WE BUILD IT.
WE FLY IT.

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SPACE SYSTEMS CATALOG

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WE KNOW SPACE.™

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BUILT FOR OPERATORS BY OPERATORS

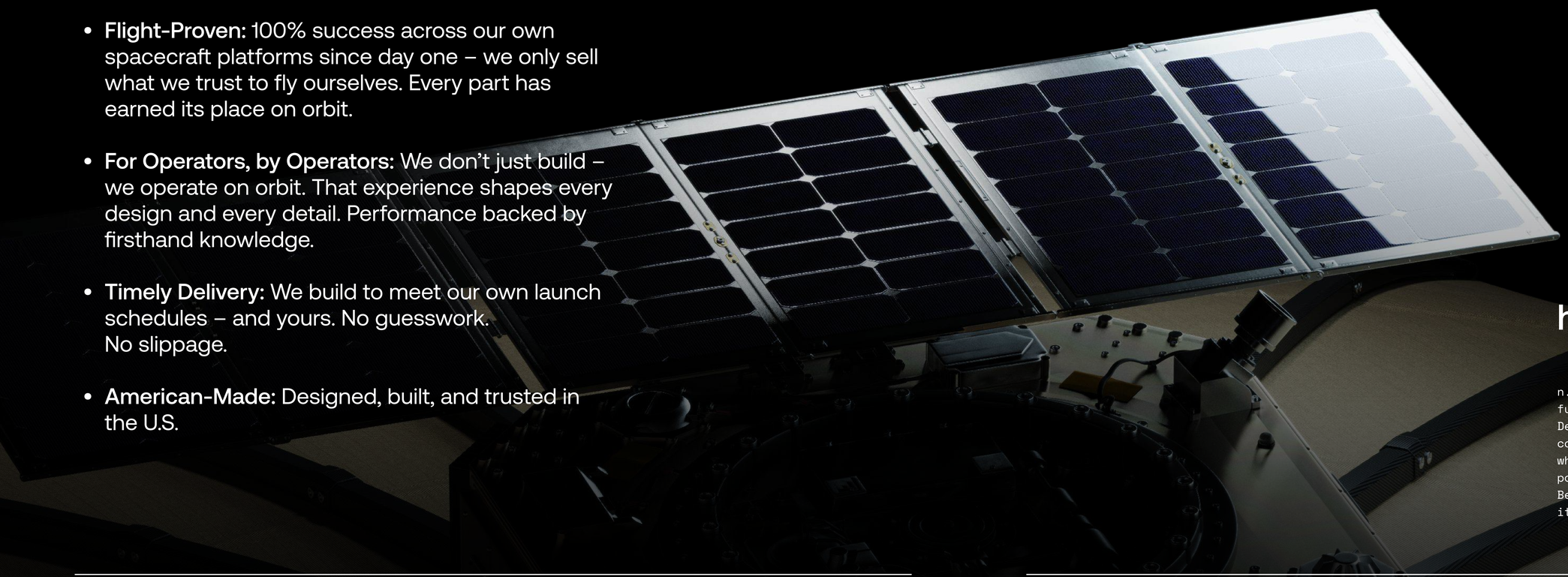
- **Flight-Proven:** 100% success across our own spacecraft platforms since day one – we only sell what we trust to fly ourselves. Every part has earned its place on orbit.
- **For Operators, by Operators:** We don't just build – we operate on orbit. That experience shapes every design and every detail. Performance backed by firsthand knowledge.
- **Timely Delivery:** We build to meet our own launch schedules – and yours. No guesswork. No slippage.
- **American-Made:** Designed, built, and trusted in the U.S.

HARDWARE CULTURE

At Umbra, components aren't line items – they're the building blocks of something bigger.

Our hardware is built from a foundation of operational experience, shaped by the real-world demands of our SAR constellation. We design, build, and deploy critical systems – powered by our software – guided by a simple principle: it has to work when it counts. Each bolt, board, and bracket is forged by engineers who don't just design for the mission – they live it. From power and communications to control and deployment, our hardware is flown, tested, and trusted in our own systems, under real-world conditions where failure isn't an option. Because when it works together, it works.

This is Hardware Culture



hardware culture

[hahrd-wair][kuhl-cher]

n. a mindset where code and components are fused by necessity, not convenience. Designed not for catalogs, but for consequences. A manufacturing environment where every element is engineered for power, resilience, clarity, and control. Because a mission is only as strong as what it's built on.

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FIRST PRINCIPLES SOLUTIONS

To set a new pace, we took matters into our own hands — applying First Principles engineering to design and build every component from the ground up, based on what we knew the mission demanded. Our inaugural lineup of hardware across four mission-critical categories:

- **Power:** Systems engineered for endurance and efficiency. From our battery modules and solar arrays to complete power systems, these are proven solutions that keep missions alive longer and working harder
- **Control:** Precision attitude and maneuvering technology, including our MSS package, reaction wheels, and Magnetorquer 6: built to adapt and hold steady under pressure
- **Communications:** Robust, resilient links. Our S-band radios and network switches deliver clarity and speed, even through interference and challenging conditions
- **Deployment:** Hardware that delivers clean separation, reliable actuation, and mission success.

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SPACE SYSTEMS

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24	Umbra SyncRelease 4

THE COMPONENTS

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BATTERY MODULE

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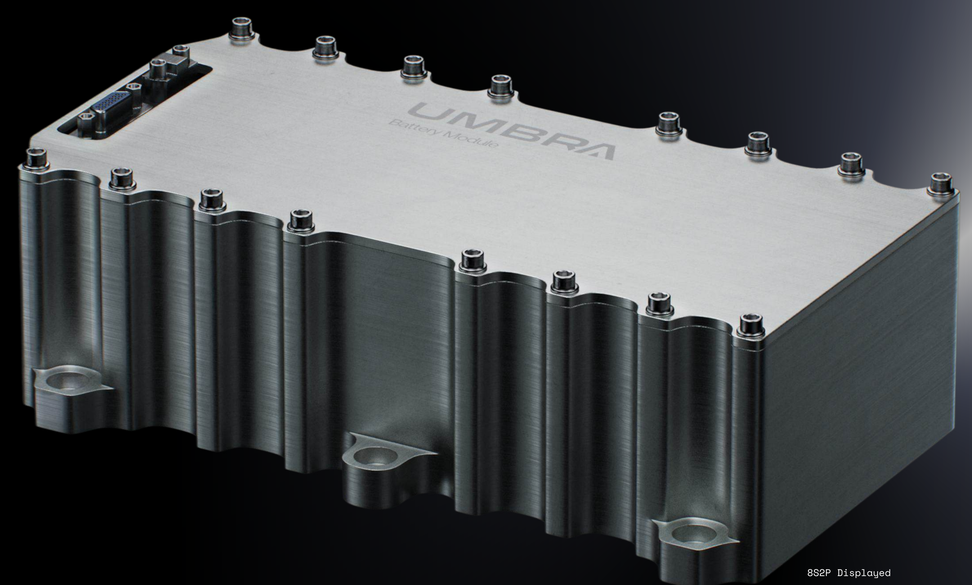
THE UMBRA BATTERY MODULE delivers reliable, high-energy-density power storage for demanding space missions. These flight-proven modules come in 8S1P (8-Cell) and 8S2P (16-Cell) configurations, which feature built-in cell balancing, thermal regulation, and a ruggedized design. Certified to UN 38.3 and compliant with NASA debris mitigation standards, they ensure safe and dependable operation. Choose Umbra Battery Modules for mission-critical power backed by flight-proven heritage.



8S2P Displayed

FEATURES

BUILT-IN SAFETY & PERFORMANCE
THERMAL MANAGEMENT & CELL BALANCING

Integrated thermal regulation (with onboard heater and temperature sensor) and built-in cell balancing circuitry ensure optimal battery performance, safety, and longevity. This comprehensive management system maximizes operational life and minimizes risks associated with battery operation in space.

FLIGHT-PROVEN | VALIDATED RELIABILITY

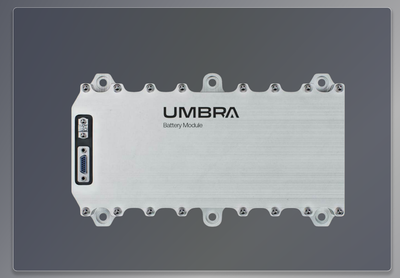
Validated through successful deployments, the Umbra Battery Module offers proven reliability and performance in real-world space environments. This flight heritage, combined with its compatibility with the complete Umbra Integrated System, provides mission-ready confidence and minimizes risk.

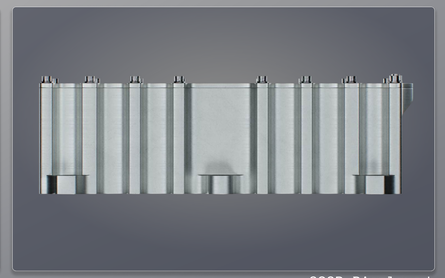
CERTIFIED & COMPLIANT
UN 38.3 & NASA STANDARDS

Umbra Battery Modules are DOT-certified to UN 38.3 for safe transportation and meet NASA-STD-8719.14C requirements for limiting orbital debris. These certifications demonstrate a commitment to safety, regulatory compliance, and responsible space operations.

HIGH ENERGY DENSITY | OPTIMIZED FOR SWaP

Utilizing high-energy-density lithium-ion cells, Umbra Battery Modules deliver significant power storage capacity in a compact and lightweight package. This optimized SWaP (Size, Weight, and Power) performance is crucial for small satellite applications.





8S2P Displayed

GENERAL SPECIFICATIONS

BATTERY VOLTAGE RANGE	22 V to 31 V
BATTERY VOLTAGE NOMINAL	28 V
INTENDED SPACE ENVIRONMENT	Multi-Orbit
HERITAGE	Flown on Umbra 1 - 12
DESIGN LIFE	5+ Years
PRODUCTION	Assembled and tested in the USA
CHEMISTRY	Lithium Ion
ELECTRICAL INTERFACE	Combination D-Sub (2 Power and 5 Signal Contacts)

CONFIGURATION SPECIFICATIONS

METRIC	8S1P	8S2P
MAX DIMENSIONS	L: 7.13 in W: 4.04 in H: 1.43 in	L: 7.13 in W: 4.03 in H: 2.50 in
MASS	0.93 kg	1.46 kg
NAMEPLATE ENERGY CAPACITY	125 Wh (4.25 Ah)	250 Wh (8.5 Ah)
MAXIMUM DISCHARGE RATE	15 A	20 A

ENVIRONMENTAL SPECIFICATIONS

RANDOM VIBE	Qualified to 14.16 G_{rms} profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
SHOCK	Qualified to 1000g peak profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
OPERATING TEMPERATURE	Charge: 10°C to 45°C Discharge: -20°C to 60°C
SURVIVAL TEMPERATURE	-20°C to 50°C (Higher temp possible during discharge)
TOTAL IONIZING DOSE DESIGN CAPABILITY	Designed to withstand at least 30 krad TID
DOT CERTIFICATION	UN 38.3 in compliance with 49 CFR §173.185
LIMITING ORBITAL DEBRIS	Meets NASA-STD-8719.14C Requirements

CONFIGURATIONS

TYPE	DESCRIPTION & DETAILS	SPACE READY	TYPICAL LEAD TIME	COST
EDU	• Both 8S2P & 8S1P available • Suitable for ground testbeds	No	< 6 Weeks	CONTACT
8S1P	8-Battery Cells	Yes	< 8 Weeks	CONTACT
8S2P	16-Battery Cells	Yes	< 8 Weeks	CONTACT

DATA SHEET 5061D0002 REV 02
PART 5061H10001-1 (8S1P) & 5061H10001-2 (8S2P)
VALID AS OF 03.20.2026

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MAGNETORQUER 6

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THE UMBRA MAGNETORQUER 6 is engineered for precise, reliable attitude control in demanding small satellite missions. Leveraging space-proven heritage and Umbra's commitment to quality, this compact torque rod delivers at least 6 Am^2 dipole moment in a minimal form factor. The Umbra Magnetorquer 6 boasts high torque per required spacecraft volume, dependable attitude control, and rigorous qualification testing. Designed for seamless integration, the Umbra Magnetorquer 6 will be ready for your mission right out of the box.

SIMPLE BUILD
SIMPLE INTEGRATION

LEO
ENVIRONMENT

MULTIPLE
MOUNTING OPTIONS

FEATURES

SIMPLE DESIGN | SIMPLE INTEGRATION

Designed for ease of integration with any GNC system, the Magnetorquer 6 can be installed in its lightest configuration using Umbra's 4-point mounting pattern or can be adapted to any other bolt pattern with the available mounting tray. The 2-pin connection is easily integrated into any GNC system. Contact us for more information about Umbra's fully integrated GNC solution.

COMPACT POWER | HIGH TORQUE DENSITY

The Umbra Magnetorquer 6 delivers a powerful 6 Am^2 dipole moment in a remarkably compact and lightweight form factor. This high torque density maximizes control authority while minimizing mass and volume, optimizing your satellite's payload capacity and maneuverability.

SEAMLESS INTEGRATION | OPERATIONALLY READY

The Umbra Magnetorquer 6 features a highly compact design, thoughtful connector placement for tight packaging, and an integrated mounting bracket for flexible installation options. This meticulous design simplifies physical integration into SWaP-constrained small satellite platforms, reducing assembly time and complexity.

PRECISION ENGINEERING | BUILT-TO-LAST

The Umbra Magnetorquer 6 is built for the demanding space environment, utilizing space-rated materials with low outgassing properties (compliant with ASTM E595). It undergoes rigorous testing, ensuring exceptional reliability and long-term performance in orbit.

GENERAL SPECIFICATIONS

MAX DIMENSIONS	5.100 in x 1.440 in x 0.875 in
MASS	300 g
INPUT VOLTAGE RANGE	12 V ± 0.5 V for > 6 Am^2 performance
INPUT VOLTAGE NOMINAL	Electromagnetics designed for 12 V
PEAK POWER	4.24 W
ELECTRICAL INTERFACE	Keyed 2 pin circular connector
INTENDED SPACE ENVIRONMENT	LEO
HERITAGE	Flown on Umbra 11+
DESIGN LIFE	5+ Years
PRODUCTION	Assembled and tested in the USA
MATERIALS COMPLIANCE	ASTM E595

ENVIRONMENTAL SPECIFICATIONS

RANDOM VIBE	Qualified to 14.16 G_{rms} profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
SHOCK	Qualified to 1000g peak profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
OPERATING TEMPERATURE	-40°C to 80°C
SURVIVAL TEMPERATURE	-40°C to 100°C
TOTAL IONIZING DOSE DESIGN CAPABILITY	Designed to withstand at least 30 krad TID

CONFIGURATIONS

TYPE	DESCRIPTION & DETAILS	SPACE READY	TYPICAL LEAD TIME	COST
EDU	Suitable for hardware-in-the-loop testbeds	No	4-Week Lead Time	CONTACT
FLIGHT	Acceptance tested	Yes	7-Week Lead Time	CONTACT

DATA SHEET 5031D0002 REV 02
PART 5031H10001-1
VALID AS OF 03.20.2026

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MSS PACKAGE

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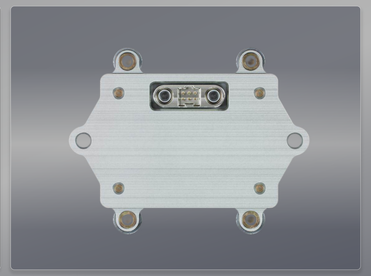
THE UMBRA MAGNETOMETER + SUN SENSOR (MSS) PACKAGE is a low-size, weight, and power (SWaP) solution for precise attitude determination. The integrated tri-axis magnetometer and dual-axis sun sensor provide essential magnetic field and solar orientation data for small satellite GNC systems. This sensor delivers flight heritage and competitive performance with respect to accuracy, reliability, and ease of integration. Its compact size and minimal power consumption make the MSS ideal for demanding missions requiring high-performance attitude knowledge in resource-constrained environments. Ready for rapid integration across diverse platforms.

LOW SWaP | HIGH ACCURACY | COMPACT FOOTPRINT



GENERAL SPECIFICATIONS

MAX DIMENSIONS	2.02 in x 1.47 in x 0.91 in
MASS	< 65 g (with standard mount)
INPUT VOLTAGE RANGE	5 +/- 1V (tolerant up to 36 V)
INPUT VOLTAGE NOMINAL	5 V
PEAK POWER	< 170 mW (at 5 V)
AVERAGE POWER	< 170 mW (at 5 V)
ELECTRICAL INTERFACE	15-Pin Micro-D Connector
DATA INTERFACE	RS-422
INTENDED SPACE ENVIRONMENT	LEO
HERITAGE	Acceptance tested and Fight Heritage
DESIGN LIFE	5+ Years
PRODUCTION	Assembled and tested in the USA
FIELD OF VIEW	110° x 110°
ACCURACY OF BORESIGHT	< 1°
ACCURACY OF FOV EDGE	8°
SOLUTION RATE	> 10 Hz
MEASUREMENT RANGE SINGLE AXIS MAGNETIC	+/- 4 Gauss
SENSITIVITY SINGLE AXIS MAGNETIC	1 mGauss
ACCURACY SINGLE AXIS MAGNETIC	± 50 mGauss

ENVIRONMENTAL SPECIFICATIONS

RANDOM VIBE	Qualified to 14.16 G_{rms} profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
SHOCK	Qualified to 1000g peak profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
OPERATING TEMPERATURE	-40°C to 80°C
SURVIVAL TEMPERATURE	-40°C to 100°C
TOTAL IONIZING DOSE DESIGN CAPABILITY	Designed to withstand at least 30 krad TID

CONFIGURATIONS

TYPE	DESCRIPTION & DETAILS	SPACE READY	TYPICAL LEAD TIME	COST
EDU	Suitable for Hardware-in-the-Loop testbeds	No	< 4 Weeks	CONTACT
FLIGHT	Acceptance Tested	Yes	< 8 Weeks	CONTACT
CUSTOM	Umbra Space Systems offers custom modifications. Please contact.	Inquire	Inquire	CONTACT

FEATURES

RS-422 OUTPUT | BROAD COMPATIBILITY

The Umbra MSS boasts minimal power consumption for its accuracy and precision capability. The combination of high performance and low power consumption the Umbra MSS provides is ideal for power-constrained small satellite missions.

ULTRA-COMPACT | LIGHTWEIGHT DESIGN

At less than 65 grams and with a minimal footprint, the Umbra MSS significantly reduces SWaP burden on small satellite platforms. This compact design enables easier integration in constrained spaces and maximizes payload capacity without sacrificing performance.

SPACE-GRADE RELIABILITY | RIGOROUSLY TESTED

Built to withstand the demanding space environment, the MSS undergoes extensive qualification testing exceeding industry standards for vibration, shock, thermal cycling, and radiation (>30 krad). This proven resilience ensures dependable operation and mission confidence throughout its multi-year design life.

HIGH ACCURACY | SMALL PACKAGE

The Umbra MSS provides fine dual-axis sun sensor accuracy (<1° at boresight) with tri-axis magnetometer readings, offering superior attitude determination compared to coarse sun sensors alone. This enhanced accuracy enables precise pointing and control for demanding and agile small satellite missions.

DATA SHEET 5041D0002 REV 02
PART 5041H10001-1
VALID AS OF 03.20.2026

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NETWORK SWITCH 8-1G

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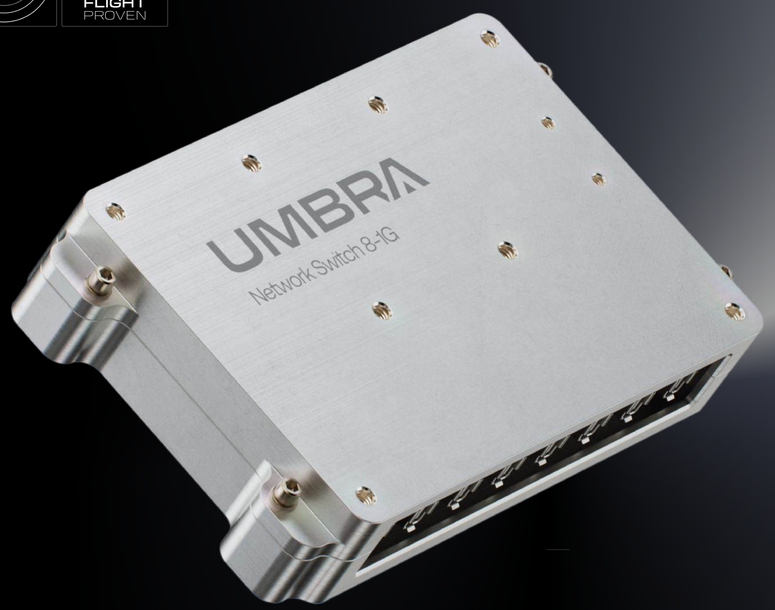
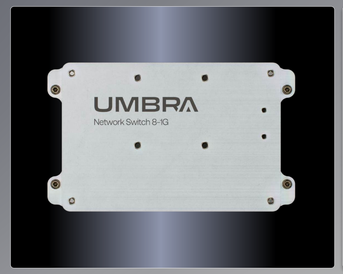
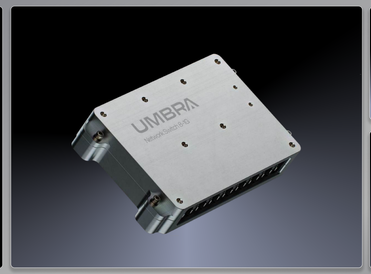
THE UMBRA NETWORK SWITCH 8-1G is a qualified ethernet device for communication between onboard modules in Low Earth Orbit (LEO). It provides mission-critical Gigabit Ethernet connectivity between 2 to 8 onboard modules, and is available in a plug-and-play unmanaged configuration, or in a managed configuration for more complex integrations. With testing tailored for Falcon 9 rideshare missions and multi-orbit compatibility, the Umbra Network Switch 8-1G offers dependable high-bandwidth intra-satellite communication, backed by rigorous testing.

RADIATION TOLERANT | MULTI ORBIT | FLIGHT PROVEN







GENERAL SPECIFICATIONS

MAX DIMENSIONS	5.84 in x 3.15 in x 0.97 in
MASS	< 300 grams
INPUT VOLTAGE NOMINAL	28 V
PEAK POWER	5.4 W (at 33 V, max traffic)
AVERAGE POWER	4.6 W (at 28 V)
ELECTRICAL INTERFACE	9-Socket Micro-D Connector
DATA INTERFACE	IX Type A Ethernet
INTENDED SPACE ENVIRONMENT	Multi-Orbit Capable
HERITAGE	Qualified and Flight Heritage on Umbra 11+
DESIGN LIFE	5+ Years
PRODUCTION	Assembled and tested in the USA
DATA RATE	Up to 1 Gbps
NUMBER OF PORTS	8
PROTOCOLS	10BASE-T, 100BASE-TX, 1000BASE-T

ENVIRONMENTAL SPECIFICATIONS

RANDOM VIBE	Qualified to 14.16 G_{rms} profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
SHOCK	Qualified to 1000g peak profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
OPERATING TEMPERATURE	-30°C to 65°C
SURVIVAL TEMPERATURE	-40°C to 85°C
EMI/EMC	• Component level radiated emissions • Electrical fast transient/ burst immunity • Power frequency magnetic field immunity testing
TOTAL IONIZING DOSE DESIGN CAPABILITY	Designed to withstand at least 30 krad TID

CONFIGURATIONS

TYPE	DESCRIPTION & DETAILS	SPACE READY	TYPICAL LEAD TIME	COST
EDU	Suitable for use in: • Software development • Hardware-in-the-Loop testbeds	No	4 Weeks	CONTACT
FLIGHT UNMANAGED	• Optional strain relief • Custom connector configurations available • Available now	Yes	< 8 Weeks	CONTACT
FLIGHT MANAGED	• Optional strain relief • Custom connector configurations available • Currently under development	Yes	< 8 Weeks	CONTACT

FEATURES

SPACE-HARDENED | RADIATION TOLERANT

Built to withstand the extreme conditions of space, the Umbra Network Switch 8-1G features a ruggedized design and radiation-tolerant components. This design ensures dependable operation in harsh environments, including rigorous vibration, shock, and radiation exposure.

SPACE QUALIFIED | RUGGEDIZED INTERFACES

Umbra's successful history of delivering mission critical data has led to the design of the Umbra Network Switch 8-1G. Fully space qualified, this module allows your spacecraft systems to take advantage of modern ethernet performance in a simple to use, low SWaP package.

HIGH-BANDWIDTH | 8-PORT GIGABIT ETHERNET

The Umbra Network Switch 8-1G is equipped with eight ports of Gigabit Ethernet (1 Gbps); the switch delivers high-bandwidth data transfer capabilities for demanding intra-satellite communication needs. This design enables efficient communication between various onboard systems and payloads.

COMPATIBILITY | SIMPLE TO COMPLEX

Designed to create an ethernet-connected infrastructure within any small spacecraft seamlessly. The Umbra Network Switch is available in unmanaged configuration for single switches used in basic applications or in a managed configuration for complex installations utilizing multiple switches or inter-satellite connections.

DATA SHEET 5091D0002 REV 02
PART 5091H10001-1
VALID AS OF 03.20.2026

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POWER PACKAGE

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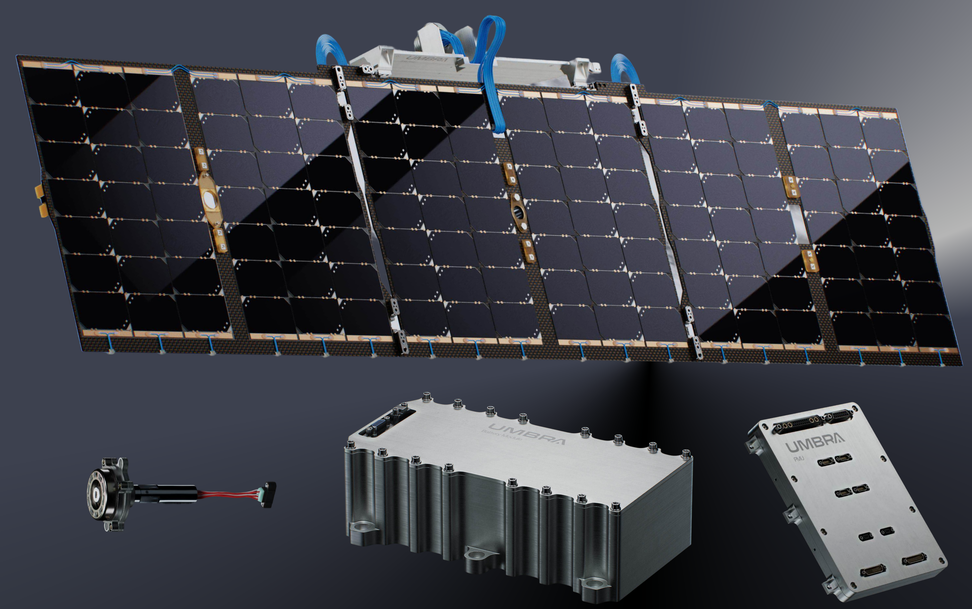
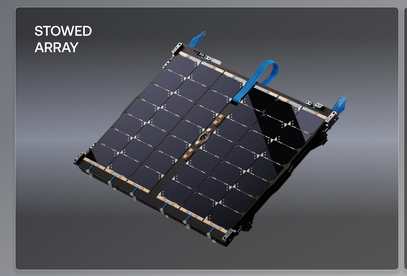
THE UMBRA POWER PACKAGE delivers a complete, integrated power solution for small satellites. Combining a high-efficiency, body-steered deployable solar array, high-density battery modules, and intelligent power management, it provides reliable power for demanding LEO missions. Flight-proven components, Falcon 9 heritage, and a compact design ensure mission success. Choose Umbra for a streamlined, high-performance power subsystem.

POWER EFFICIENCY | COMPACT FOOTPRINT | MORE THAN 5YR MISSION LIFE | LEO ENVIRONMENT | FLIGHT PROVEN





GENERAL SPECIFICATIONS

BUS VOLTAGE RANGE	28 V ± 4V
BUS VOLTAGE NOMINAL	28 V
PEAK POWER	**Single Array:** 120 W generation BOL **Dual Array:** 240W generation BOL
AVERAGE POWER	N/A
ELECTRICAL INTERFACE	Power Umbilical Inhibits TT&C
DATA INTERFACE	RS-422
INTENDED SPACE ENVIRONMENT	LEO
HERITAGE	In combination: Individual component designs flown on Umbra 1-10, combined and repackaged for customer product
DESIGN LIFE	5+ Years
PRODUCTION	Assembled and tested in the USA

ENVIRONMENTAL SPECIFICATIONS

RANDOM VIBE	Qualified to 14.16 G_{rms} profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
SHOCK	Qualified to 1000g peak profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
OPERATING TEMPERATURE	Solar Array & HDRMS: -50°C to 90°C
SURVIVAL TEMPERATURE	Solar Array & HDRMS: -60°C to 120°C
TOTAL IONIZING DOSE DESIGN CAPABILITY	Designed to withstand at least 30 krad TID

CONFIGURATIONS

TYPE	DESCRIPTION & DETAILS	SPACE READY	TYPICAL LEAD TIME	COST
EDU	• Battery Modules: Not Space Rated • Power Management Unit: Not Space Rated	No	< 6 Weeks	CONTACT
FLIGHT	• Default flight configuration (as described in this data sheet) • Umbra Steered Deployable Solar Array-120: **1x** • Umbra Battery Module-8S2P: **2x** • Umbra Power Management Unit: **1x** • Umbra Hold Down and Release Mechanism: **1x**	Yes	< 18 Weeks	CONTACT

FEATURES

EASY | GENERATION, STORAGE & MANAGEMENT

The Umbra Power Package provides a complete, pre-integrated power subsystem, combining solar power generation, high-density energy storage, and intelligent power management. This integrated approach simplifies procurement, reduces integration complexity, and optimizes system-level performance.

COMPACT POWER | SIMPLE INTEGRATION

Featuring a high-efficiency, body-steered deployable (BSD) solar array and high-energy-density lithium-ion battery modules, the system delivers robust and reliable power. Body-steering removes the need for a solar array drive, while the batteries ensure continuous operation through eclipse and peak demand periods.

FLIGHT-PROVEN | VALIDATED RELIABILITY

Successfully flown on Falcon 9 rideshare missions to LEO, the solar array, battery, and HDRM offer proven reliability. This flight heritage reduces mission risk and provides assurance of dependable performance in real-world space environments.

LOW SWaP | REDUCE FOOTPRINT

Engineered for small satellite applications, the Power Package optimizes SWaP (Size, Weight, and Power) through its compact and lightweight design. The high stowage efficiency of the array and the high energy density of the batteries minimize the system's footprint, maximizing available payload volume.

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REACTION WHEEL

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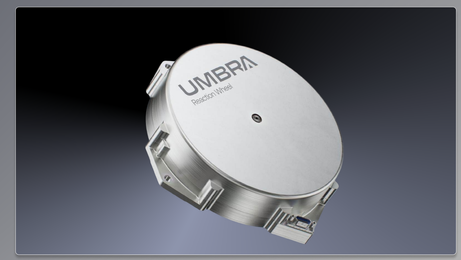
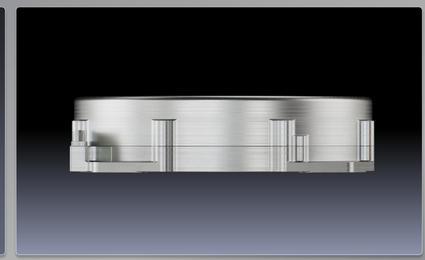
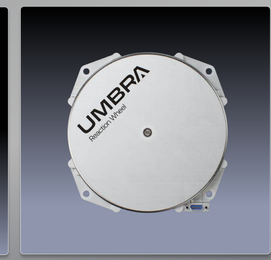
THE UMBRA REACTION WHEEL delivers precise and reliable attitude control for small satellites, focusing on responsible space debris mitigation. Designed for demisability per NASA standards, this > 2 Nms reaction wheel offers high torque and momentum in a compact, lightweight package. Optimized for seamless integration with other Umbra Components and test levels tailored for Falcon 9 Rideshare, it provides a qualified, high-performance solution for demanding missions.

>2Nms ASSEMBLY | RE-ENTRY DEMISEABLE | MULTI ORBIT







GENERAL SPECIFICATIONS

MAX DIMENSIONS	6.0 in x 6.0 in x 1.5 in
MASS	2 kg
INPUT VOLTAGE RANGE	24-32 V
INPUT VOLTAGE NOMINAL	28 V
PEAK POWER	100 W at maximum torque (typical)
AVERAGE POWER	5 W steady state draw
ELECTRICAL INTERFACE	15-Socket Micro-D Connector
DATA INTERFACE	RS-485
INTENDED SPACE ENVIRONMENT	Multi-orbit
HERITAGE	Qualification testing complete in Q2 2026
DESIGN LIFE	5+ Years
PRODUCTION	Assembled and tested in the USA
MOMENTUM	+/- 2.0 Nms (at max rpm)
MAX TORQUE	250 mNm

ENVIRONMENTAL SPECIFICATIONS

RANDOM VIBE	Qualified to 14.16 G_{rms} profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
SHOCK	Qualified to 1000g peak profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
OPERATING TEMPERATURE	-34°C to 70°C
SURVIVAL TEMPERATURE	-34°C to 80°C
TOTAL IONIZING DOSE DESIGN CAPABILITY	Designed to withstand at least 30 krad TID

CONFIGURATIONS

TYPE	DESCRIPTION & DETAILS	SPACE READY	TYPICAL LEAD TIME	COST
EDU	Suitable for use in Hardware-in-the-Loop testbeds and software development testbeds	No	< 4 Weeks	CONTACT
FLIGHT	Flight Hardware with Acceptance Testing	Yes	< 12 Weeks	CONTACT
CUSTOM	Umbra Space Systems is adding additional wheel sizes to our catalog. Please contact us with your needs.	Inquire	Inquire	CONTACT

FEATURES

RESPONSIBLE DE-ORBITING | DEMISEABLE DESIGN

Engineered for complete demisability upon atmospheric re-entry in compliance with NASA-STD-8719.14C, this reaction wheel minimizes space debris. This commitment to responsible space operations is crucial for sustainable LEO activities and simplifies the licensing process.

HIGH-PERFORMANCE CONTROL | MOMENTUM

Providing >2 Nms of momentum and 100 mNm of maximum torque, the Umbra Reaction Wheel enables precise attitude control and agile maneuvering for small satellites. This high-performance capability allows for demanding pointing requirements and quick response to disturbances.

BUILT FOR RELIABILITY | REDUNDANCY & QUALITY

Built for dependable operation, the Umbra Reaction Wheel features redundant Hall Effect control and ABEC 7 ceramic angular contact bearings. These high-quality components enhance reliability and ensure long-term performance in the harsh space environment.

STANDARD INTERFACE | EASY INTEGRATION

Designed for optimized performance and seamless integration with any GNC system utilizing RS-485 communication, the Umbra Reaction Wheel works harmoniously with other Umbra components. Contact us for more information on Umbra's fully integrated GNC solution, utilizing Umbra Reaction Wheels.

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S-BAND RADIO

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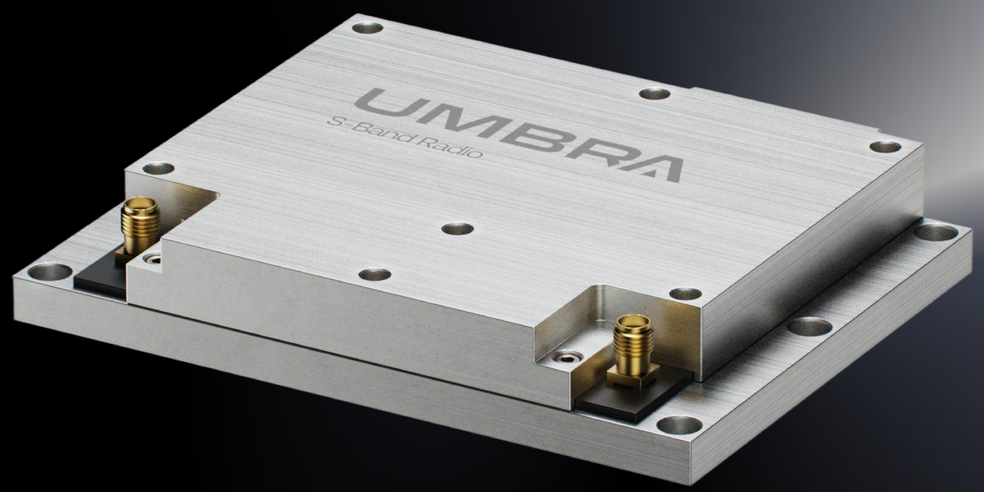
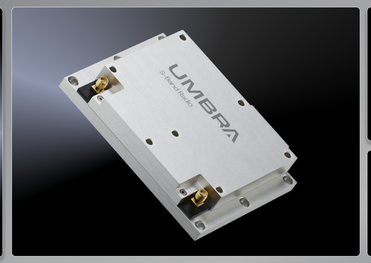
THE UMBRA S-BAND RADIO is a qualified transceiver for command and telemetry in Low Earth Orbit (LEO). It supports Unified S-Band, complies with modulation and coding standards defined by the Consultative Committee for Space Data Systems (CCSDS MODCOD), and integrates easily via an industrial Ethernet interface. With testing tailored for Falcon 9 rideshare missions, it offers post-launch configurability for flexibility on-orbit, reliable communication with commercial ground stations and compatibility with launch requirements. Above all, the Umbra S-Band Radio boasts high value and short lead times.

CCSDS COMPLIANT | LEO ENVIRONMENT | S BAND FULL SUPPORT | ON-ORBIT CONFIGURATION





FEATURES

ON-ORBIT FLEXIBILITY | REMOTELY CONFIGURABLE

The Umbra S-Band Radio offers unparalleled flexibility, allowing for complete reconfiguration of communication parameters after launch. This powerful capability enables on-the-fly adjustments to optimize performance and adapt to evolving mission needs throughout the satellite's operational life.

SPACE QUALIFIED | RADIO HERITAGE

Umbra's extensive history in RF payloads and high-performance downlinks has led to the design of the Umbra S-Band Radio. Fully space qualified, this design offers a full 2W output power to close demanding link budgets.

GLOBAL COMPATIBILITY | UNIFIED S-BAND & CCSDS

Engineered for full compliance with the Unified S-Band standard and Consultative Committee for Space Data Systems (CCSDS) modulation and coding schemes (MODCOD), the Umbra S-Band Radio ensures robust communication compatibility. This standard adherence simplifies operations and guarantees reliable data links with diverse systems.

WORRY-FREE TELEMETRY | SIMPLE INTEGRATION

Built on Umbra's operational experience with Telemetry, Tracking, and Control (TT&C) via commercial ground network providers. The Umbra S-Band Radio has been engineered to provide seamless integration into your spacecraft, your test Hardware-in-the-Loop testbed, and to ensure reliable connection with your chosen ground provider.

GENERAL SPECIFICATIONS

MAX DIMENSIONS	4.82 in x 3.7 in x .812 in
MASS	< 300 g
BUS VOLTAGE RANGE	28 ± 4 V
BUS VOLTAGE NOMINAL	28 V
PEAK POWER	15.7 W while transmitting
AVERAGE POWER	4.4 W while receiving
ELECTRICAL INTERFACE	15-Pin Micro-D Connector
DATA INTERFACE	GigE over IX connector with Serial backup
INTENDED SPACE ENVIRONMENT	LEO
HERITAGE	Acceptance tested. First Flight Q2 2026
DESIGN LIFE	5+ Years
PRODUCTION	Assembled and tested in the USA
OUTPUT POWER	Up to 2 W
DATA RATE	1 kbps to 1 Mbps
OPERATING DOPPLER	± 100 kHz at 10 kHz/s
SENSITIVITY @ 100KBPS	-100 dBm
TRANSMIT MODCOD	OQPSK, HDLC, NRZ-L/M/S, Convolutional Encoding (k=7, ½, G2 inverted), Reed-Solomon (255,223)
RECEIVE MODCOD	BPSK, HDLC, NRZ-L/M/S
FREQUENCY RANGE	Uplink: 2025 MHz to 2110 MHz, Downlink: 2200 MHz to 2290 MHz
ACQUISITION TIME	< 3 seconds

ENVIRONMENTAL SPECIFICATIONS

RANDOM VIBE	Qualified to 14.16 G_{rms} profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
SHOCK	Qualified to 1000g peak profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
OPERATING TEMPERATURE	-30°C to 65°C
SURVIVAL TEMPERATURE	-40°C to 85°C
EMI/EMC	MIL-STD-461
TOTAL IONIZING DOSE DESIGN CAPABILITY	Designed to withstand at least 30 krad TID

CONFIGURATIONS

TYPE	DESCRIPTION & DETAILS	SPACE READY	TYPICAL LEAD TIME	COST
EDU	Suitable for Hardware-in-the-Loop testbeds	No	< 5 Weeks	CONTACT
FLIGHT	Acceptance Tested • Optional – Diplexer • Optional – Diplexer + Splitter	Yes	< 8 Weeks	CONTACT
CUSTOM	Umbra Space Systems offers custom modifications. Please contact.	Inquire	Inquire	CONTACT

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SOLAR ARRAY

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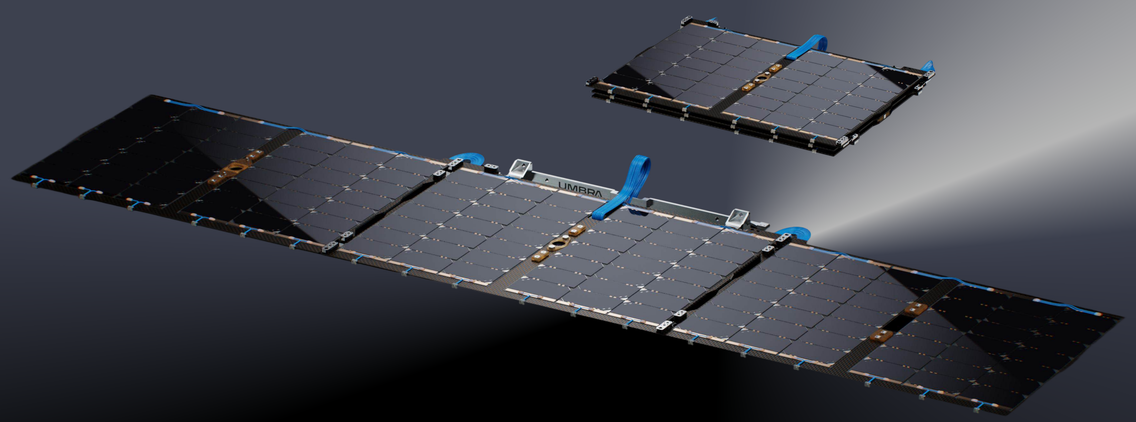
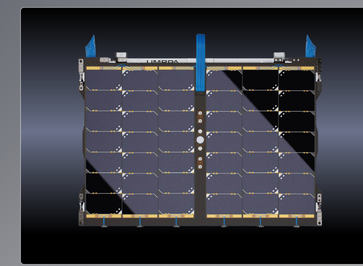
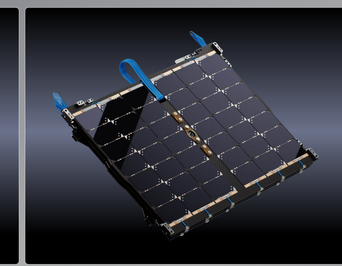
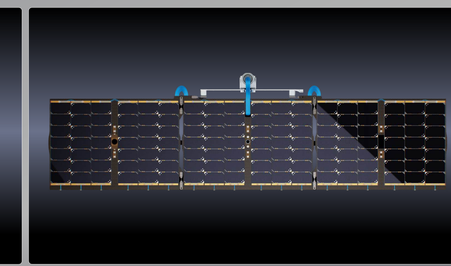
THE UMBRA BODY STEERED DEPLOYABLE SOLAR ARRAY delivers more than 120W of reliable power in a compact, flight-proven design for small satellites. Optimized for body-steering in Low Earth Orbit (LEO), this tri-fold array features high dynamic stability and redundant, premium triple-junction solar cells. Validated on Falcon 9 and designed for seamless integration within the Umbra Integrated System, this solar array provides a dependable, high-performance power generation solution.

120W+ MULTI-UNIT CAPACITY | MORE THAN **5YR** MISSION LIFE | HIGH STOW COMPACTION | **LEO** ENVIRONMENT









GENERAL SPECIFICATIONS

MAX DIMENSIONS STOWED	12.87 in x 12.95 in x 2.90 in
MAX DIMENSIONS DEPLOYED	40 in x 13 in x 10 in
MASS	2.5 kg
PEAK POWER	120W generation BOL (at 28°C, AM0)
ELECTRICAL INTERFACE	Single MIL-38999 Connector
HERITAGE	Design flown on Umbra 1 - 12
VOC	BOL: 38.2 V (at 28°C) EOL: 37.4 V (at 28°C, 5-year estimate)
VMP	BOL: 34.0 V (at 28°C) EOL: 33.0 V (at 28°C, 5-year estimate)
IMP	BOL: 9 Strings @ 445 mA = 4 total
PRODUCTION	Assembled and tested in the USA

ENVIRONMENTAL SPECIFICATIONS

RANDOM VIBE	Qualified to 14.16 G_{rms} profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
SHOCK	Qualified to 600g peak profile enveloping attenuated GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
OPERATING TEMPERATURE	-50°C to 90°C
SURVIVAL TEMPERATURE	-60°C to 120°C
TOTAL IONIZING DOSE DESIGN CAPABILITY	Designed to withstand at least 30 krad TID

FEATURES

COMPACT POWER | HIGH EFFICIENCY

The Umbra Solar Array generates 120W of peak power (BOL) from a compact, tri-fold design. This high power density, combined with premium triple-junction solar cells, maximizes energy generation while minimizing stowed volume, crucial for small satellite applications.

BODY-STEERING OPTIMIZED DESIGN

Specifically engineered for body-steering, this array eliminates the need for complex, dedicated pointing mechanisms. This design simplifies spacecraft design, reduces weight and power consumption, and enhances overall mission efficiency for agile small satellites.

FLIGHT-PROVEN | VALIDATED RELIABILITY

Validated through successful deployments, the Umbra Solar Array offers proven reliability and performance in real-world space environments. This flight heritage, combined with its compatibility with the Umbra HDRM, provides mission-ready confidence and minimizes risk.

BUILT TO ENDURE | ROBUST & REDUNDANT

The Umbra Solar Array is built for long-term operation, featuring multiple layers of redundancy in the photovoltaic design, premium triple-junction cells with bypass diodes, and robust construction. Space-rated materials, rigorous testing exceeding industry standards, and customizable coverglass options ensure lasting performance in the harsh LEO environment.

CONFIGURATIONS

TYPE	DESCRIPTION & DETAILS	SPACE READY	TYPICAL LEAD TIME	COST
EDU	• Deployable panels only, for use in structural/thermal model builds • Cells not included • Single & Double Available	No	< 4 Weeks	CONTACT
FLIGHT	• Acceptance tested • Multiple arrays can be used on the same spacecraft, or integrated into the UMBRA POWER PACKAGE	Yes	**Single Wing:** < 12 Weeks **Double Wing:** < 16 Weeks	CONTACT
CUSTOM	Umbra Space Systems offers custom modifications. Please contact.	Inquire	Inquire	CONTACT

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SYNCRELEASE 4

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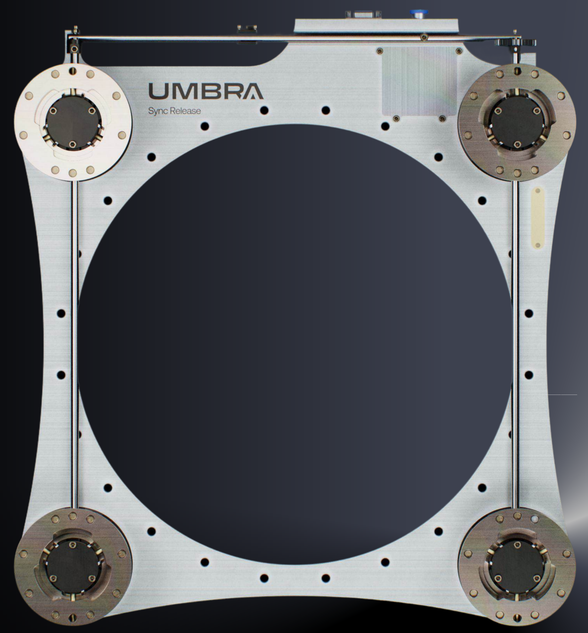
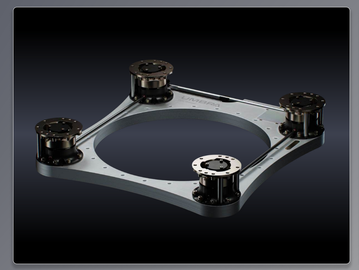
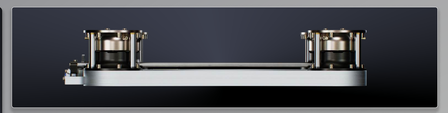
THE UMBRA SYNCHRONIZED RELEASE MECHANISM 4 is a spacecraft separation system designed for precise and controlled deployment from a launch vehicle. The Umbra SyncRelease 4 is engineered for small satellites to ensure low-shock, debris-free separation. Optimized for SpaceX Falcon 9 Rideshare missions, Umbra SyncRelease 4 presents a reliable integration for its associated payload and surrounding mission assets. This lightweight, all-inclusive solution simplifies spacecraft deployment while maintaining the reliability required for extreme launch environments.

RAPID START-UP

SYNC RELEASE







FEATURES

DEBRIS-FREE DEPLOYMENT | EASY INTEGRATION

The mechanism ensures a simple & synchronized deployment, generating minimal foreign object debris (FOD). Unlike traditional pyrotechnic systems, the Umbra SyncRelease 4 is easily resettable, speeding up integration testing and launch site integration.

LOW-SHOCK SEPARATION | PROTECT PAYLOAD

Engineered for low-shock separation, the Umbra SyncRelease 4 minimizes the loads on your spacecraft during deployment. This design protects sensitive instruments and components, ensuring their operational integrity after launch.

VALIDATED | MISSION-READY RELIABILITY

Umbra continuously seeks to expand the envelope of spacecraft mass properties validated for Umbra SyncRelease 4 customers. The Umbra SyncRelease 4 provides simple actuation you can trust. The inherent reliability of the design minimizes mission risk and ensures dependable separation in real-world space environments.

TAILORED DEPLOYMENT | CUSTOMIZABLE

Offering customization for CG offset, Umbra engineers will work to tailor the deployment parameters to your specific spacecraft and mission needs. This flexibility ensures optimal separation conditions for a wide range of small satellite platforms.

GENERAL SPECIFICATIONS

MAX DIMENSIONS	17.700 in x 19.680 in x 3.480 in
MASS	**Lower/Launch Vehicle Side:** 5.48 kg **Upper/Flyaway Vehicle Side:** 0.92 kg
BUS VOLTAGE RANGE	24 - 32 V
BUS VOLTAGE NOMINAL	28 V
PEAK POWER	< 4.5 W
AVERAGE POWER	3W @ 24V
ELECTRICAL INTERFACE	9-Socket D-Sub Connector
INTENDED SPACE ENVIRONMENT	Separation occurring within 4 hours of launch
HERITAGE	Protoflight planned Q3 2026
DESIGN LIFE	1 Launch, plus > 5 I&T actuation cycles
PRODUCTION	Assembled and tested in the USA

ENVIRONMENTAL SPECIFICATIONS

RANDOM VIBE	Qualified to 14.16 G_{rms} profile enveloping GEVS, Falcon 9, SpaceX Rideshare, and Electron levels
SHOCK	Qualified to 2,000g peak profile
OPERATING TEMPERATURE	-30°C to 70°C
SURVIVAL TEMPERATURE	-40°C to 80°C
QUASI-STATIC LOAD	Qualified to 12.5g axial and 16.88g lateral sine bursts

CONFIGURATIONS

TYPE	DESCRIPTION & DETAILS	SPACE READY	TYPICAL LEAD TIME	COST
EDU	Suitable for test fits and Hardware-in-the-Loop testbeds	No	< 6 Weeks	CONTACT
FLIGHT	Flight Hardware with Acceptance Testing	Yes	< 16 Weeks	CONTACT
CUSTOM	Umbra Space Systems offers custom configurations tailored for your spacecraft mass properties. Please contact.	Inquire	Inquire	CONTACT

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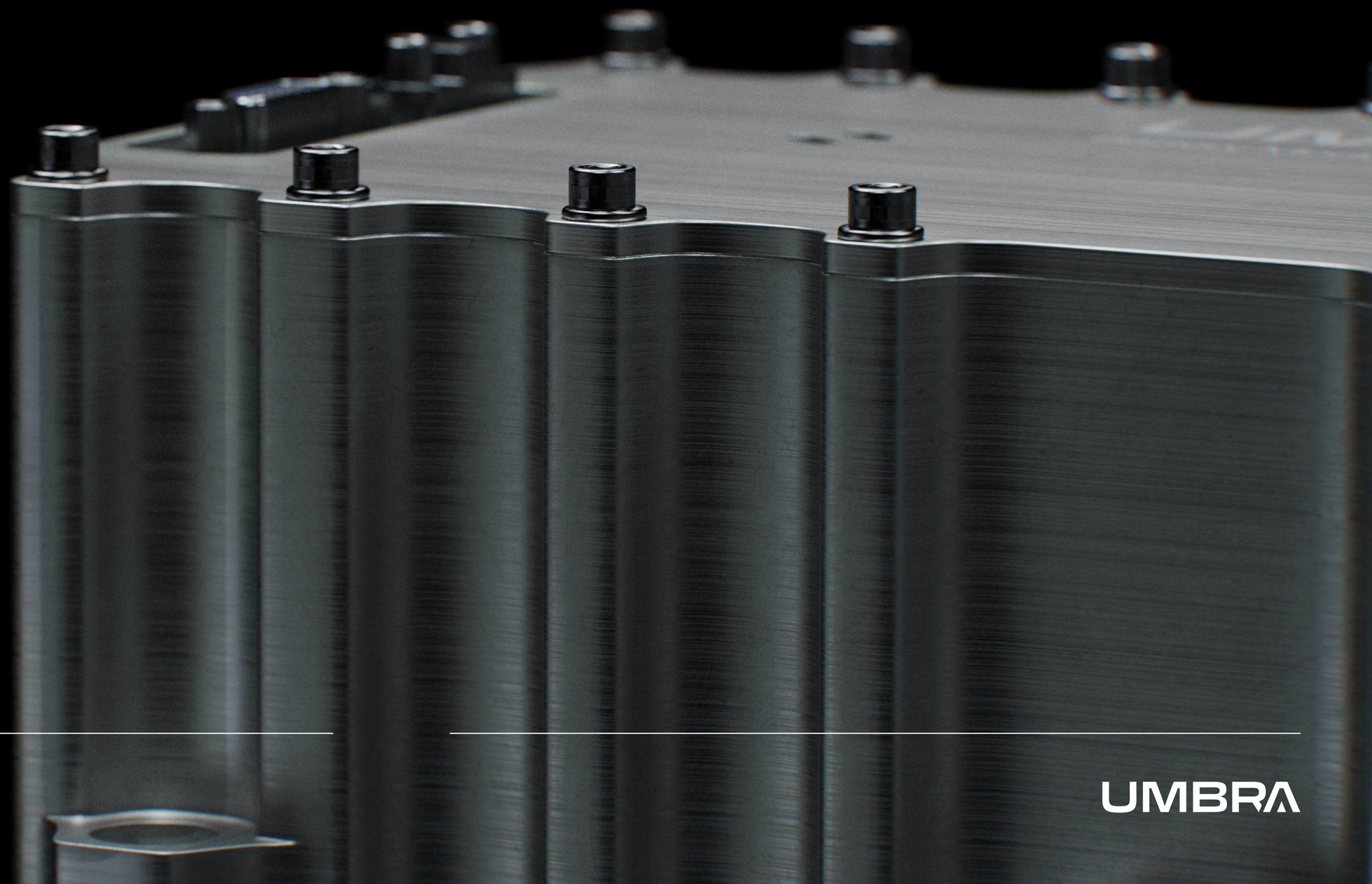

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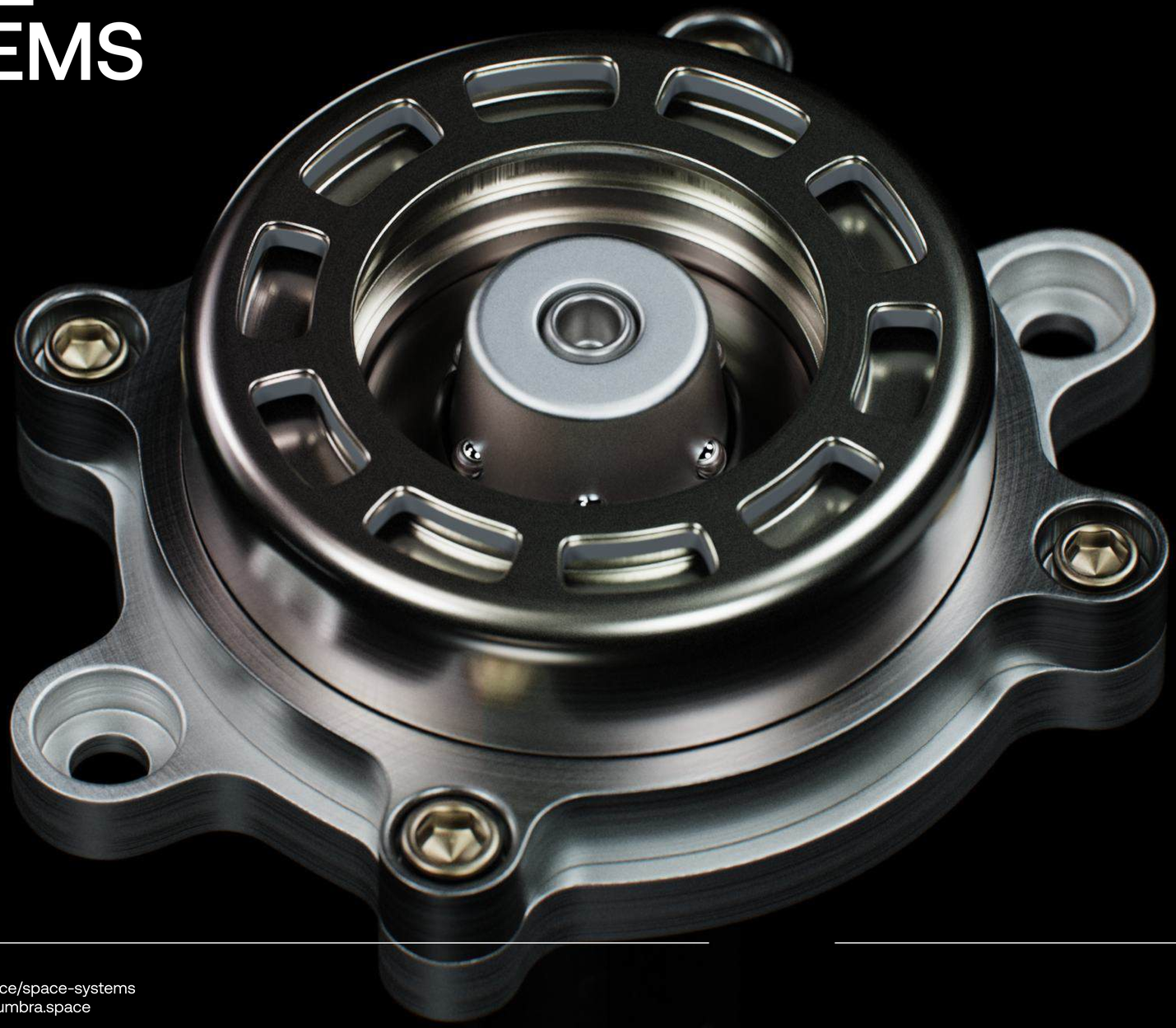

THANK YOU

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