



## MAIN FEATURES

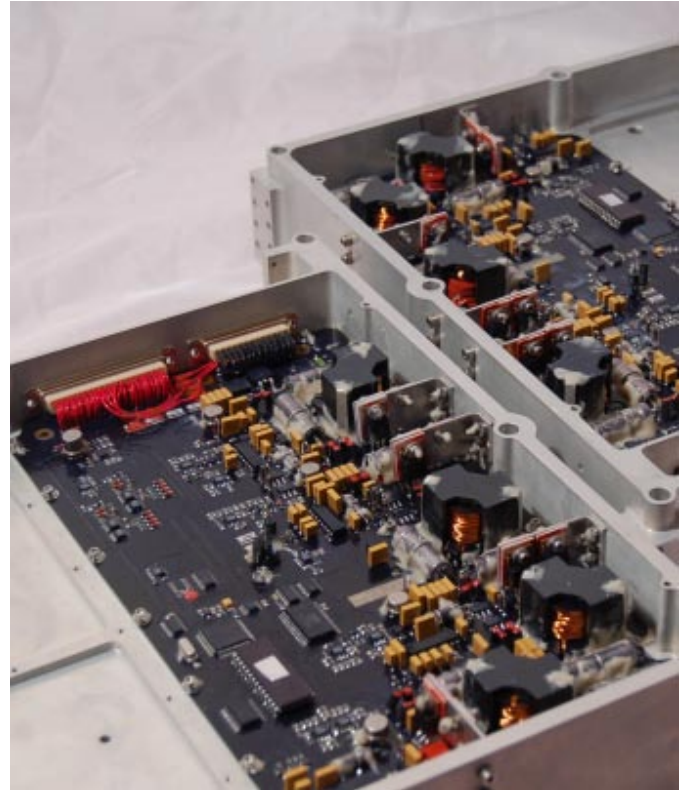
- Non-sequential, modular interface to solar arrays; Permits different cell types/string lengths per interface.
- Effective maximum power point tracking system.
- Battery bus 16 – 35V and 5V regulated.
- Max currents: Battery bus = 15A / 5V bus = 2A.
- Compatible with NiCd, NiMH, Li-ion and Lithium Polymer battery systems.
- Resettable over-current latching power switches.

## APPLICATIONS

- Small satellites with a power requirement from 20W to 300W orbit average power.
- Suitable for LEO and interplanetary environments.

## TRACK RECORD

- Over 20 missions including: Cerise\* ('95), Clementine\* ('99), PICOSat\* ('01), ALSat-1\* ('02), UK-DMC\* ('03), TOPSat\* ('05), BEIJING-1\* ('05), CFESat\* ('07), RapidEye\* ('08) and RASat ('08, Pictured left).



## TECHNICAL DESCRIPTION (see block diagram on next page)

This highly successful power system has not only served over 20 small satellite missions, it is highly modular and delivers excellent performance in most mission configurations. The power system consists of 3 main elements; Battery Charge Regulator (BCR), Power Conditioning Module (PCM) and Power Distribution Module (PDM):

### BCR

Power from each solar panel feeds into a dedicated BCR (i.e. one BCR per solar panel). The BCR output then feeds directly onto a battery bus. This configuration has several advantages:

- Allows the use of different solar cell technologies and string lengths on each panel.
- The maximum power point of an individual panel can be tracked (especially advantageous for multiple aspect array configurations).
- Battery to Bus direct connection providing maximum efficiency during eclipse (essential for frequent and lengthy eclipse periods).

Each BCR also has the ability to be controlled by software.

### PCM

The PCM provides a regulated 5V supply from the raw battery voltage.

An additional function of the PCM is to provide fully-autonomous battery over-discharge protection.

### PDM

The PDM consists mainly of MOSFET based power switches, providing a highly efficient and proven interface to the rest of the spacecraft.

Fuses are also available for essential systems such as receivers.

### TELEMETRY AND TELECOMMAND

A dedicated serial data bus can interface performance telemetry from the power system. This interface is also used to issue telecommands.

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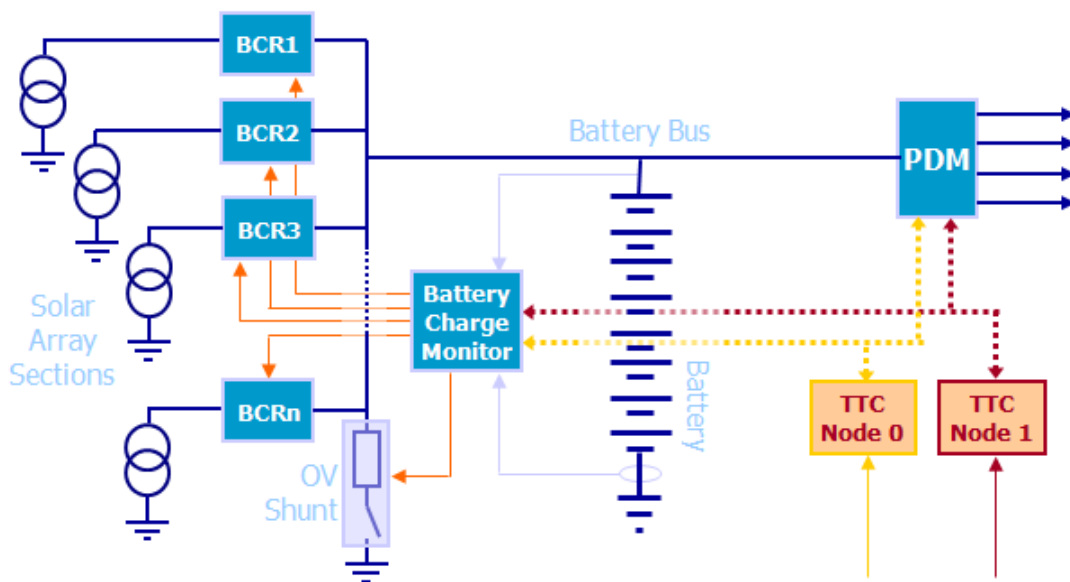


Performance Specifications (Performances can be adapted to mission specific needs).

SYSTEM UNIT	PERFORMANCES
<b>BCR Specifications</b>	O/P Current: 2.5A max. I/P Voltage: 30V – 60V. O/P Voltage: 35V max.
<i>Charge method</i>	Taper charge (constant current/constant voltage). Temperature compensated.
<i>Battery Compatibility</i>	Compatible with Nickel Cadmium, NiMH, Lithium-ion and Lithium Polymer.
<i>MPPT Technique</i>	Estimator based on solar array characteristics over temperature.
<b>PCM Specifications</b>	O/P Current: 2A max. I/P Voltage: 20V - 35V. O/P Voltage: 5V +/-1%.
<b>BCR efficiency versus output power.</b>	
<b>Power System Mass</b>	With 4 BCRs, dual redundant PCM, dual TTC node and 40 switches in PDM: <1.5kg
<b>System Volume</b>	Typical dimensions (for above spec): 300mm (l) x 150mm (w) x 70mm (d)

Please contact us with your specific requirements ([enquiries@clyde-space.com](mailto:enquiries@clyde-space.com)).

## Block Diagram



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