

Hybrid Battery Supercapacitor (HBS)



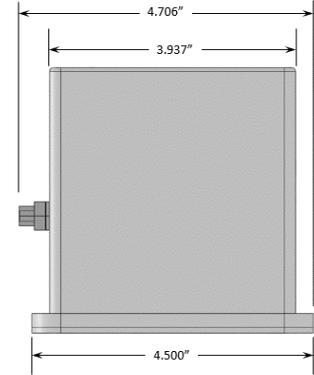
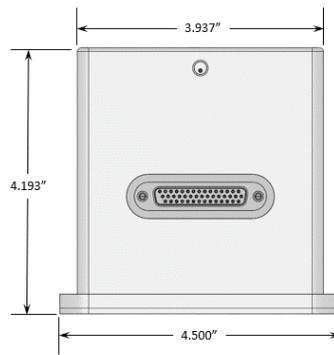
The West Coast Solutions Hybrid Battery Supercapacitor (HBS) is a revolutionary new technology which combines the high power advantages of a capacitor with the storage benefits of a battery for higher power with a smaller size and mass than traditional batteries. HBS, typically used as an auxiliary power source charged off the main bus, is enabling a new generation of high power payloads on SmallSats by providing 700 W of sustained power from a compact 1 U hybrid battery. Targeted applications include synthetic aperture radar (SAR), advanced propulsion technologies, lasercom, high data rate downlink transmitters, large array infrared sensors, and directed energy.



- High-power density battery for SmallSats
- High reliability, radiation tolerant space design
- 150 Wh energy and >700 W power in a 1U form factor
- Cycle life > 30,000
- Scalable for higher energy and higher power

West Coast Solutions is seeking industry partners to help us commercialize this technology with appropriate applications.

Hybrid Battery Supercapacitor (HBS)



Specification	Value
Operating Voltage	17.6-33.6 V
Capacity	5 Ah
Energy Storage ¹	150 Whr @ 0.2 C charge/discharge
Cycle Life ²	> 30,000 cycles
Charge Rate	1 C up to 95% State of Charge at -20-35 °C
Discharge Rate ³	5C down to 15% State of Charge at -20-35 °C
Maximum Continuous Current	25 A
Module Mass	1.65 kg
Module Volume	10 cm X 10 cm X 10 cm (1 U)
Energy Density	91 Wh/kg
Power Density	> 424 W/kg
EMI/EMC Standards	Meet or exceed MIL-STD-461F and MIL-STD-462
Applied Random Vibration	GEVS-compliant (14.1 grms)
Shock	Peak shock level 1210 g (900 Hz to 10 kHz)
Operating Temperature	-20-45 °C
Storage Temperature	-15-55 °C
Total Ionizing Dose	15 krad (Si)
EEE Parts	EEE components shall meet or exceed EEE-INST-002 Level 2

¹The HBS provides the specified energy storage at Beginning of Life based on a 0.5 C charge and discharge across thermal interface temperatures -5-45 °C

²The HBS retains at least 80% of its Beginning of Life Energy Storage capacity after the specified number of cycles under the following operating conditions:

- Charge and discharge cycles between 40% and 90% State of Charge
- Charge and discharge rate of 0.5 C with 1% of the uniformly-distributed cycles occurring at 5 C discharge
- A thermal interface temperature of 25 °C

³2 C discharge down to 15% State of Charge safe at extended temperature range of -20-45 °C