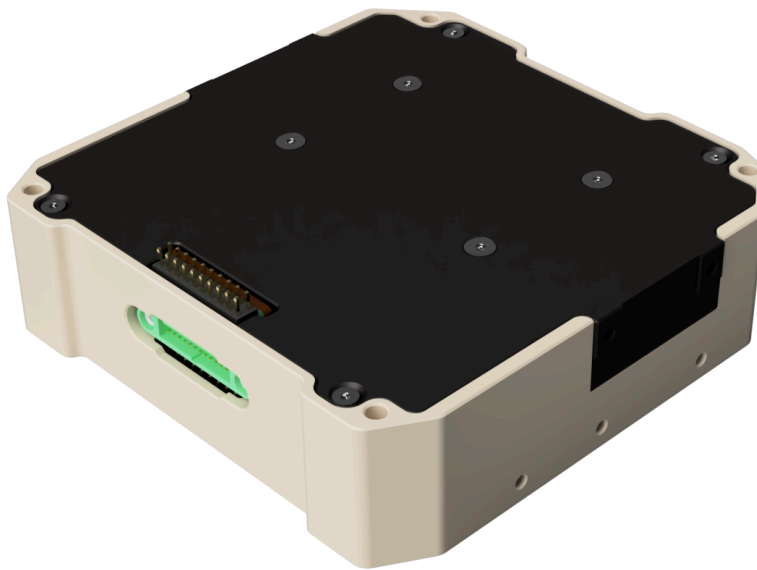




TakeMe2Space

PowerBank-50

Technical Specifications



Description:

PowerBank-50 is a modular CubeSat battery pack using high energy density lithium ion cells. Each pack contains 4 x 18650 cells, with a total energy capacity of over 50 Wh. The battery configuration can be either 2S2P or 4S1P. Multiple battery packs of the same configuration can be stacked together to increase the overall energy storage capacity of the satellite. The built-in battery management system optimally charges and discharges the batteries to maximise battery life and ensures constant power delivery to the system even when the batteries are charging. An intelligent fuel gauge system monitors and logs the battery health and state of charge, balances the cells, and protects the cells from various fault conditions. Polyimide heaters are attached to each cell to ensure that the cell temperature does not drop below 5°C. The cells and electronics are packaged into a compact PEEK enclosure with an aluminium lid for thermal management. The pack provides rich telemetry and heater control through I2C protocol.



Specifications:

	Parameter	Value	
Physical	Outer Dimensions	95.5 x 95.5 x 26.0 mm	
	Weight	370 g	
	Form factor	PC104 compliant	
	Materials	PEEK enclosure, Al 6061-T6 lid and cell holders	
	Operating Temperature	-40°C to +85°C (with heaters active)	
	Storage Temperature	+15°C to +30°C (recommended)	
Cell	Chemistry	Li-ion (NCA)	
	Form Factor	18650	
	Voltage	Nominal: 3.6 V Full Charged: 4.2 V Full Discharged: 2.65 V	
	Capacity	3500 mAh / 12.6 Wh	
	Specific Energy	252 Wh/kg	
	Operating Temperature	Charging: 10°C to 45°C Discharging: 0°C to 60°C	
Battery Pack	Configuration	4S1P	2S2P
	Input Voltage Range	18 - 30 V	9 - 30 V
	Battery Charging Voltage	16.8 V	8.4 V
	Discharge Voltage Range	Nominal: 14.4 V Fully Charged: 16.8 V Fully Discharged: 12 V (varies with DoD limit)	Nominal: 7.2 V Fully Charged: 8.4 V Fully Discharged: 6 V (varies with DoD limit)
	Nominal Capacity	50.4 Wh (3.5 Ah @ 14.4 V)	50.4 Wh (7 Ah @ 7.2 V)
	Charge Current	Nominal: 1.0 A Max: 2.0 A	Nominal: 2.0 A Max: 3.2 A
	Max Discharge Current	Continuous: 5.0 A Pulse: 10.0 A	Continuous: 5.0 A Pulse: 12.0 A
	Max Discharge Power	Continuous: 72 W Pulse: 144 W	Continuous: 36 W Pulse: 86 W
	Cycles (@ Depth of Discharge)	20,000 (@ 20% DoD) 10,000 (@ 30% DoD) 5,000 (@ 50% DoD) 1,000 (@ 80% DoD)	



	Battery Heater Power	Up to 3 W per cell (EPS controlled)
	Idle Power Consumption	0.1 W
Safety	Over-voltage Protection	Limits charging voltage to programmed voltage
	Under-voltage Protection	Prevents discharge when battery voltage reaches lower threshold
	Over-charge current	Prevents charging current above programmed threshold
	Over-discharge current	Prevents discharge current over programmed limit
	Short-circuit protection	Detects short circuit and cuts off batteries from load
	Resettable Fuse	PTC fuse shuts off battery when overheated, resets when fuse has cooled
	Over temperature protection	Does not charge or discharge when cell temp. is over 60°C
	Under temperature protection	Does not charge when cell temp. is below 5°C
	Internal self-discharge detection	Measures and logs battery leakage current
	Active Cell Balancing	Fuel gauge monitors and balances cells in series (up to 10 mA balance current)
Telemetry	Charge Voltage	
	Discharge Voltage	
	Individual Cell voltage	
	Charge Current	
	Discharge Current	
	Charge Power	
	Discharge Power	
	Battery Cycle Count	
	Battery Charge %	
	Battery Capacity	
	Time-to-full/empty	
	Cycle-based Age Forecast	
	IC Die Temperature	
	Battery Temperature	
Interfaces	Connectors	1 x Samtec B2B Header male 1 x Samtec B2B Header female



		1 x Harwin Gecko-SL
	Communication	I2C
Software	Software Development Kit (SDK)	SDK will be provided for all sensors
	Supported Languages for SDK	C - Language
Testing & Compliance	ETL: TVAC, EMI/EMC, Vibration and Shock Tolerance	TBD
	Mission Life Expectancy	Up to 5 Years