



ZIN Technologies

# Battery Management Systems (BMS) Model: BMSFA1000

## ZIN Battery Management Systems (BMS)

### DESIGN HIGHLIGHTS

Complete Battery Management System  
Designed for Spacecraft Li-Ion Cells

### EXTENSIVE TELEMETRY

+/-50mV Cell Voltage Accuracy  
+/-1% Battery Current Telemetry  
Cell Temperature Telemetry

### EASY INTEGRATION

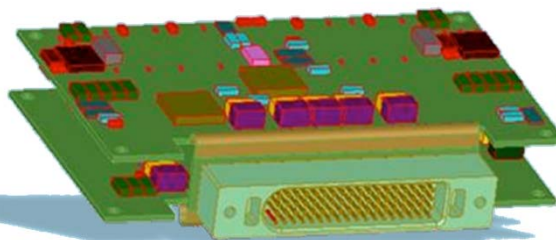
Packaged with Battery Cells  
Small, Lightweight Rigid-Flex Design  
Powered from Battery Cells  
Hardware Shutdown Mode  
Outputs Data via SPI Serial Bus  
Does Not Unbalance Cells

### COST EFFECTIVE

No COTS upscreening required  
Modular design fits many battery types  
No series cell limitation

### MISSION CRITICAL DESIGN

Complete Internal Redundancy Options  
EEE Parts Selection per:  
EEE-INST-002 / MSFC-STD-3012  
Radiation-Hardened: 100kRAD  
Size, Weight & Power Efficient Design  
MIL-STD-461 EMC Tests  
Thermal Vacuum Cycling / Outgassing  
Shock and Vibration



Spacecraft batteries have strict safety requirements that dictate that cell voltages, temperatures, and currents be measured. And controlled.

While there are many BMS that fulfill these needs for commercial systems, commercially available systems are not constructed with space-grade, radiation-hardened components. ZIN's Spacecraft BMS fills this need by integrating cell voltage, temperature, and current telemetry into a printed wiring board packaged within the battery.

ZIN's BMS system offers extraordinary flexibility. Its innovative approach to cell voltage monitoring measures the voltage of a Li-Ion cell within +/-50mV, even in series stacks with hundreds of volts of common mode voltage. ZIN's modular system is extendable to handle an arbitrary number of series cells, and performs equally well in low voltage and high voltage batteries.

Unlike existing Battery Management Solutions, ZIN's system requires no upscreening to meet EEE Parts specifications.

- ❑ ZIN Technologies develops innovative spacecraft battery management solutions that monitor Li-Ion Cells during charging and discharging.
- ❑ For simple integration, the BMS can be powered directly from the Li-Ion cells that it monitors.
- ❑ ZIN provides a hardware shutdown mode to completely disconnect the battery from the cells when the system is inactive.
- ❑ ZIN's BMS prevents overcharging, overcurrent, and overtemperature from harming space power systems.
- ❑ ZIN BMS is designed for critical applications and meets requirements for EMC, Shock, Vibration, Thermal Vacuum, Outgassing, Radiation, and EEE parts control.



**ZIN Technologies Inc.**

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Founded in 1957, ZIN provides engineering services and products to NASA and the aerospace industry. ZIN has managed the development of Mission Critical Class A/B space flight hardware (aerospace/space systems) from formulation, design, and development through to fabrication, integration, testing, verification, and mission operations.

Our experience includes the development and validation of new technologies (sensors, inertial navigational measurement units (IMUs), composites, advanced acoustic resonant attenuation, optics, power, additive manufacturing and wireless/RF).

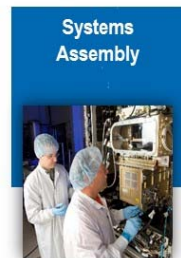
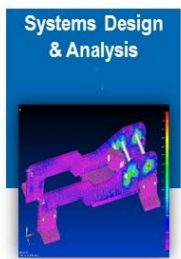
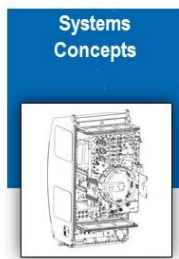
ZIN provides hardware and service for ISS research investigations, space launch systems, satellite systems, and space based human research projects enabling future space and science missions.



**Focus on Quality - Certified and Compliant with Industry and Government Quality Standards**



## OUR PRODUCTS & SERVICES



- ❑ **Minority Owned-SDB**
- ❑ **AS9100 certified**
- ❑ **DCAA Approved Forward Pricing**
- ❑ **Headquartered Cleveland Ohio**
- ❑ **Award Winning Capabilities**

