

Power Conditioning and Distribution Unit for 1U CubeSat

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The Power Conditioning and Distribution Unit (PCDU) as an essential part of a Electrical Power System (EPS) of each satellite. It's purpose is to regulate the power coming from solar panels and to manage batteries in order to supply constant power as needed to the satellite electronics.

We have embarked in developing an open source PCDU to be used in 1U (single unit) CubeSats (or larger), that is simple, robust, and reliable.

In brief, the requirements placed on the PCDU are:

- regulate input power from solar panels (up to six connections)
- interface to a Li-Ion battery module, that may uses two Li-Ion cells in parallel to increase capacity and for redundancy.
- integrate system power switch to power off all outputs (e.g. using Kill Switches)
- provide stable 5 Volt output with at least 5 Watt
- provide switchable 5 Volt outputs
- integrate a telemetry and telecommand interface (TMTC IF) to control and monitor the PCDU
- have this TMTC redundant, and switchable via pulse on a select line
- have all modules and units of the PCDU operate in redundancy, such that there is no single point of failure

As one can immediately see, only 5 Volt is provided as power output. This is done purposely, as 3.3V or 2.5V (also used often, such as for on board computer), can be easily drawn from this 5V line via simple low dropout regulators, at those systems that need it. This way, it simplifies the PCDU a lot, and focus can be put on making this 5V line as robust as possible.

In this presentation we present the current status of the developments and show how you can get involved.

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