



DMSA: Deployable Multifunction Solar Array

PRODUCT NAME

DMSA: Deployable Multifunction Solar Array with embedded antennas, magnetorquers and sensors

SUMMARY

The EXA DMSA/1 (Deployable Multifunction Solar Array for 1U) is the upgraded version of the latest DSA 1/A, it is our entry level product 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, 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 AzurSpace 3G-30 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/1 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):
 - 4.5V to 5.2V top side
 - 3.2V to 3V bottom side
- 2A@20V Schotky diodes integrated
- Power Delivered:
 - Condition full sunlight in LEO
 - 1U Low-cost solar cells: 3.75 W minimum
 - 1U High power AzurSpace 3G-30: 12 W minimum
- Cell Efficiency: 28% (High power) or 19% (low cost)
- Release within 5 seconds
- Deploys immediately
- Embedded Magnetorquers MT02:
 - 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 μ Nm @ 3.2 mTesla (1U mass)
 - Angular acceleration: 1.75 Rad/sec² (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 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 : 46g
 - 2 panels: 70g
 - 3 panels: 92g
- 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	Yes	Yes
Vibration	No	Yes
Thermal Cycling	No	Yes
Thermal Vacuum	No	Yes
Continuity Isolation	Yes	Yes
Solar cells Cracks	Yes	Yes
Flasher Test	Yes	Yes
Performance	Yes	Yes

CONFIGURATIONS

- 1 Panel Array – deploys as 3 panels (2 on top, 1 on bottom), low-cost cells 3.5W each: 3500€
- 1 Panel Array – deploys as 3 panels (2 on top, 1 on bottom), AzurSpace 3G-30, 7.2W each: 5500€
- 2 Panel Array – deploys as 5 panels (3 on top, 2 on bottom), low-cost cells 5W each: 6500€
- 2 Panel Array – deploys as 5 panels (3 on top, 2 on bottom), AzurSpace 3G-30, 12W each: 9000€
- 3 Panel Array – deploys as 7 panels (4 on top, 3 on bottom), low-cost cells 7W each: 8500€
- 3 Panel Array – deploys as 7 panels (4 on top, 3 on bottom), AzurSpace 3G-30, 16.8W each: 13000€

EXTRA OPTIONS

- Integrated NEMEA Anti-Radiation, Thermal Regulation MLI shield (EM, Gamma, X-Ray, Alpha, Beta, L-neutron): 500€
- Embedded MT1/T Magnetorquer: 500€
- Coarse Sun Sensor – Vishay: 500€
- Embedded UHF/VHF Antennas: 1500€