

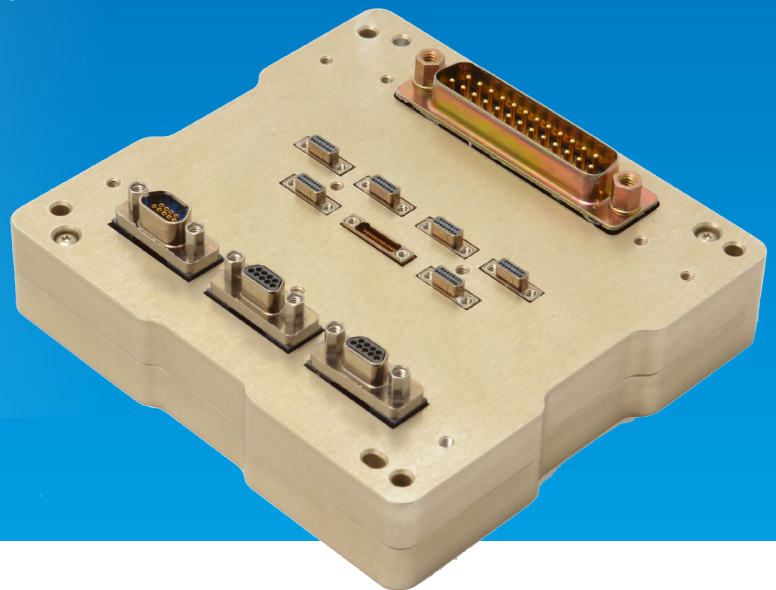
PS-NS01

Nano PCDU

Main Features

- Modular design approach delivers scalability and easy tailoring to mission-specific requirements and custom interfaces
- Reliable high-performance power solution for nanosatellite platforms, originally designed for 6U
- 45 W peak power
- 12 V nominal bus and battery voltage, auxiliary 5 V and 3.3 V outputs
- Individual latching current limiters (LCLs) on all outputs
- Retriggerable LCLs (RLCLs) on system-critical outputs
- FPGA based control and monitoring of all switches and interfaces through RS485
- Six solar array string inputs
- S3R battery charge regulation
- Solar array deployment interface for thermal knife or burn wire
- ITAR free equipment

The AAC-Clyde Nano PCDU (Power Conditioning and Distribution Unit) for nanosatellites is the result of a joint development project between AAC Microtec, the US Air Force Research Laboratory (AFRL), and Swedish Defense Materiel Administration (FMV). The unit was designed for the SPARC-1 6U CubeSat, but it also supports other spacecraft form-factors (e.g. 2U, 3U and larger satellites). The flexible and modular PCDU is designed for mission life up to five years in LEO and implements both power conditioning and distribution of the regulated 12 V battery bus and auxiliary 5 V and 3.3 V outputs. The rigorous testing and extended qualification campaign compliments an innovative design approach that combines COTS and radiation hardened components and optimizes the reliability and performance characteristics of the system.



Dependable technologies

The PCDU design builds on heritage from previous missions with customers such as ESA, NASA, JAXA and other commercial organisations. A number of design features are implemented to achieve optimized reliability characteristics. For example, the use of discrete bipolar design rather than integrated circuits, enables a better characterisation of the system through a more thorough Parts-Stress-Analysis (PSA). Internal supply voltages are current limited with automatic restart and the FPGA design features Triple-Modular-Redundancy (TMR).

Modular design

The PCDU adopts a modular design approach which enables easy customization. Integration of interfaces for deployment mechanisms, magnetic torquers, payloads and other equipment can be added through modular design elements. This approach minimizes the risk of failure and, reduces the additional qualification requirements.

Technical Specifications

General

Design life	5 years in LEO
System power (average)	20 W
System power (peak)	45 W
Primary bus voltage	12 V
Auxiliary bus voltage	5 V and 3.3 V non-isolated
Battery regulation	S3R
Efficiency - Solar Array	>95% S3R regulation
Efficiency – Battery discharge	>94% @ 12 V, 30 W load
Efficiency – Battery charge	<94% @ 2.1 A S/A current
Efficiency – Auxiliary converters	<90% @ 1 A out
Idle power consumption	<1 W
Operating temperature range	-30°C to +60°C
Radiation (TiD)	20 kRAD (qualified >30 kRAD, Si)
Mass	220 g

Dimensions

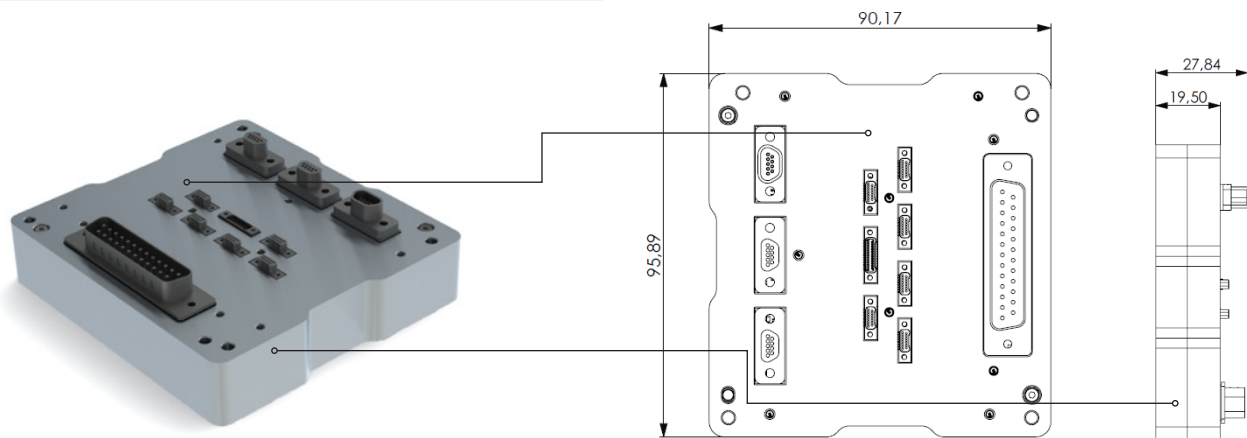
Length	95.89 mm
Width	90.17 mm
Height	27.84 mm

Telemetry and control interfaces

TM/TC	RS485 serial interface Flash-based FPGA controller
Telemetry	Bus voltage Bus current Batter curryent Internal unit temperature Internal unit voltages LCL status
Pulse command reset	RS422 levels
Actuators and thermal knives	Arm and fire actuation strategy

Electrical interfaces

Primary bus outputs	7 individual protection (LCL or RLCL)
Auxiliary bus outputs	2 individual protection (LCL)
Solar array interface	7s6p triple junction panels (nominal)
Battery	120 Wh Li-Ion



For more information, please contact:

ÅAC Microtec AB

Uppsala Science Park
Dag Hammarskjölds väg 48
SE-751 83 Uppsala, Sweden
☎ +46 (0) 18 560 130
✉ info@aacmicrotec.com

AAC Microtec North America, Inc.

5 Berry Patch Ln Columbia
Illinois 62236
USA
☎ +1 (602) 284 79 97
✉ info@aacmicrotec.com

AAC Microtec UK Ltd

Atlas Building, Harwell Campus
Oxfordshire OX11-0QX,
United Kingdom
☎ +44 (0) 7500 93 48 29
✉ info@aacmicrotec.com

Clyde Space

Skypark 5
45 Finnieston Street
Glasgow G3 8JU,
United Kingdom
☎ +44 (0) 141 946 4440
✉ info@clyde.space

