



CUBESAT POWER



The World's Most Successful, Popular, High Performance Electrical Power Systems for CubeSats

MAIN FEATURES

- Over 200 Clyde Space EPS units delivered to date
- High Efficiency Solar Array Interface
- Dedicated Active Maximum Power Point Tracking of Individual solar arrays
- High Power 3.3V, 5V and Raw Battery buses with 12V and 2.5V available as optional bus rails (other voltages also available on request).
- Flexible design: different solar cell types/string lengths
- Can interface to multiple solar arrays; one per spacecraft facet and deployed panels
- Compatible with Lithium Ion and Lithium Polymer batteries (We also supply Cubesat batteries).
- Telemetry and telecommand via I2C interface
- Bus over-current and battery under-voltage protection
- USB battery charger for ground testing
- True dead launch – ideal diode and separation switch
- 1U, 1.5U, 2U and 3U CubeSat versions available
- Large Deployed/6U solar panel version (FlexU EPS) available(>80W instantaneous solar power capable)

APPLICATIONS

- CubeSats and Nanosatellites with a power requirement from 1W to 50W Orbit average power

BATTERY

A Clyde Space lithium polymer battery can be integrated with the Clyde Space EPS, as a daughter board on the 1U, 1.5U & 2U EPS and as a standalone board on all others.

TLM/TC

Telemetry and telecommand functionality is handled by a dedicated I2C compatible microcontroller. Telemetry channels include array and battery currents, voltages and temperatures. Telecommands provide reset/run capability on each power bus.



CUBESAT EPS OVERVIEW

With a history of over 150 shipped units, the Clyde Space EPS range offers a complete Power System solution for the full range of CubeSats, from the 1U, through to 3U deployed and 6U form factors. With Battery Charge Regulators, integrated Maximum Power Point Tracking, high efficiency regulated voltages and several protection systems the EPS delivers the maximum power in a robust design to any CubeSat.

BCR

There are multiple Battery Charge Regulators (BCRs) on each EPS. Each BCR can interface to solar panels on opposing sides of the spacecraft (one fully illuminated at any time). Each BCR has a dedicated active Maximum Power Point tracker, ensuring maximisation of solar energy across the orbit.

The BCR uses a high efficiency power stage and is rated to 3W to 12W, scaled to match the connected solar array. A simple charge pump powers the low level electronics from input voltages as low as 3.5V.

PCU

Synchronous rectifiers provide high efficiency DC-DC converters to regulate to 5V and 3.3V from the raw battery voltage at up to 4A per bus. 12V is also available on many models as standard or option.

An automatic light operation provides seamless operation from zero load.

PROTECTIONS

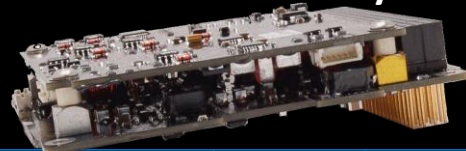
An over-current on any of the power buses triggers the timed disconnection of the power bus in question. An unloading function disables the outputs when the battery voltage is less than 6.5V, re-activating once the battery recovers.



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Trust the CubeSat World Leader to deliver your CubeSat mission power – over 40% of all missions already have...



Variant	BCR Configuration	Height (mm)	Mass (g)	BATT (Whr)	Rad Tol (kRad)	Quiescent Power (W)	BCR Eff	Regulator Efficiency	Operating Temp (°C)
1U EPS	CS-1UEPS2-NB CS-1UEPS2-10 CS-1UEPS2-20	3x 3W SEPIC	12.7 15.4 22.0	83 163 229	- 10 20	10	<0.1	3W - 83%	5V - 96% 3.3V - 95% -40 / +85
1.5U EPS	CS-1U5EPS2-NB CS-1U5EPS2-10 CS-1U5EPS2-20	2x 4.5W SEPIC 1x 3W SEPIC	12.7 15.4 22.0	85 165 231	- 10 20			4.5W - 85% 3W - 83%	
2U EPS	CS-2UEPS2-NB CS-2UEPS2-10 CS-2UEPS2-20	2x 6W B/B 1x 3W SEPIC	12.7 15.4 22.0	87 167 233	- 10 20			6W - 89% 3W - 83%	
3U EPS	CS-3UEPS2-NB	2x 12W BUCK 1x 3W SEPIC	15.3	83				12W - 90% 3W - 83%	
XU EPS	CS-XUEPS2-41	4x 12W BUCK 1x 3W SEPIC	15.3	133				12W - 91%	
	CS-XUEPS2-42	4x 12W BUCK 2x 3W SEPIC	15.3	137				12V - 90%	
	CS-XUEPS2-60	6x 12W BUCK	15.3	139					

POWER DISTRIBUTION MODULE (PDM)

The Clyde Space CubeSat Power Distribution Module enables full control of subsystem and payload activation. With 24 separate power distribution switches each load can be commanded on or off at any given time via an I2C command. Each switch has a current telemetry and over-current protection.

In addition, the PDM can interface to multiple peripheral devices, translating RS442, RS232, or TTL Serial communications on to the main I2C bus.

MAIN FEATURES

- 24 Power switches with selectable voltage (3.3V/5V/12V/VBATT).
- Over current protection.
- Individual current monitoring per switch.
- Individual telecommand control per switch.
- Telemetry channels for up to 30 Analogue signals
- 5 serial interfaces for serial peripherals to I2C connection.
- 40 spare analog channels on main I2C microcontroller.
- Mass 75g (including header)



Clyde Space is ISO9001:2008 certified Perform and inspect conventional and surface-mount solder assembly, repair and modification operations in conformance with; ECSS-Q-ST-70-08, ECSS-Q-ST-70-28 & ECSS-Q-ST-70-38

DESIGN, ASSEMBLY, INTEGRATION AND TEST

To ensure ease of integration with your satellite and mission, Clyde Space provides a detailed 3D model (in .step format) and a detailed user manual with our products as standard. User Manuals and 3D models for standard products can be found at www.clyde-space.com

