 2.1 dB max
        - Dipole configuration = 3.1 dB max
        - Extended Monopole = 2.3 dB max

    - Lambda: from 1/4 to full wave
    - Connectors: User defined
    - Cable: RG316, RG178 or User defined
- Sun Sensor:
    - Analog, GPIO, 5 to 16V
    - Linear response range from 0.2V to 5V
    - Working current: 50 mA
    - Working FOV: 65 degrees H/V
- Temperature sensor:
    - Analog, GPIO, 4 to 12V
    - Linear response range from 0.3V to 1.5V
    - Working current: 80 mA
    - Working temperature: -65 to 135C

PRODUCT PROPERTIES

- Mass (exact mass depends on configuration):
    - 1 panel: 135 g
    - 2 panels: 264 g
    - 3 panels: 331 g
- Panel Thickness:
    - Folded:
        - 1 panel: 2 mm
        - 2 panels: 4 mm
        - 3 panels: 6.25 mm
    - Unfolded: 1.5 mm
- Deploy/Release control board included, TTL 3.3 or 5V operated
- Operating Temperature: -80 to +130°C
- Radiation Tolerance: 4 years minimum in LEO

MATERIALS

- Panels:
    - Side panel: FR4-Tg180
    - Deployable panels: FR4-Tg180 1.25mm thick
- Contact sensors: Deploy and Release
- Actuators:
    - Deploy: Spring operated
    - Release: EXA MDR/R1C, 50 grams max torque
- Cell Material: GaAs (High power) or mono crystalline Silicon (low cost)
- Cell Interconnector: Invar Silver plated
- Interfaces:
    - Custom choice, normally 3 Molex PicoBlade inline 4 pin connector with gold plated contacts
    - PTFE (Teflon) space grade cables, single strand, silver plated copper (AWG26, AWG24)

TESTING

All panels are provided with tests reports regarding:

- Continuity isolation between cells and substrate
- No cracks warranty
- Thermal Bake out (10E-7 mbar @ 50C for 24 hours)
- Full vibration test for Falcon 9, Electron, Soyuz, Dnepr and Long March 2D
- QT and AT is performed on the unit to be shipped

Test	QT	AT
Functional		
Vibration	✓	
Thermal Cycling	✓	
Thermal Vacuum	✓	
Continuity Isolation		
Solar cells Cracks		
Flasher Test		
Performance		

CONFIGURATIONS

Variants for Low Yield Solar Cells (19%)	Total Nominal Yield in Watts per Array	Base Price/€
3U Panel Array – 1 panel (Low yield)	10	7,350
3U Panel Array – 2 panels (Low yield)	14	9,800
3U Panel Array – 3 panels (Low yield)	21	14,700

Variants for Medium Yield Solar Cells (22%)	Total Nominal Yield in Watts per Array	Base Price/€
3U Panel Array – 1 panel (Medium yield)	12	8,400
3U Panel Array – 2 panels (Medium yield)	16	11,200
3U Panel Array – 3 panels (Medium yield)	24	16,800

Variants for High Yield Solar Cells (30%)	Total Nominal Yield in Watts per Array	Base Price/€
3U Panel Array – 1 panel (High yield)	26	18,375
3U Panel Array – 2 panels (High yield)	35	24,500
3U Panel Array – 3 panels (High yield)	52	36,750

EXTRA OPTIONS

- Integrated NEMEA Anti-Radiation, Thermal Regulation MLI shield (EM, Gamma, X-Ray, Alpha, Beta, L-neutron): 1500€
- Embedded MT02 Magnetorquer: 1500€
- Coarse Sun Sensor – Vishay: 500€
- Embedded UHF/VHF Antennas: 3000€